Climate Change Policy Events and Stock Market Performance: An Event Study Approach

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Abstract

This study delves into the impact of two significant climate events, namely the Global Shield Funding and the Paris Agreement, on stock market returns. By analyzing the responses of investors to these climate events, the study aims to provide insights into how financial markets react to global initiatives addressing climate change. The research focuses on assessing the implications of the Global Shield Funding announcement and the Paris Agreement on stock market dynamics, particularly in V7 countries. Through event studies and market model analyses, the study examines the relationship between these climate events and stock returns, shedding light on investor sentiment and market performance in the context of climate change initiatives. The findings contribute to understanding the interplay between climate events, investor behavior, and financial markets, highlighting the importance of sustainable investments in a changing environmental landscape.

Keywords: Climate events, Global Shield Funding, Paris Agreement, Stock market returns, Investor behavior, financial markets, Event studies, Market performance, Climate change initiatives

1. Introduction

Climate change stands as a formidable global challenge in the contemporary landscape, exerting its influence across all spheres of society. Evidently, instances of climate-induced devastation emerge with alarming regularity, transcending geographical and demographic boundaries. The Paris Climate Accord represents a groundbreaking and universally binding covenant, compelling signatory parties to mitigate carbon emissions and constrain global temperature escalation to below 2 degrees Celsius (UNFCCC, 2016). Illustrating a steadfast commitment to environmental concerns, the European Union (EU) has embarked on a multifaceted approach, exemplified by initiatives like the EU Climate Change Adaptation Strategy (EEA, 2015), reaffirming its dedication to combatting climate change. The prevailing paradigm, epitomized by the Paris Agreement on climate change and the Strategic Framework

for Climate and Energy for the period 2020 to 2030 (EEA, 2015), underscores the imperative of achieving environmental sustainability for the collective well-being.

The impacts of climate change pose significant challenges for developing countries, especially those that are most vulnerable to natural disasters and climate shocks. These countries often lack adequate financial resources and mechanisms to cope with the losses and damages caused by extreme weather events, such as floods, droughts, cyclones, and wildfires. To address this gap, a new initiative called the Global Shield against Climate Risks was launched at the 27th Conference of the Parties (COP27) to the United Nations Framework Convention on Climate Change (UNFCCC) in November 2022 (UNFCCC, 2022). The Global Shield is a joint effort by the Group of Seven (G7) and the Vulnerable 20 Group of Finance Ministers (V20), which represents 58 climate vulnerable economies (BMZ, 2022). The aim of the Global Shield is to provide pre-arranged financial support to developing countries that are exposed to climate risks, by mobilizing public and private funds, enhancing risk pooling and insurance mechanisms, and facilitating rapid and effective response and recovery. The Global Shield is expected to benefit millions of people living in the most climate-affected regions of the world, by improving their resilience and reducing their poverty (BMZ, 2022; UNFCCC, 2022; WorldBank, 2022).

It is imperative to underscore that no nation or demographic enclave is immune to the repercussions of climate change, as cogently (Birindelli & Chiappini, 2021). Both the general populace and governmental authorities are presently directing heightened attention toward climate change, indicative of an increased awareness of its significance. Furthermore, scholarly inquiries have significantly enriched our understanding of the variables influencing climate over the past three decades (Antoniuk & Leirvik, 2021). This augmented understanding has led to intensified scrutiny of the societal and economic implications arising from climate change (He & Liu, 2018). Investors are increasingly scrutinizing the intricacies of transitioning toward a sustainable, environmentally conscious economy, notwithstanding the protracted and occasionally overlooked nature of climate change effects, as evidenced in the studies of Alsaifi et al. (2020) and Shi et al. (2019). Such developments have served to catalyze global awareness of climate change, ultimately culminating in the promulgation of various environmentally friendly policies. Investors are increasingly motivated to act due to the pressing issue of climate change (Birindelli & Chiappini, 2021).

The financial landscape has experienced a notable transformation, with green enterprises reaping substantial benefits as environmental concerns ascend, while their brown counterparts face adversity (Clausing, 2020). Businesses worldwide have witnessed enhanced profitability upon recognizing the imperative of proactively addressing climate change for societal and environmental well-being (He & Liu, 2018). What was once considered a discretionary endeavor has progressively evolved into a prerequisite for businesses, either through regulatory mandates or market pressures. Research substantiates that investors castigate entities displaying reluctance in addressing climate change (Pástor et al., 2021). Paradoxically, businesses with lower carbon emissions garner rewards in this evolving landscape (Pástor et al., 2021). Additionally, research suggests that the implementation of environmental regulations in China leads to more severe penalties for pollution-intensive enterprises (Guo et al., 2020). Nevertheless, some studies contend that investors may harbor reservations about environmental endeavors, citing concerns about escalating administrative burdens (Berkman et al., 2019).

The aim of this study is to examine the impact of the Global Shield Finance Facility and the Paris Agreement on stock exchange returns. To achieve this aim, the following research objectives will be pursued: first, to investigate the relationship between the Global Shield

package and the stock returns of V7 countries and secondly, to assess the relationship between the Paris Agreement and the stock returns of V7 countries. To address these objectives, the following research questions will guide this study: first, what is the relationship between the Global Shield package and the stock returns of V7 countries? and what is the relationship between the Paris Agreement and the stock returns of V7 countries?

This study contributes to the existing body of knowledge by providing insights into the impact of significant climate events, such as the Global Shield Funding and the Paris Agreement, on stock market returns. By analysing investor responses to these climate initiatives, the research enhances understanding of how financial markets react to global efforts addressing climate change. The study's findings offer valuable information on the relationship between climate events and stock market dynamics, highlighting the role of investor sentiment and market performance in the context of sustainable investments. This research adds to the literature on climate change initiatives, investor behavior, and financial market reactions, thereby enriching the understanding of the interplay between environmental factors and economic outcomes.

