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Navigating Geo-political Turbulences: The Resilience of NSE ESG Index – An Event Study

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Abstract

The Efficient Market according to the hypothesis, the stock market can be greatly impacted by geopolitical crises. This research attempts to look into the effects of geopolitical tensions, specifically focusing on the Russia-Ukraine War, the Israel-Hamas conflict, and the Red Sea crisis to evaluate the resilience of the NSE ESG Index. The research has been undertaken using, paired sample t-test to examine whether geopolitical tensions had any discernible impact on the NSE ESG. In the majority of cases analysed, geopolitical tensions failed to significantly influence the NSE ESG Index, highlighting its stability and superiority of NSE ESG in the face of external geopolitical factors.

Keywords: *NSE ESG Index, Geo-political events, Resilience, Red Sea crisis, Israel- Hamas war, Russia Ukraine war.*

Introduction:

The question whether a geopolitical crisis has adverse effect on a particular stock market index has been of vital interest for investors for a long time. The event research methodology has been used more often than not to determine how an event affected a specific stock market index. This study analyses the impact of geopolitical conflict on the NSE ESG index. With the awareness towards environment pollution and social ill deeds now a day's investors are inclined towards socially responsible investments, the return through which gives a feeling of satisfaction of fulfilling the individual responsibilities towards the society. Broadening the vision, some of the companies by taking initiative publish their sustainability performance reports by following the ESG principles (Hoti et al., 2005). The purpose of the Nifty 100 ESG Index is to represent the performance of the business in the index by using the environmental, social, and governance (ESG) risk score. Each index component's weight is skewed according to the company's ESG risk score; that is, the weight of each constituents is determined by the company's free float market capitalization and modified ESG risk score. (Sandeep Singh., 2020). Similar research in the area have found out remarkable effect of the Geo political turbulences on the stock market barring some of the exceptional cases. However, this research is evidence to the fact that Geo political turbulences might fail to negatively impact an index which has stock market Resilience due to the unique characteristics that it has.

Rationale behind the Study:

The justification for studying the resilience of the NSE ESG Index during geopolitical turbulences is rooted in the growing significance of sustainability-focused investments and their performance under market stress. Geopolitical events, such as wars, sanctions, and diplomatic tensions, often lead to heightened market volatility, creating uncertainty for investors. Given the global shift towards

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Governance, Environmental anqqd Social, (ESG) investing, analysing how green indices like the NSE ESG behave during such occurrences can reveal information about the defensive capabilities of sustainable assets. Research has shown that ESG indices tend to be less vulnerable to external shocks, as they prioritize long-term stability and resource efficiency, making them relatively insulated from crises that may impact traditional, resource-intensive industries (Bialkowski, Gottschalk, & Wisniewski, 2008). Furthermore, studies suggest that green companies, by focusing on energy efficiency and reduced environmental impact, are better equipped to navigate disruptions in global energy markets that often accompany geopolitical turbulence (Sadorsky, 2012). Additionally, examining the resilience of sustainability-focused investments in developing nations such as India, where the NSE ESG operates, can highlight whether green investments offer a stable investment option during times of heightened risk (Lehtonen, 2020). It is sometimes thoughts that the market is efficient, which means that stock prices reflect the totality of all available information, including previous information held by both private and public entities. In this regard, the event research would describe how investors react to new information and how it affects the firms' value. Any new information or occurrence is immediately and objectively seized by the market, which then explains it in the current market price.

Literature Review:

Event Studies:

Kothari & Warner, (2006) Event studies provide fresh data demonstrating how the characteristics of event sample firms, including volatility; can influence the properties of event research techniques, which can differ by calendar period. According to Binder (1998) Using event studies as a regular methodology in financial and strategic economic research has made it possible to quantify how an event affects share prices. El Ghoul et al., (2023) Importance of selecting an event, deciding on a study period (Short vs. Long term), estimating abnormal returns, determining statistically whether the event in question results in a stable price reaction, and investigating the contribution of formal and informal institutions to the explanation of cross-national variations in price reaction should be remembered. Reeb et al. (2012) The event study, also referred to as the event study method (ESM), is an empirical technique designed to capture the financial impact of an event by examining how the stock values responded to the announcement of the event (Campbell, Lo & MacKinlay, 1997; McWilliams & Siegel, 1997). A method of event study, “determines whether there is an ‘abnormal’ stock price effect associated with an unanticipated event. From this analysis the researcher can infer the significance of the event”. McWilliams and Siegel (1997) The generalized sign test's power and specifications, which are based on the proportion of positive abnormal returns throughout an estimating period, are documented elsewhere. The generalized sign test is used in simulations with daily stock return data that include both listed exchanges and NASDAQ equities. Arnold R. Cowan (1992)

Several event studies have proved that major events like war, economic distress, allies of nations, international events will have significant influence on the performance of the Stock markets across the globe. The most widely used approaches reject the null hypothesis of zero average abnormal return too often when it is true, even though they are quite powerful when it is incorrect, when an event results in even slight increases in variance. Ana Paula Serra (2002) records the responses of investors to information changes that impact their assessment of the impacted companies' future earnings, i.e., how the stock market views (and reacts to) changes in the impacted companies' future profit stream. Ekkehart Boehmer, Jim Masumeci, Annette B. Poulsen (1991) Since stock prices are thought to represent all information that is accessible to the general public, they only fluctuate in reaction to information that investors are unaware of. (Fama, Fisher, Jensen, & Roll, 1969). The researcher searches for proof of an "abnormal return" (AR), which represents the event's unexpected financial impact on the firm's worth. The daily ARs are combined and referred to as "cumulative abnormal returns," or CARs, over time periods greater than a day (also known as "event windows"). (Brown & Warner, 1980, 1985).

