Assessing the Impact of the Turkey-Syria Earthquake on Global Stock Markets

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Abstract

Using the event study and cross-sectional analysis, we show that the impact of the Turkey-Syria earthquake on the leading stock market indices of 53 nations was not uniform. While the global, European, and developed markets exhibit negative returns on t+1 and t+4, positive returns were observed on t+2 and t+3, indicating that market participants later adjusted their perceptions and expectations of the event. The country-wise analysis suggests that investors' optimistic view leads to positive returns. We show that trade dependence and proximity to the event zone negatively impact returns, while past returns just before the event can predict returns during the event windows.

Keywords: *Earthquake; event study; Turkey; Trade-to-GDP; returns; disasters*

Suggested Citation:
Pandey, D.K., Hassan, M.K., Huda, M. & Khan, M.A. (2023). Assessing the impact of the Turkey-Syria Earthquake on global stock markets. *International Journal of Accounting, Business and Finance, 2* (2), 15-27.

1. Introduction

Major earthquakes can significantly impact local economies, often causing widespread damage to infrastructure and disrupting economic activity (Botzen et al., 2019; Gianfreda & Scandolo, 2013). However, the effects of such disasters can also be felt globally due to disruption in the supply chain, rise in insurance claims, rise in demand for construction goods, and other reasons. The recent earthquakes in Turkey, which had magnitudes of 7.8 and 7.5 on the Richter scale, have claimed more the 43000 lives[1] in Turkey and Syria.

There is limited evidence on how stock markets react to earthquakes. Chen et al. (2023) found that while banks in China significantly react to earthquakes, insurance sector stocks are insignificant to natural disasters. Tao et al. (2019) found a negative impact of the 2011 Tohoku Earthquake on Japanese stock markets. Examining the same event, Valizadeh et al. (2017) found that while some sectors suffered huge losses, others benefitted from the earthquake.

[1] https://www.aljazeera.com/news/2023/2/17/turkey-finds-new-survivors-as-quake-death-toll-crosses-43000

Takao et al. (2013) found that the 2011 Tohoku Earthquake negatively affected the insurance companies' stock returns.

Similarly, Scholtens and Voorhorst (2013) support the negative impact of earthquakes on stock market returns. Yamori and Kobayashi (2002) found negative impacts of the Hanshin-Awaji earthquake on stock returns of insurance companies. However, Tao (2014) found that the stocks in the Sichuan province did not experience any significant impact from the 2013 M7.0 Lushan Earthquake. Yang (2010) argues that owing to the benefits of post-quake reconstruction, the concerned sector stock returns were significantly positive after the May 2012 earthquake in China. The literature examining the association between earthquakes and stock market reactions is limited. Moreover, the extant literature does not agree on how earthquakes impact stock market returns. Furthermore, the extant literature concentrates on the impacts of earthquakes on the local market. Hence, there is a need to examine how global stock markets react to a significant earthquake in a country.

We conduct an event study analysis on the stock indices of 52 countries (23 developed markets and 29 emerging and other markets) to fill the literature gap by focusing on earthquakes' global impact rather than just the local markets. Additionally, we contribute to understanding how different countries may be affected differently by natural disasters. Prior research on the impacts of different events provides that emerging markets are more sensitive to significant events (Boubaker et al., 2022). Hence, we divided the sample into developed and emerging markets to determine if emerging markets reacted similarly to this event. Further, we divided the sample into different regions: Americas, Europe, Middle East and Africa, and Asia-Pacific markets. The study has important implications for investors, policymakers, and other stakeholders interested in understanding the immediate impact of natural disasters on the global financial markets. By shedding light on the complex relationship between earthquakes and stock market returns, this study provides insights that can inform risk management strategies and aid disaster preparedness planning.

The event study analysis reveals heterogeneous effects of the earthquake across various regions and markets. The global, European, and developed markets recorded negative returns on t+1 and t+4. However, these markets also experienced positive returns on the t+2 and t+3, suggesting that the market participants adjusted their perceptions and expectations of the event. Furthermore, the country-wise analysis suggests that investors in some countries were optimistic about their market's prospects, as they experienced positive returns during the event window. In addition, cross-sectional analysis shows that trade dependence and proximity to the event zone had a negative impact on returns during the event window. Additionally, the findings show that past returns can predict returns during the post-event windows, suggesting that historical performance can significantly predict future returns during similar events.

The remainder of the study is as follows: Section 2 discusses a brief review of literature, Section 3 presents the data and methods, Section 4 discusses the quantitative findings, and Section 5 concludes by suggesting future research agendas.