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By comparing actual and expected returns—which are calculated using data and modeling before the event window, or "estimation window"—it is possible to determine whether the stock market response is anomalous. (McWilliams & Siegel, 1997). In general, event studies face minimal challenges when using daily data. Usually, standard operating procedures are clearly defined, even in cases when unique daily data characteristics are ignored. Stephen J. BROWN Jerold B. WARNER (1985) Although they can vary, the short-term and long-term effects are constant, indicating that strategic implementation is also crucial (Zollo & Meier, 2008). ESM is also perfect for researching events that impact a large number of firms and maybe finding firm behaviors and characteristics as well as market variables that have a differential impact on investors' responses to different firms. Analysing the effects of macro-shocks like natural catastrophes or foreign currency crises is another use of ESM (King, 2015). Firm announcements on new product launches, mergers and acquisitions, new market entry, etc., or announcements from other entities, such as governments, regulatory authorities, and rivals, may be included in ESM-related corporate events at the micro level and in the marketing discipline. Warren, Ertekin, and Sorescu (2017). The ESM gives an objective assessment of company performance by concentrating on stock prices. A thorough literature study on the ESM was conducted by (Fama, Fisher, Jensen, & Roll, 1969), and their findings provide a solid conceptual grasp of how the ESM might be applied in marketing research. Research in accounting and finance has increasingly employed the ESM to analyse how different events affect company stock prices (Cowan, 1992).

In contrast to the domains of accounting, finance, and management, the ESM's application in marketing research has grown over time (Binder, 1998; Boyd, Chandy, & Cunha, 2010; Corrado, 2011; Ball & Brown, 2013), although it remains glaringly low (Beckers, van Doorn, & Verhoef, 2017). In fields of importance to IB research, like internationalization, ESM has been widely embraced in accounting, economics, and finance (Sorescu et al., 2017; Das, McNeil, Pouder, & Daly, 2020). The stock market's assessments of (and investment responses to) rises and decreases in the future profit stream of the impacted firms are captured by ESM, which also records investors' responses to information changes that impact their assessment of the firms' future profits. Stock prices are thought to represent all information that is known to the public, therefore they only fluctuate when new information that investors are not aware of is released (Doukas & Travlos, 1988). When researchers are unable to witness the financial details, an event study can use high-frequency data to estimate the expected impact of new information, such as a new joint venture or a CEO's termination package. ESM, for example, has been applied to evaluate strategic choices (Merchant & Schendel, 2000).

ESM has a number of significant drawbacks. First and foremost, ESM is limited to listed (i.e., publicly traded) companies. Because there is no stock market data for privately held or fully state-owned companies, the approach cannot be used to them. However, listed but partially state-owned businesses (often known as hybrid or mixed businesses) can use ESM (Carvalho & Guimaraes, 2018). ESM assumes that stock markets are informational efficient, meaning that the price of a company's shares completely reflects all publicly accessible information pertinent to its prospects for the future, both before and after the announcement. ESM is also perfect for researching events that impact a large number of firms and maybe finding firm behaviors and characteristics as well as market variables that have a differential impact on investors' responses to different firms. Examining the effects of macro-shocks like natural catastrophes or foreign currency crises is another application of ESM (Fama et al., 1969). Country returns have an impact on a company's stock market performance. Therefore, modifications for financial integration and international trade may be necessary when using ESM in a multi-country context (Park, 2004).

The Russia Ukraine War:

P G., Kumar K, S., & C. Bhat, D. (2022) Using the Nifty-50 index as a base, this study aimed to comprehend and analyse the crisis's effects between

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Russia and Ukraine on the Indian stock market. The Event Study is used in this investigation for analysing changes in the Nifty-50 indices during a 16-day period (8 days of estimation and 8 days of observation) from February 8, 2022, to March 4, 2022. Sanath Kumar K, (2022) Russia's meagre 1% share of India's overall trade would hardly have an impact. The main worry, though, is the indirect effect—through the markets. Increased costs will undoubtedly hinder demand and consumption. The impact of the Russia-Ukraine war on metal index returns is explained by the event research approach, which looks at changes in index prices to demonstrate how an event influences market returns beyond expectations.

Ten days are taken for the pre-event and ten days for the post-event phases of the event study. Cohen& Ewing, (2022) Countries worldwide are barely recovering from the economic impact of the covid-19 pandemic, the recent 2022 Russia attack on Ukraine could worsen the situation as global economies may witness yet another rise in commodity prices and 'supply chain chokeholds.' Wang et al. (2022) evaluated the transmission of yields and commodity volatility in the period of war in Ukraine and show that return spill overs increase. During conflict, crude oil was a net transmitter of the return, while wheat and soybeans clearly receive the return spill overs. The spill over index volatility rises from less than 35% to 85% immediately after the beginning of the war. Umar et al. (2022) investigated the impact of geopolitical risk, GPR, generated by the Russia–Ukrainian conflict on both European and Russian bond, equity and commodity markets. The results "indicate that most assets show a mix of negative and positive relationship with GPR" and therefore this produces changes in asset returns under normal market conditions. Tosun and Eshraghi (2022) documented a statistically and economically significant market sanction imposed by investors on Reminders, which they attribute to "negative sentiment regarding companies that maintained their trade ties with Russia" after the February 2022 invasion. The Russian–Ukrainian military conflict resulted in a marked increase in geopolitical risk, and the economic sanctions imposed on Russia have damaged its economy.

The Israel Hamas War:

Martins, (2023) The impact of the terrorist attack by Hamas against Israel on October 7, 2023, on the global bond, equities, and commodities markets was investigated in this study using the event study approach. The findings indicate that the Middle East area is the only region with negative anomalous returns in the global equities markets. The three largest economies in the world—China, Europe, and the US—presented negligible anomalous returns. On the plus side, producers of natural resources who anticipate a short-term boost in commodity prices are benefiting from the rise in geopolitical risk. Ultimately, the findings demonstrate the presence of negative abnormal short-term returns in the bond markets. Sameer Patil (2023) The outbreak of Israel-Hamas hostilities, following the latter's deadly raid on 7 October 2023, has sparked never-before-seen violence in the Gaza Strip. The involvement of external powers, coupled with the regional powers' pursuit of geopolitical ambitions through proxies, threatens the fragile stability of West Asia. However, beyond the geopolitical implications lurks the threat of terrorist violence and radicalisation. Shambhavi Naik (2023) The paper concluded that The Israel-Hamas conflict will have a negligible impact on biotechnology in India. However, if the war continues, there might be an opportunity for India to attract international players to set up R&D or manufacturing units. India needs to create incentives to facilitate the entry and establishment of these players. O'Donnell & Centre for European Reform., (2008) The EU has to put everything on the line to help this most recent effort to put an end to the Israel-Hamas war. However, it should also push for fresh policies, especially with regard to Hamas, from its allies, especially the US and Israel.

The Red Sea Crisis:

Theo Notteboom et al., (2024) explain The Red Sea crisis is expected to have varied impacts on different industries in India, with potential disruptions in trade routes and delays in delivery of goods affecting sectors such as capital goods, crude imports, fertiliser exports, steel, pharmacy, and textiles. However, the textiles industry is unlikely to be significantly impacted. Findings shows that

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disruption in trade routes due to the Red Sea conflict is causing delays and driving up costs, impacting various sectors including capital goods, crude imports, fertiliser exports. The steel sector and textiles industry are not expected to be significantly impacted. Notteboom et al., (2024) Authors have undergone an analysis of the ongoing Red Sea crisis, its impact on shipping and trade, the challenges faced by shippers, and the potential risk of inflationary pressures if the security situation does not improve significantly. Findings Shows that The Red Sea crisis has significantly disrupted shipping and logistics, affecting inter oceanic passages and routes due to a series of weather anomalies, military conflicts, and nautical accidents. The attacks by the Houthi militia have led to a dramatic reduction in trade through the Suez Canal, with shipping lines rerouting their vessels around the Cape of Good Hope.

NSE Nifty 100 ESG Index:

Research on ESG indices like the Nifty 100 ESG Index often examines whether ESG-focused portfolios can offer competitive returns. For instance, Kumar & Sharma (2021) analysed how ESG indices perform relative to traditional benchmarks, suggesting that ESG indices can match or even outperform non-ESG counterparts under certain market conditions due to increased investor demand for sustainable assets. Similarly, Singh et al. (2022) explored how ESG investments are perceived as safer in times of market volatility, potentially reducing downside risks.

The literature also discusses how the Nifty 100 ESG Index promotes better corporate governance standards. According to research by Balasubramanian et al. (2020), firms in the index are encouraged to adopt better governance and transparency practices to meet ESG benchmarks, improving their appeal to socially conscious investors. Furthermore, studies show that by including firms with high governance ratings, the Nifty 100 ESG Index helps create awareness and encourages wider adoption of ethical practices among Indian corporations. Sustainable development goals (SDGs) play a significant role in the index's criteria, emphasizing companies' contributions to environmental and social causes. Gupta and Banerjee (2020) found that firms in the Nifty 100 ESG Index often exhibit better environmental management practices, from reduced carbon emissions to waste management strategies. This aligns with global trends, where ESG indices prioritize firms that reduce their environmental footprint. Investor interest in the Nifty 100 ESG Index has been growing, particularly as younger and institutional investors prioritize ESG factors. Mishra (2021) shows that demand for ESG funds has led to significant inflows in ESG-focused assets, including those tracking indices like the Nifty 100 ESG. The study indicates that this shift may help reduce capital costs for high-ESG-score companies, incentivizing more firms to enhance their ESG credentials. While ESG indices like Nifty 100 ESG are promising, scholars note limitations, such as potential greenwashing and inconsistent ESG metrics. Das et al. (2021) argue that firms may sometimes overstate their ESG commitments to attract investment, a practice known as greenwashing. They highlight the need for stricter regulations and better standardization in ESG reporting to enhance transparency and credibility in the index.