2. Literature review

Natural disasters can potentially cause significant disruptions to economies and societies worldwide. In recent years, researchers have increasingly focused on understanding the impact of these events on financial markets. This literature review aims to overview key studies examining the relationship between natural disasters and financial markets, including stock prices, market volatility, investor behavior, and corporate philanthropic responses.

Several studies have investigated natural disasters' immediate and long-term effects on stock prices. Gianfreda and Scandolo (2013) conducted an event study analysis of the Fukushima nuclear crisis and found evidence of abnormal returns in both energy and agricultural markets. Similarly, Valizadeh et al. (2017) explored the impact of Japan's 2011 earthquake on stock market sector returns and observed significant effects in Japan and trading

partner countries. Brounen and Derwall (2010) compared the effects of terrorist attacks and earthquakes on stock markets and found that price declines following terrorist attacks were more pronounced, albeit temporary, while earthquakes had milder effects.

The relationship between natural disasters and market volatility has also received attention. Matsubayashi and Kamada (2021) investigated the impact of the Great East Japan Earthquake on suicide rates. They found a decline in suicide rates in the affected regions over time, suggesting a possible reduction in market volatility due to improved social safety nets. Sachdeva (2020) examined the behavior of Indian stock prices during turbulent times, including natural disasters, and highlighted the deviation from efficient market behavior. The study revealed that stock prices may respond differently to unexpected events, leading to market anomalies and irrational investor behavior.

Natural disasters often trigger corporate philanthropic initiatives aimed at disaster relief and recovery. Azuma et al. (2023) explored shareholder reactions to corporate philanthropic disaster responses after the 2016 Kumamoto earthquakes in Japan. Their findings indicated that cash donations generated positive shareholder reactions, which could be attributed to signaling the firm's future financial prospects. Papadakis (2006) analyzed the financial implications of supply chain design and found that pull-type supply chains were associated with lower profitability after component price increases resulting from natural disasters, highlighting the risk exposure of certain supply chain configurations.

Greving et al. (2018) examined the emotional content in Wikipedia articles on terrorist attacks and earthquakes. They found that articles on terrorist attacks contained more anger-related content, while articles on earthquakes had more sadness-related content. This highlights the emotional spillover effect on Wikipedia articles and the need to consider emotional aspects in disaster reporting.

The impact of natural disasters on financial markets and insurance companies has been widely studied. Yamori and Kobayashi (2002) explored the market valuation of insurance companies after earthquakes, finding that Japanese earthquakes led to negative stock price reactions for domestic insurance firms, in contrast to previous studies on US earthquakes. Takao et al. (2013) investigated the influence of the Great East Japan Earthquake on insurance companies, noting that stock prices decreased, but non-life insurance companies experienced a lesser decrease than life insurance companies. Chen et al. (2023) extended this analysis by examining the capital market responses of financial firms to various types of natural disasters in China. They found that security companies were more sensitive, experiencing statistically significant negative abnormal returns, while banks responded mainly to earthquakes, and insurance companies showed generally insignificant cumulative abnormal returns.

Mazzocchi and Montini (2001) assessed the economic impact of an earthquake on tourist flows in Umbria, Italy. They found that local arrivals in the affected region fell drastically following the earthquake, resulting in a substantial loss of tourism business. This study highlights the need for economic assessments and mitigation strategies to support affected tourism sectors.

Natural disasters have profound social and health implications. Xiong et al. (2010) investigated an insecticide-associated incident and disease outbreak in China. They emphasized the importance of preventive techniques and training for medical rescue teams to address non-standard operating procedures in pest control that can lead to disease incidents. Wu et al. (2014) examined the impact of the Great Wenchuan Earthquake on the self-concept of adolescent survivors. They found that negative coping strategies and a lack of sense of control were associated with negative self-concepts. This underscores the need for targeted support and interventions to mitigate the psychological effects of disasters on vulnerable populations.

This literature review provides a comprehensive analysis of studies examining the impact of natural disasters on various factors. It highlights the effects of natural disasters on stock prices, market volatility, investor behavior, corporate philanthropic responses, emotional spillover effects in Wikipedia articles, insurance companies, tourism, earthquake prediction, and social and health implications. Understanding the multifaceted consequences of natural disasters is crucial for developing effective mitigation strategies, disaster response plans, and support systems for affected communities. Further research in this field is needed to enhance preparedness and resilience in the face of natural disasters.