Objective of the study:

This study, by taking NSE ESG Index, tries to understand and examine the impact of the Geo-Political tensions namely Red Sea crisis, Israel-Hamas war, Russia Ukraine and on this Index to demonstrate the comprehensive movements of the index prices.

Research Methodology:

The event study methodology has been used to check whether Geo-political turbulences namely, Red Sea crisis, Israel- Hamas war, and Russia Ukraine war, had significant impact on the cumulative average abnormal returns of NSE ESG during the event period. For this purpose, paired samples t- test was used and p value was calculated by using SPSS. The event study methodology has been used under this study which analysed the changes in the index prices which in turn reflects how the events affected market returns beyond expectations.

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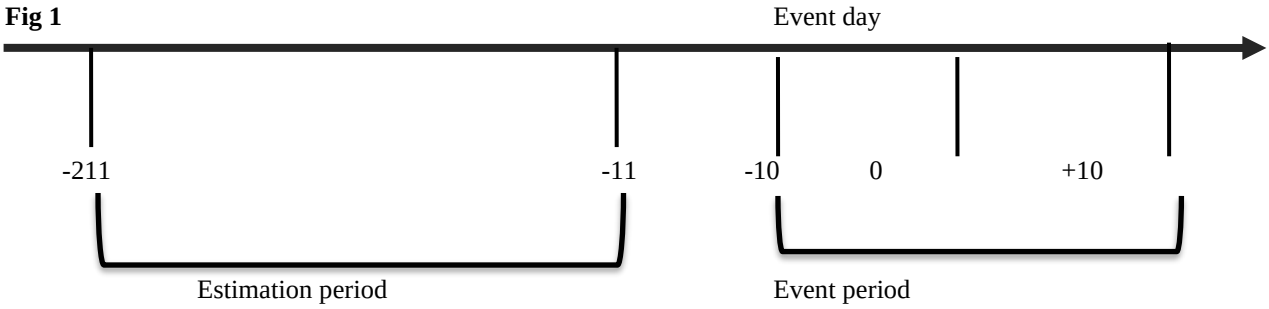
The study was conducted by taking the estimation period of 200 days (-211 days of the event) and event period of 20 days (-10 to +10 days of the event). The timelines of event study are as follows:

Event	Estimation period: 200 days (-211 to -11)	Event period: 20 days (-10 to +10)
Russia- Ukraine war	26/04/2021 to 9/02/2022	10/02/2022 to 14/03/2022
Israel- Hamas war	02/12/2022 to 21/09/2023	22/09/2023 to 23/10/2023
Red-Sea crisis	14/12/2022 to 4/10/2023	05/10/2023 to 03/11/2023

Index values were collected from the official website of NSE India. It is assumed that previous 40 weeks' performance is normal hence we take that period as a base for comparison. The event period is the period in which we suspect the influence of the said event. Event day or day zero is a day in which declaration of the specific event took place, the year the day that the announcement of Israel- Hamas war was been made (BHAT DEEPA C et al., 2022)

Fig 1



According to EMH (Eugene FAMA, 1970), it is not possible for any participant in the market, to outperform the market by earning abnormal returns as the stock prices quickly adjust to all the publicly available information. To empirically test the market efficiency, especially the semi-strong form of market efficiency during the event of the Israel-Hamas war, the event study methodology is adopted by taking an event window of 35 days.

Calculation of Abnormal Returns:

The values in the Table 1 are calculated as follows:

1. %Average Abnormal Return
   %AAR=Daily Returns-Expected Returns*100/Daily Returns
   % Daily Returns: $R_t = (P_t - P_{t-1}) *100/P_{t-1}$
   Where, P_t = Closing NSE Nifty 50 Index value of the current day
   P_{t-1}= Closing NSE Nifty 50 Index value of the previous day
   **Expected Returns is the average or mean returns of 200 days (-11 to -211 days of event date)
2. Cumulative Average Abnormal Returns:
   CAAR is the summation of all the % AARs calculated to know the total abnormal returns made before and after the event. CAAR by giving a clear picture of the cumulative abnormal returns, serves as a useful analytical tool in addition to the percentage AAR in the event that the influence is not fully displayed on the event date.
3. Standard Deviation:
   $$S.D = \sqrt{\sum(xi - \bar{x})^2 \div n}$$
   Whereas,
   σ = Standard Deviation
   xi = Terms Given in the Data
   $\bar{x}$ = Mean
   n = Total number of Terms
4. Skewness:
   Skewness has be calculated as: 3(mean-median)/ Standard deviation.

The above values have been calculated by using MS Excel.