Existing studies often focus on major global events or natural disasters in specific regions, leaving a gap in understanding how regional earthquakes can potentially reverberate globally. By addressing this research gap, this study contributes to the literature by providing empirical evidence on the spillover effects of the Turkey-Syria quake on global stock markets. This study aims to enhance our understanding of the interconnectedness of financial markets and the potential transmission channels of regional earthquakes to global investment sentiments. To conduct this study, we employ an event study methodology to analyze stock price movements and market volatility before, during, and after the Turkey-Syria quake. By examining the reaction of global stock markets to this regional earthquake event, we shed light on the extent of the spillover effects and identify any significant changes in investor behavior or market dynamics. Additionally, we consider exploring the heterogeneity of the impact across different sectors or regions, investigating whether certain countries are more susceptible to the shocks caused by the Turkey-Syria quake. This analysis provides valuable insights for investors, policymakers, and risk management strategies.

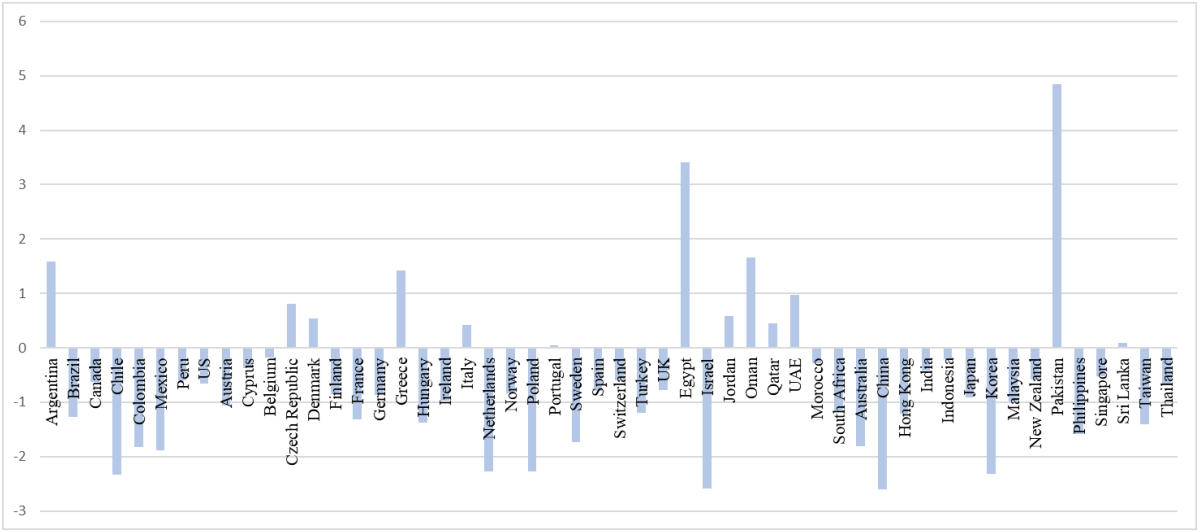

Figure 1. Stock market returns on the event day

3. Data and methods

Our initial sample includes 82 nations (23 developed, 24 emerging, 21 frontier, and 14 standalone markets)[2]. However, owing to the data availability, the final sample includes only 53 indices (23 developed and 30 emerging and other markets) (see Appendix A1). Following Boubaker et al. (2022) and Pandey and Kumari (2021), we use the MSCI All Country World Index (AWCI) has been used as the benchmark index. Figure 1 presents the event-day stock market returns on the event date, indicating that returns for only 11 markets are positive.

[2] We follow the MSCI's market classification to select the sample indices. Daily index prices have been collected from investing.com. Recent event studies have relied on this market classification (Boubaker et al., 2022; Pandey & Kumari, 2021; Pandey et al., 2024).

We follow the Brown and Warner (1985) event study method[3] and use the market model[4] to estimate the abnormal returns (AR) as in Equation (1).

$$AR_{i,t} = LR_{i,t} - (\hat{\propto} + \hat{\beta}.LR_{ACWI,t}) \quad (1)$$

where, $AR_{i,t}$ indicates the AR of the index *i* on day *t*; $LR_{i,t}$ indicates the actual log return (LR) of the index *i* on day *t*; $\hat{\propto}$ and $\hat{\beta}$ are the estimators of the OLS regression model; and $R_{ACWI,t}$ indicates the LR on the benchmark index *ACWI* on day *t*.

$$CAR_{i,T1-T2} = \sum_{t=T1}^{T2} AR_{i,t} \quad (2)$$

where, $CAR_{i,T1-T2}$ indicates the cumulative AR (CAR) of index *i* during the event window (*T1–T2*).

Prior literature argues that Trade-to-GDP (*TGDP*) and proximity to the event (*DIST*) have a significant cumulative impact. Trade symbolizes international dependence and may affect abnormal returns (Abbassi, Boubaker, et al., 2023; Abbassi, Kumari, et al., 2023). Since the Turkey earthquake is expected to disrupt the supply chain and impact trade, we use the log of *TGDP*. Proximity to the event can also impact abnormal returns (Ferreira & Karali, 2015). Hence, we use the log of *DIST*. In addition, since prior literature argues that past returns and volatility significantly drive abnormal returns during the event window (Hassan et al., 2022; Kumari et al., 2022), we control for past returns (*PSTR*) and volatility (*VOL*). We present the cross-sectional regression model in Equation (3).

$$CAR_{i,T1-T2} = \alpha_i + \beta_1 LnTGDP_i + \beta_2 LnDIST_i + \beta_3 PSTR_i + \beta_4 VOL_i + \varepsilon_i \quad (3)$$

where $CAR_{i,T1-T2}$ is as in Equation (2). We define the variables in Appendix A2 and present the empirical model in Figure 2.

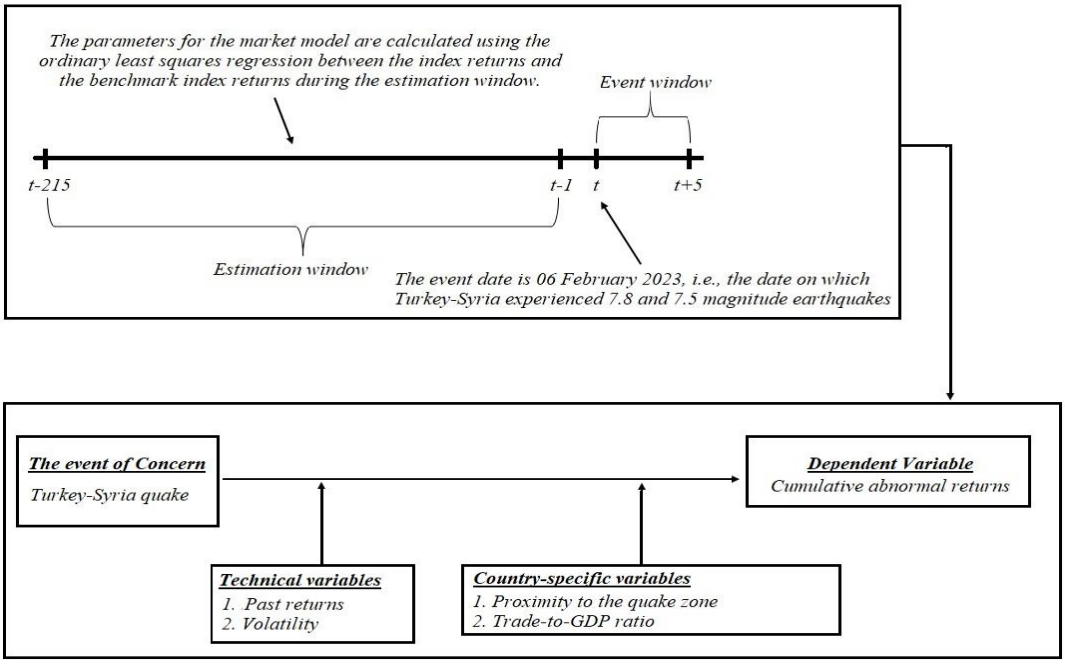

Figure 2. Empirical framework

[3] The event study method is most widely used in finance literature to capture the immediate effect of significant events (Boubaker et al., 2015; Goodell & Huynh, 2020; Jin et al., 2022; Mansley et al., 2023; Nerlinger & Utz, 2022; Pandey, Assaf, et al., 2023; Pandey, Hassan, et al., 2023; Pandey & Kumari, 2021; Wang et al., 2022; Yousaf et al., 2023; Yousaf & Goodell, 2023). We use a 215-day estimation window ranging from t_{-215} to t_{-1}, and a 6-day event window from t_0 to t_{+5}.

[4] Market model is the most widely used estimation model in event studies.