Hypothesis:
For the statistical test the hypothesis is stated as below:

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H_1: There is a significant difference between the Average Abnormal Returns of estimation period and event period of the Red Sea crisis on NSE ESG Index.

H_2: There is a significant difference between the Average Abnormal Returns of estimation
Period and event period of the Israel- Hamas war on NSE ESG Index.

H_3: There is a significant difference between the Average Abnormal Returns of estimation period and event period of the Russia Ukraine war on NSE ESG Index.

The hypothesis testing is done using a paired sample t-test to understand if there is a notable distinction between Average Abnormal Returns of estimation period and event period.

H4: There is a significant difference between the Average Abnormal Returns of estimation period and event period of the on NSE ESG Index

Data Analysis:

Conceptual Model:

The geopolitical tensions, specifically the Israel-Hamas conflict, the Russia-Ukraine war, and the Red Sea issue, are probably going to affect the NSE ESG Index's values.

Conceptually this can be shown from the following model.

Fig 1: Conceptual Model

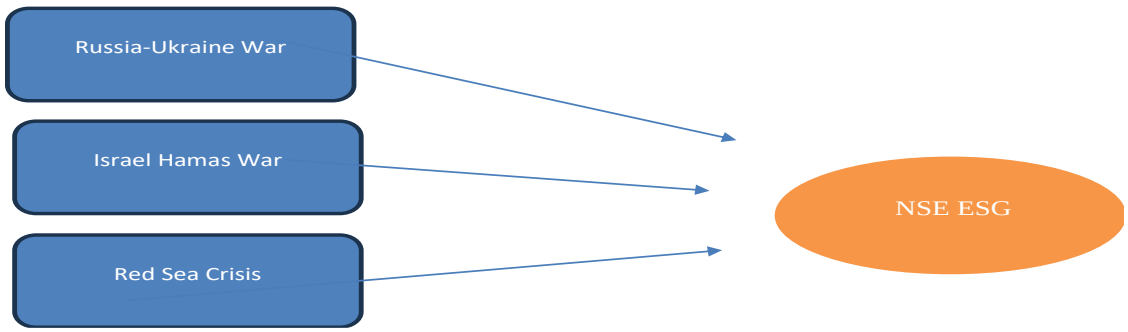

Table No. 1 displays the significance of the events—the Red Sea Crisis, the Israel-Hamas War, and the Russia-Ukraine War —the average daily returns of the NSE ESG, as well as the percentage daily average abnormal return, cumulative average abnormal return, and t value—are calculated using AAR and CAAR.

Average daily returns of the NSE ESG as well as the percentage daily average abnormal return, cumulative average abnormal return, and t value, which are computed using AAR and CAAR, in order to assess the significance of the events—the Red Sea Crisis, the Israel-Hamas War, and the Russia-Ukraine War.

.Table 1: Red Sea Crisis, Israel- Hamas War and Russia-Ukraine War - Returns, AAR and CAAR

	Red-Sea Crisis				Israel- Hamas War:				Russia-Ukraine War:			
Days	% AAR (1)	CAAR (2)	SD (3)	SKEW (4)	% AAR (1)	CAAR (2)	SD (3)	SKEW (4)	% AAR (1)	CAAR (2)	SD (3)	SKEW (4)
10	0.81	-2.94			-2.70	-5.62			2.76	-13.55		
5	1.17	-3.74	1.51	-1.62	0.04	-2.92	1.41	-1.17	-2.33	-16.31	2.71	1.52
4	-1.61	-4.92	1.46	1.39	-0.73	-2.95	0.40	1.45	-1.44	-13.97	0.47	1.51
3	-1.00	-3.30	0.30	0.34	-0.58	-2.22	0.59	1.60	-2.17	-12.53	1.15	0.98