4. Quantitative results

Table 1 reports the findings of the event study analysis for different samples. The average abnormal returns (AAR) for the global (52 indices) and European markets (21 indices) is significantly negative (positive) on t+1 and t+4 (t+2 and t+3). This aligns with previous studies such as Gianfreda and Scandolo (2013) and Valizadeh et al. (2017) that found negative abnormal returns in energy and agricultural markets following the Fukushima nuclear crisis and the impact of Japan's earthquake on stock market sector returns. The developed markets (23 indices) experienced significant negative (positive) abnormal returns on t+4 (t+2 and t+3). These findings are consistent with Brounen and Derwall (2010), which found that terrorist attacks had a more pronounced but temporary negative effect on stock markets than earthquakes. The AARs for the Asia-Pacific markets (15 indices) are significantly negative on t+4 and t+5. The Americas (8 indices) and Middle East & African markets (8 indices) are insignificant to the event. These findings suggest that the event's impact was not uniform across different regions and markets. The negative abnormal returns evident in the global, European, and developed markets on t+1 and t+4 may indicate that the event had a negative impact on investor sentiment in these regions. Further insights can be drawn from the cross-sectional analysis. Additionally, the positive abnormal returns observed on t+2 and t+3 may suggest that the market participants later adjusted their perceptions and expectations of the event, leading to positive outcomes in the short term, as evidenced in Yang (2010). Although it is evident that emerging markets are not sensitive to earthquakes, future research should focus on providing supporting evidence.

Table 1. Average abnormal returns during the event window for different samples

Days	Global	Developed	Emerging	Americas	Europe	MEA	Asia-Pacific
t	-0.02	-0.09	0.03	0.57	-0.25	0.52	-0.36
	(-0.15)	(-0.47)	(0.12)	(1.32)	(-1.11)	(1.47)	(-1.12)
t+1	-0.47***	-0.38**	-0.54**	-0.36	-0.76***	-0.22	-0.28
	(-3.07)	(-1.97)	(-2.38)	(-0.84)	(-3.41)	(-0.62)	(-0.89)
t+2	0.57***	0.50**	0.62***	0.59	0.85***	0.20	0.38
	(3.68)	(2.57)	(2.71)	(1.37)	(3.82)	(0.57)	(1.19)
t+3	0.34***	0.27	0.40*	-0.62	0.93***	0.14	0.16
	(2.24)	(1.41)	(1.75)	(-1.44)	(4.20)	(0.40)	(0.49)
t+4	-0.31**	-0.49	-0.16	0.13	-0.61***	-0.11	-0.23
	(-1.99)	(-2.52)	(-0.72)	(0.30)	(-2.74)	(-0.31)	(-0.73)
t+5	-0.04	0.00	-0.07	0.17	0.27	-0.05	-0.57*
	(-0.25)	(0.02)	(-0.31)	(0.39)	(1.21)	(-0.14)	(-1.80)

Notes: This table presents the average abnormal returns for different markets. t-values are presented in parentheses. *, **, and *** indicate p-values less than 0.10, 0.05, and 0.01, respectively.

Table 2 presents the country-wise CARs of the event and post-event windows. China, Egypt, and Korea, among the emerging markets, and Argentina and Pakistan, among the frontier and standalone markets, experienced a significant event-day impact on their stock indices. While the event-day impact was negative for China and Korea, it was positive for Egypt, Argentina, and Pakistan. While the stock indices of Austria, Chile, China, Czech Republic, Egypt, Hungary, Italy, Korea, Norway, Pakistan, and Morocco experience significant positive CARs during the event window [+1,+3], those of the Philippines, Qatar, and Argentina evidence significant negative CARs. The positive results indicate that the investors in these countries were optimistic about the prospects of these markets. While Austria, Chile, Czech Republic, Egypt, Hungary, Norway, Pakistan, and Morocco continued to experience significant positive CARs during the event window [+1,+5], the Philippines and Qatar continued to experience significant negative CARs.