2	-1.34	-2.30	0.22	-1.48	0.37	-1.65	0.65	-1.29	0.09	-10.37	1.91	-0.55
1	-0.92	-0.97	0.38	-0.31	0.69	-2.02	0.85	-1.46	1.63	-10.45	3.77	-1.41
0	-0.58	-0.04	0.22	-1.43	-0.92	-2.71	0.83	-1.21	-5.54	-12.09	3.63	-0.80
-1	-0.49	0.54	0.22	1.43	0.26	-1.79	0.84	-1.14	-0.94	-6.55	2.54	-1.68
-2	-0.15	1.03	0.31	-0.28	0.73	-2.05	0.88	-1.19	-1.35	-5.61	0.25	1.59
-3	0.13	1.18	0.38	-0.78	-0.98	-2.78	0.91	1.50	-1.42	-4.26	0.14	1.29
-4	-0.64	1.05	0.75	-0.05	-0.67	-1.79	0.180	-1.73	-1.14	-2.84	0.35	-0.61
-5	0.87	1.69	0.85	-1.72	-0.67	-1.12	0.12	1.73	-1.85	-1.70	1.01	0.82
-10	0.82	0.82	1.79	-1.73	-0.45	-0.45	0.83	1.60	0.15	0.15	1.43	-1.16
-11	-2.26	0.07	2.13	-1.29	0.88	-0.01	1.14	-0.506	0.94	0.15	4.72	-1.67
-20	1.85	2.33	2.39	-1.73	1.82	-0.89	1.22	-0.66	-7.61	-0.78	5.95	-1.27
-30	1.92	0.49	1.68	-1.72	-0.62	-2.71	1.26	1.20	3.85	6.83	5.81	-0.85
-40	-1.03	-1.43	1.47	0.05	0.04	-2.09	1.04	0.98	-0.15	2.98	2.65	1.44
-50	0.42	-0.40	1.36	-0.19	1.43	-2.13	0.88	-1.56	-1.18	3.13	2.79	-1.47
-60	1.69	-0.82	0.94	-1.02	1.70	-3.57	0.76	-1.50	-5.42	4.31	3.11	-1.08
-70	2.27	-2.51	1.04	-1.14	0.25	-5.26	0.72	0.73	0.65	9.73	3.14	1.24
-80	0.25	-4.78	1.11	1.66	0.79	-5.52	0.46	-0.48	-3.82	9.08	3.71	-0.62
-90	0.45	-5.03	0.20	0.07	1.18	-6.31	0.19	-0.60	3.55	12.90	3.82	1.25
-100	0.66	-5.48	1.28	1.68	1.03	-7.49	0.34	1.34	-1.90	9.35	2.73	-0.47
-110	2.77	-6.14	1.70	0.72	1.68	-8.51	1.27	1.23	1.26	11.25	2.66	-0.56
-120	-0.60	-8.91	2.40	-1.18	3.48	-10.19	2.06	-0.36	3.40	9.99	1.13	1.44
-130	4.06	-8.31	3.12	1.41	-0.64	-13.67	2.83	1.32	1.70	6.59	0.85	-0.61
-140	-1.88	-12.37	3.25	1.64	-1.94	-13.04	1.16	0.36	2.73	4.90	2.29	-1.34
-150	-1.20	-10.49	0.74	-0.24	-2.96	-11.10	1.15	0.34	-1.65	2.17	2.43	1.69
-160	-2.68	-9.29	0.75	1.04	-0.65	-8.14	1.42	1.64	-1.31	3.82	0.78	1.36
-170	-2.22	-6.61	1.54	1.56	-3.27	-7.49	1.47	-1.71	-0.16	5.13	2.16	1.19
-180	0.19	-4.39	1.22	0.85	-0.77	-4.22	1.35	-1.62	2.88	5.30	1.63	1.55
-190	-1.38	-4.58	1.69	-0.22	-1.09	-3.45	0.84	-1.44	0.34	2.41	1.29	-1.00
-200	-3.20		1.22		-2.36				2.07		1.28	
-210												

Source; as computed and compiled by the authors.

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The outbreak of war can lead to a sharp sell-off in stocks. At the same time, investors may move towards traditionally safer assets like gold, bonds, or currencies perceived as safe havens. However, the narrative with NSE ESG index is somewhat different because those investors who invest in green economy stocks are not just looking for higher returns but also portion of the sustainable economy. Therefore, the panic selling that we see in the traditional indices we might not see in the NSE ESG.

The reason behind calculating abnormal returns is that there shouldn't be any abnormal returns following an event if it had no influence. But occasionally, the effects of the incident could show up in the pricing a few days later. In these situations, a more accurate statistical measure is the cumulative average anomalous return.

Red-Sea Crisis:

During the estimation period of the Red Sea Crisis, the CAAR was flatter; however during the event period the CAAR was negative, suggesting that the event had a rather evil impact on the NSE ESG Index.

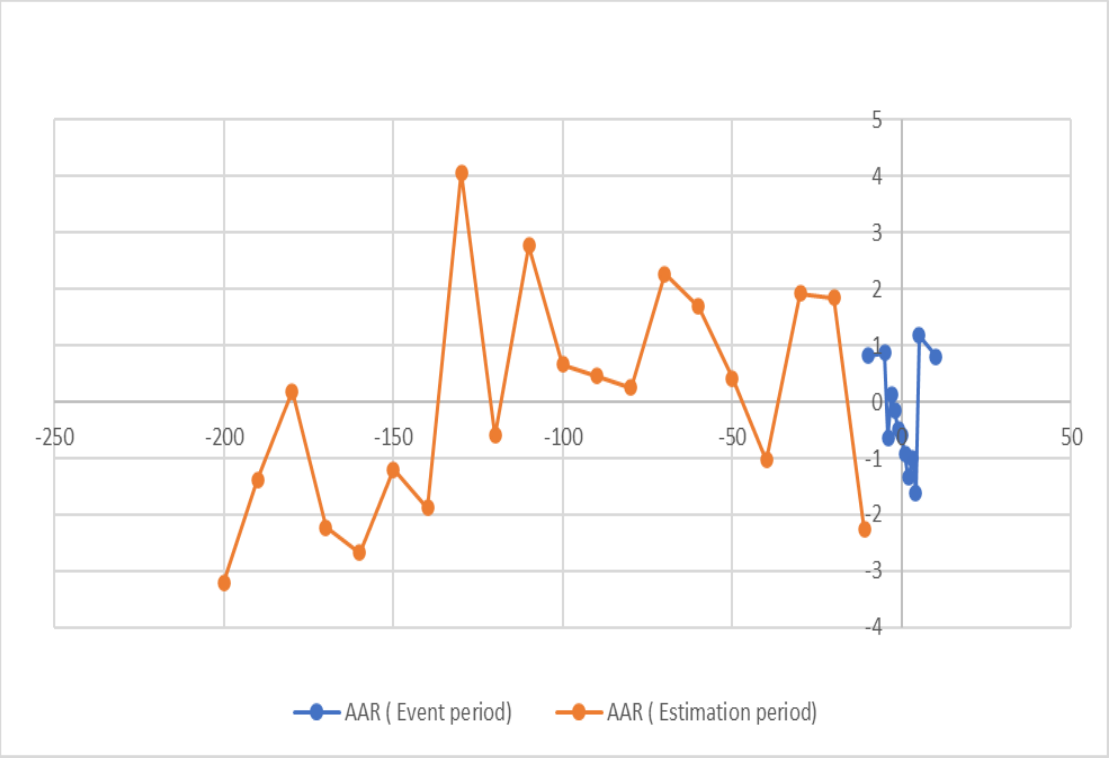
Israel- Hamas War:

Here also one can make note of the fact that during the estimation that the CAAR was flatter; however, during the event period the CAAR was negative, suggesting that the event had a rather evil impact on the NSE ESG Index.

Russia-Ukraine War:

From the analysis it can be observed that, during the estimation that the CAAR was flatter, however during the event period the CAAR was negative, suggesting that event had a rather evil impact on the NSE ESG Index.

Chart 1: AAR in estimation period and event period of Red sea Crisis



Israel- Hamas War: Here also one can make note of the fact that during the estimation that the CAAR was flatter; however, during the event period the CAAR was negative, suggesting that the event had a rather evil impact on the NSE ESG Index.

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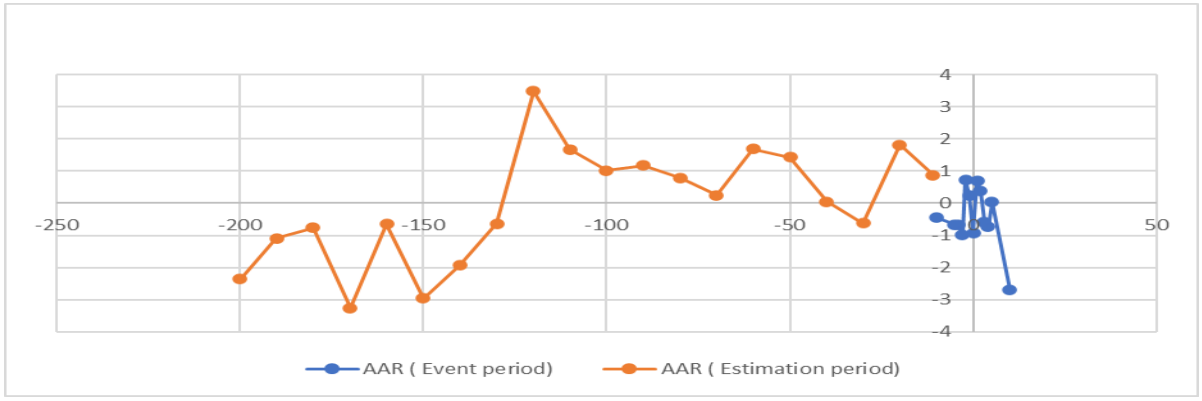
Chart 2: AAR in estimation period and event period of Israel- Hamas War:



Russia-Ukraine War: From the analysis it can be observed that, during the estimation that the CAAR was flatter, however during the event period the CAAR was negative, suggesting that the event had a rather evil impact on the NSE ESG Index.

Chart 3: AAR in estimation period and event period of Russia-Ukraine War:

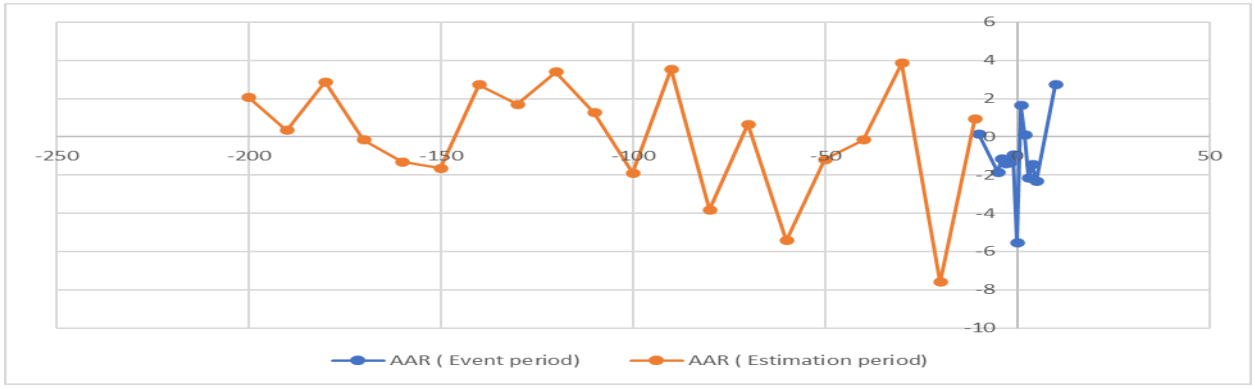


Table 2: Results of statistical tests of AAR for NSE ESG Index upon the impact of Red Sea Crisis:

Paired Samples Test:

	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 VAR00001 - VAR00002	2.23352	5.63123	1.56182	-1.16940	5.63644	1.430	12	.178

A paired samples t-test is used to test the first alternative hypothesis, which states that there is a significant difference between the Average Abnormal Returns before and after the Red Sea Crisis announcement on the NSE ESG index. The p-value obtained is 0.178, indicating that the alternative hypothesis is rejected at the 5% significance level. This suggests that the Red Sea Crisis had no effect on the NSE ESG Index and that there were no statistically significant abnormal returns.

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Table 3: Results of statistical tests of AAR for NSE ESG Index upon the impact of Israel Hamas War:

Paired Samples Test:

	Paired Differences					T	Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 VAR00001 - VAR00002	2.94462	4.90339	1.35996	-.01848	5.90771	2.165	12	.051

The paired samples t-test is used to test the second alternative hypothesis, which states that there is a significant difference between the Average Abnormal Returns before and after the Red Sea Crisis announcement on the NSE ESG index. The p-value obtained is.051, meaning that the alternative hypothesis is rejected at the 5% significance level. This suggests that the Israel-Hamas conflict had no effect on the NSE ESG Index and did not provide statistically significant anomalous returns.

Table 4: Statistical test results of AAR for NSE ESG Index upon the impact of Russia Ukraine War.

Paired Samples Test:

	Paired Differences					T	Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 VAR00001 - VAR00002	-15.04505	3.91865	1.08684	-17.41307	-12.67703	-13.843	12	.000

The third alternative hypothesis, which is tested using the paired samples t-test, states that there is a significant difference between the Average Abnormal Returns on the NSE ESG index before and after the announcement of the Russia-Ukraine War. The p-value obtained is.000, suggesting that the alternative hypothesis is accepted at the 5% significance level. This suggests that BSE Gr was impacted by the Russia-Ukraine war.

Findings:

1. Of late the globe has been witnessing a surge of violence and instability, as Hamas fighters launch lethal offensive on civilians in Israel, Russia invades Ukraine, and Iran and North Korea come up with nuclear threats. Wars and stand-offs like these have global implications, not only for peace and security, but also for economies and global stock indices. Impacted by investor psychology of fear, these geo political turbulences do have a negative impact towards global supply chains, the commodity prices and stock market indices.

2. Though Russia-Ukraine War did impact the NSE ESG Index, Red Sea crisis and Israel-Hamas conflict did not have any significant impact on the returns of NSE ESG Index. The findings suggest that the NSE ESG Index was not considerably impacted by global evil factors that too the geopolitical incidents and situations.
3. The findings suggest that the NSE ESG Index was not considerably impacted by global geopolitical conflicts. This result emphasizes the index's robustness by indicating that, despite outside geopolitical influences, it remains largely steady and indeed possess stock market resilience.

Practical Implications:

1. Due to a sense of fear and uncertainty geopolitical turbulences result in increased volatility in the stock market as market react to news and events. Investors need to be cautious while investing in the stock market during geopolitical crisis.
2. Geo-political tensions can disrupt Global supply chains hinder the movement of commodities between the countries and lead to an increase in commodity prices. Hence market participants in the commodity market also need to keep an eye on the geo political turbulences.
3. These conflicts influence currency exchange rates, which impact the competitiveness of companies operating in global markets. Investors who invest in companies which have Global exposure should keep this in mind while taking their investment discussions.
4. With each passing day geo-political tensions around the globe have been increasing and this suggests that each country has to strengthen its National Defence system. The countries can give more focus on indigenous production of arms, ammunitions and weapons and if need arises import sophisticated combat vehicles. This will not only be crucial in the times of war but also make other countries hesitant to invade the country which has massive defence strength.

Conclusion:

Significant global conflicts including the Red Sea crisis, Israel-Hamas conflict, and Russia-Ukraine War occurred, however the NSE ESG Index was largely untouched. The study evaluated the effects of these crises on the stock market, concentrating on the NSE ESG Index, using a paired sample t-test and Cumulative Average Abnormal Returns (CAAR) computations and it was found that though Russia-Ukraine War did impact the NSE ESG Index, Red Sea crisis and Israel-Hamas conflict did not have any Significant impact on the returns of NSE ESG Index. The findings suggest that the NSE ESG Index was not considerably impacted by global concerns. This result emphasizes the index's robustness by indicating that, despite outside geopolitical influences, it remains largely steady. The resilience of the index can be ascribed to the incorporation of companies that fulfil Environmental requirements, which presumably mitigates the negative impact of geopolitical disruptions.

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