Table 2. Country-wise cumulative abnormal returns for different event windows

Developed markets				Emerging markets			
Country	**0,0**	**+1,+3**	**+1,+5**	**Country**	**0,0**	**+1,+3**	**+1,+5**
Australia	0.04	-0.71	-1.86	Brazil	0.69	-0.58	0.02
	(0.04)	(-0.45)	(-0.90)		(0.55)	(-0.27)	(0.01)
Austria	-0.01	3.41**	1.93	Chile	-0.17	0.51	0.34
	(-0.01)	(2.19)	(0.96)		(-0.13)	(0.23)	(0.12)
Belgium	0.15	0.89	0.01	China	-0.64	0.88	1.17
	(0.12)	(0.40)	(0.00)		(-0.83)	(0.66)	(0.69)
Canada	0.23	-0.17	-0.05	Colombia	1.10	-1.98	-2.02
	(0.32)	(-0.13)	(-0.03)		(0.60)	(-0.62)	(-0.49)
Denmark	0.91	1.37	1.72	Czech Republic	0.23	2.52***	3.02***
	(1.56)	(1.36)	(1.32)		(0.48)	(3.03)	(2.82)
Finland	-0.13	0.80	0.21	Egypt	1.90***	5.41***	2.66*
	(-0.13)	(0.45)	(0.09)		(2.90)	(4.76)	(1.81)
France	-0.65	0.51	0.32	Greece	0.35	3.63	4.85
	(-0.56)	(0.26)	(0.13)		(0.18)	(1.10)	(1.14)
Germany	-0.08	0.96	-0.35	Hungary	-0.92	2.48	2.91
	(-0.12)	(0.87)	(-0.25)		(-1.04)	(1.62)	(1.48)
Hong Kong	-1.58	1.82	-0.58	India	-0.29	0.38	-0.45
	(-1.29)	(0.85)	(-0.21)		(-0.36)	(0.27)	(-0.25)
Ireland	0.06	-0.85	-2.51	Indonesia	-0.35	0.34	0.29
	(0.06)	(-0.46)	(-1.06)		(-0.68)	(0.38)	(0.25)
Israel	0.02	-1.36	-0.39	Korea	-1.31	1.86	0.58
	(0.02)	(-0.71)	(-0.16)		(-1.19)	(0.97)	(0.24)
Italy	-0.35	0.59	0.56	Malaysia	-0.89	0.14	0.65
	(-0.36)	(0.35)	(0.26)		(-0.33)	(0.03)	(0.11)
Japan	1.00	-0.46	-1.23	Mexico	-1.20	-1.04	-1.13
	(0.49)	(-0.13)	(-0.27)		(-1.46)	(-0.73)	(-0.61)
Netherlands	-0.71	0.47	0.74	Peru	0.91	0.31	-1.21
	(-0.91)	(0.35)	(0.42)		(1.53)	(0.30)	(-0.92)
New Zealand	-0.35	-0.33	-0.58	Philippines	-1.08	-1.37	-1.53
	(-0.24)	(-0.13)	(-0.18)		(-1.26)	(-0.93)	(-0.80)
Norway	-0.48	3.40*	3.42	Poland	-1.08	1.71	-0.76
	(-0.43)	(1.77)	(1.38)		(-1.52)	(1.39)	(-0.48)
Portugal	0.18	0.32	-0.47	Qatar	0.83	-2.39	-2.57
	(0.22)	(0.23)	(-0.25)		(0.80)	(-1.32)	(-1.11)
Singapore	0.20	-0.79	-1.91	Saudi Arabia	0.30	-1.11	-0.03
	(0.23)	(-0.54)	(-1.00)		(0.20)	(-0.44)	(-0.01)
Spain	-0.15	0.75	0.01	South Africa	-0.19	0.54	-0.27
	(-0.12)	(0.36)	(0.00)		(-0.18)	(0.3)	(-0.12)
Sweden	-0.86	-1.22	-1.81	Taiwan	-1.58*	1.80	1.75
	(-0.82)	(-0.67)	(-0.77)		(-1.75)	(1.15)	(0.87)
Switzerland	-0.05	-0.54	-0.82	Thailand	-0.12	-0.82	-1.22
	(-0.05)	(-0.29)	(-0.34)		(-0.08)	(-0.31)	(-0.35)
UK	-0.39	0.82	0.98	Turkey	-1.26	-1.05	0.21
	(-0.28)	(0.33)	(0.31)		(-1.19)	(-0.57)	(0.09)
US	0.93	-0.64	0.45	UAE	0.87	0.06	-0.04
	(0.8)	(-0.32)	(0.17)		(1.04)	(0.04)	(-0.02)
				Kuwait	0.35	-0.69	-0.83
					(0.95)	(-1.10)	(-1.02)
Frontier and standalone markets							
Pakistan	1.89**	3.14**	1.38	Jordan	0.38	0.52	1.71
	(2.29)	(2.20)	(0.75)		(0.40)	(0.31)	(0.79)
Argentina	2.06**	0.45	2.86	Oman	0.26	0.17	-0.54
	(2.34)	(0.29)	(1.45)		(0.28)	(0.1)	(-0.26)
Lithuania	0.06	0.53	0.15	Sri Lanka	-0.26	-2.10	-4.74*
	(0.08)	(0.42)	(0.09)		(-0.23)	(-1.06)	(-1.86)

Notes: This table presents the cumulative abnormal returns for the sample nations. t-values are presented in parentheses. *, **, and *** indicate p-values less than 0.10, 0.05, and 0.01, respectively.

Concomitantly, Colombia, Germany, Ireland, Peru, Sweden, and Oman experienced significant negative CARs during the event window [+1,+5], and Argentina experienced a significant positive CAR, indicating market recovery from a negative CAR in [+1,+3]. The results are partly in line with Ferreira and Karali (2015), Tao (2014), Tao et al. (2019), Yamori and Kobayashi (2002), and Yang (2010).

Table 3 presents the findings of the cross-sectional analysis. *TGDP* and *DIST* significantly drive abnormal returns on the event date. The event day results support that trade dependence negatively affects returns (Boubaker et al., 2022). Concomitantly, *DIST* continues to negatively drive the CARs in [+1,+3. In line with prior research, *PSTR* significantly predicts returns during the event windows [+1,+3] and [+1,+5].

To summarize, the cross-sectional analysis suggests that *TGDP*, *DIST*, and *PSTR* are significant factors that drive abnormal returns around the event date. Trade dependence negatively affects returns, while proximity to the event zone negatively impacts returns. Additionally, investors can benefit from following past returns just before the event. These results provide insights for investors interested in developing investment strategies around political elections, major economic announcements, or natural disasters.

Table 3. Results of the cross-sectional analysis

Variables	**[0,0]**	**[+1,+3]**	**[+1,+5]**
LnTGDP	-0.65**	-0.75	-0.54
	(0.31)	(0.53)	(0.51)
LnDIST	-0.52**	-0.66*	-0.58
	(0.23)	(0.39)	0.38
PSTR	-0.09	3.10*	3.53**
	(0.91)	(1.54)	1.48
VOL	0.42	0.24	-0.16
	(0.39)	(0.67)	(0.54)
Adjusted R^2	0.1032	0.1084	0.1043
Obs.	50	50	50
F-stat	2.41**	2.49**	2.43**

Notes: This table presents the coefficients of the regression model. Standard errors are presented in parentheses. * and ** indicate p-values less than 0.10 and 0.05, respectively.

The findings of the event study analysis are robust to estimation windows of different lengths. Additionally, we compare the test statistics of a non-parametric test (Ataullah et al., 2011; Corrado, 1989), and find the results similar to the parametric estimates. Regarding the cross-sectional analysis, the model is robust to multicollinearity because no significant correlation exists between the independent variables, and the variance inflation factor is within acceptable limits.

5. Conclusions

Using the event study analysis, we find that the event's impact was not uniform across different regions and markets. While the global, European, and developed markets exhibit negative returns on t+1 and t+4, positive returns were observed on t+2 and t+3, indicating that market participants later adjusted their perceptions and expectations of the event. The country-wise analysis suggests that investors in some countries were optimistic about the prospects of their markets. Through the cross-sectional analysis, we show that trade dependence and proximity to the event zone negatively impact returns, while past returns just before the event can predict returns during the event windows.

These findings provide insights for investors interested in developing investment strategies around significant events. First, the event study analysis reveals that the impact of

the Turkey-Syria quake was not uniform across different regions and markets. Investors should consider the specific regional dynamics and diversify their portfolios across various markets to mitigate the potential adverse effects of regional earthquakes. Second, the negative abnormal returns observed in the global, European, and developed markets on t+1 and t+4 suggest a negative impact on investor sentiment in these regions. Market participants should closely monitor investor sentiment following regional earthquakes and consider adjusting their investment strategies accordingly. Third, the positive abnormal returns observed on t+2 and t+3 indicate that market participants adjusted their perceptions and expectations of the event later. Investors should be aware of these short-term adjustments and carefully analyze market dynamics to capitalize on potential positive outcomes. Fourth, the country-wise CARs provide insights into the specific impacts of the Turkey-Syria quake on individual countries' stock indices. Investors interested in these countries, such as China, Egypt, Korea, Argentina, and Pakistan, should closely monitor their respective stock markets and consider incorporating these findings into their investment decisions. Fifth, the cross-sectional analysis highlights the significance of trade dependence (TGDP) and proximity to the event zone (DIST) in driving abnormal returns. Investors should consider countries' trade relationships and geographic proximity to the event zone when assessing the potential impact of regional earthquakes on their investments. Lastly, the findings suggest that investors benefit from considering past returns just before the event. Historical performance may provide valuable insights for developing investment strategies around political elections, significant economic announcements, or natural disasters.

Table 4. Parametric and non-parametric test-statistics

Days	Global		Developed		Emerging		Americas	
	C	T	C	T	C	T	C	T
t	-1.01	-0.15	-0.94	-1.06	-0.51	0.01	0.41	0.16
t+1	-2.09**	-1.98**	-2.03**	-1.53	-1.00	-0.05	-1.50	-1.19
t+2	4.05***	3.22***	2.20**	1.90*	0.46	0.09	1.60	1.49
t+3	1.43	2.35**	1.85*	1.88*	0.26	0.05	-1.80*	-1.33
t+4	-2.58***	-2.49**	-3.12**	-3.05**	-0.68	-0.04	0.88	-0.19
t+5	0.02	-0.16	0.37	-0.14	-0.31	0.00	1.42	1.27

Days	Europe		Middle East & Africa		Asia-Pacific	
	C	T	C	C	T	C
t	-0.73	-0.48	1.24	1.53	-0.23	-1.00
t+1	-2.71***	-3.30***	0.45	0.51	0.08	0.39
t+2	3.36***	2.74***	0.95	0.79	1.70*	1.22
t+3	2.46**	3.28***	0.06	1.05	1.03	1.32
t+4	-2.70***	-1.75*	-0.49	-0.90	-1.91*	-1.92*
t+5	1.64	1.19	-0.62	-0.78	-2.50**	-2.00**

Notes: This table presents the Corrado (C) values and the t-values (T) for different samples. *, **, and *** indicate p-values less than 0.10, 0.05, and 0.01, respectively.

These findings emphasize the importance of considering regional variations, investor sentiment, short-term market adjustments, country-specific impacts, trade dependence, proximity to the event zone, and historical performance when making investment decisions in the aftermath of regional earthquakes. Policymakers can also utilize these insights to formulate strategies to mitigate the potential adverse effects of such events on financial markets and investor confidence. Future research should follow Gianfreda and Scandolo (2013) to examine the impacts on agricultural commodities, and Scholtens and Voorhorst (2013), Yamori and Kobayashi (2002), and Yang (2010) to examine the impacts of the earthquake on the domestic

stock market. Additionally, the long-term impact of the earthquake can provide further insights into the dynamics of global stock markets.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding information

The author declared no financial support for the research, authorship, and/or publication of this article.

Acknowledgments: None

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Appendix A1. Sample nations

Americas (8)		**Europe (21)**		**Middle East and Africa (9)**		**Asia-Pacific (15)**	
Country	**Index**	**Country**	**Index**	**Country**	**Index**	**Country**	**Index**
Argentina	MSCI Argentina	Austria	DJ Austria	Egypt	MSCI Egypt	Australia	MSCI Australia USD
Brazil	MSCI Brazil	Belgium	MSCI Belgium	Israel	MSCI Israel	China	MSCI China NET USD
Canada	MSCI Canada	Cyprus	DJ Cyprus 10 Titans	Jordan	MSCI Jordan	Hong Kong	MSCI Hong Kong
Chile	MSCI Chile	Czech Republic	MSCI Czech Republic	Oman	MSCI Oman	India	MSCI India
Colombia	MSCI Colombia	Denmark	MSCI Denmark	Qatar	MSCI Qatar	Indonesia	MSCI Indonesia
Mexico	MSCI Mexico	Finland	MSCI Finland	UAE	MSCI United Arab Emirates	Japan	MSCI Japan
Peru	MSCI Peru	France	MSCI France	Morroco	MSCI Morocco	Malaysia	MSCI Malaysia
United States	MSCI US NET USD	Germany	MSCI Germany	Saudi Arabia	MSCI Saudi Arabia	New Zealand	MSCI New Zealand
		Greece	MSCI Greece	South Africa	MSCI South Africa	Pakistan	MSCI Paksitan
		Hungary	MSCI Hungary			Philippines	MSCI Philippines
		Ireland	MSCI Ireland			Singapore	MSCI Singapore
		Italy	MSCI Italy			Korea	MSCI Korea
		Netherlands	MSCI Netherlands			Sri Lanka	MSCI Sri Lanka
		Norway	MSCI Norway			Taiwan	DJ Taiwan
		Poland	MSCI Poland			Thailand	MSCI Thailand
		Portugal	MSCI Portugal				
		Spain	MSCI Spain				
		Sweden	MSCI Sweden				
		Switzerland	MSCI Switzerland				
		Turkey	MSCI Turkey				
		United Kingdom	MSCI United Kingdon				

Notes: This table presents the sample nations indicating the indices used for the analysis.

Appendix A2. Variable definitions

Variable	Abbreviation	Description	Data Sources
Cumulative abnormal return	*CAR*	The cumulative abnormal return over the 3-day and 5-day event windows.	Calculated using Equation (2)
Trade-to-GDP ratio	*LnTGDP*	The level of trade to the country's GDP as of 2021.	https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS
Proximity to the quake	*LnDIST*	The natural log of the distance of the sample countries from Turkey in kilometers.	https://www.distancefromto.net
Past Returns	*PSTR*	Average returns of the last 20 days before the earthquake event.	Based on price data from investing.com
Volatility	*VOL*	The standard deviation of the stock market returns during the estimation window	Based on price data from investing.com

Notes: This table defines all variables used in the study.