2. Literature Review

The global conversation regarding climate change has shifted from a niche concern to a central focus of public, political, and corporate agendas. As scientific evidence increasingly emphasizes the urgent need for sustainable practices, the financial implications of climate change have gained significant attention. Literature review delves into the existing body of literature exploring the intricate relationship between climate change announcements and their subsequent impact on stock market dynamics.

2.1 Climate Change

Investment decisions must now consider climate risk due to climate change policies aimed at curbing energy consumption. Recent studies, such as Krueger et al. (2020) and Bolton and Kacperczyk (2021) have shown that investors are cognizant of climate risk and even demand higher profits from businesses with higher pollution levels. Moreover, climate-conscious businesses benefit from cheaper debt expenses compared to those without greenhouse gas disclosure (Jung et al., 2018).

Antoniuk and Leirvik (2021) found that shareholders holding equities with higher climate risks should receive compensation. Antoniuk and Leirvik (2021) investigating the influence of the Paris Agreement revealed that climate change events boost the clean energy sector by raising awareness among nations and prompting the passage of climate-friendly regulations. Shareholders increasingly prioritize climate concerns and seek long-term investments in businesses with minimal carbon footprints. This rise in climate awareness positively impacts the value of green equities while negatively affecting the value of companies with higher carbon emissions (Ardia et al., 2020). Corporations worldwide have realized the financial benefits of addressing climate change and societal and environmental concerns (Bouzzine, 2021). However, a systematic literature assessment of 38 event studies indicates that stock markets react unfavorably to environmental contamination incidents.

Initially considered optional, environmental consciousness has gradually become essential for businesses in various ways. Researchers have found that investors penalize companies that do not prioritize addressing climate change, favoring low-carbon-emitting businesses (Bolton & Kacperczyk, 2021; Pástor et al., 2021). On the other hand, some studies suggest that investors may have a negative attitude toward environmental responsibility due to increased regulatory

costs (Berkman et al., 2019). Berkman et al. (2019) examined how climate change policies affect the value of both U.S. and foreign companies, highlighting that investor perceptions of a company's environmental commitment can drive up regulatory costs, particularly for those exposed to high climate risk (Ramiah et al., 2016). The study also evaluated the impact of 75 environmental-related policy announcements on equities portfolios in the UK, revealing that stock returns were affected by nuclear, international, and domestic statements. Interestingly, the introduction of environmental measures in the UK did not significantly affect the performance of the electrical industry, a major polluter. However, S&P 500 energy-related companies suffered undervaluation due to climate change news events (Anttila-Hughes, 2016).

Han et al. (2019) demonstrated that Australia's carbon pricing strategy negatively affected industries reliant on carbon-intensive practices, despite positive government findings. Rogova and Aprelkova (2020) evaluated the effects of IPCC declarations on publicly traded companies in the United Nations (UN) and found that companies, regardless of their carbon presence, performed abnormally. Additionally, Antoniuk and Leirvik (2021) studied the impact of four incidents on exchange-traded funds (ETFs) focusing on clean energy or fossil fuel industries, highlighting the rapid investor response to climate change knowledge.

The effects of the 2016 U.S. elections on the renewable energy sector were also analyzed, revealing that the election of President Donald Trump had a negative impact on the sector's returns, particularly for non-U.S. businesses (Aklin, 2018). Xu et al. (2021) investigated the effects of Sino-U.S. trade disputes on Chinese power companies, concluding that firms with overseas activities faced ambiguous risks abroad. Their research also explored the impact of policy shocks on photovoltaic solar enterprises in China, showing that renewable energy firms' stock returns were influenced by subsidies and policy support, with greater subsidies making firms more susceptible to policy changes (Liu et al., 2021).

2.2 Climate Change and Stock Returns

Tian et al. (2019) shifted attention to heavy-polluting organizations and the impact of 270 Central Government Environmental Inspections on their stock prices. While these inspections led to substantial irregular stock declines for some firms, those with strong political connections experienced fewer restrictions, particularly state-owned firms. Zeng et al. (2021) corroborated these findings, emphasizing the role of Central Environmental Protection Inspections in negatively affecting the stock returns of Chinese A-listed companies, with generally adverse abnormal returns (ARs) resulting from increased pressure on these firms.

Furthermore, 41 declarations "poor performance to meet environment obligations" from global automakers were examined, revealing significant aggregate stock losses for these companies, particularly when environmental regulators intervened or excessive emissions were discovered. The Volkswagen Dieselgate scandal, characterized by extensive emissions deception, severely damaged investor confidence in the automotive sector (Wood et al., 2018).

Fracarolli Nunes and Lee Park (2016) considered 33 U.S.-based automakers, including suppliers and manufacturers, and found that Dieselgate had a significant detrimental impact on both tiers, especially those reliant on diesel fuel technology. Jacobs and Singhal (2020) investigated the effects of Dieselgate on various stakeholders, including customers, tier-1 and tier-2 vendors, wholesalers, retailers, and rental agencies. Tier-1 and tier-2 suppliers of engine components and emissions systems, particularly those with strong ties to Volkswagen, experienced substantial mean stock losses. European Volkswagen consumers and other European carmakers also suffered significant stock losses.

Research examined the effects of seven Deepwater Horizon disaster-related events on the stock market returns of 45 oil and gas companies, categorized into different segments. Overall, oil and gas companies experienced significant stock losses, albeit to varying degrees, with some sectors more affected than others (Humphrey et al., 2016).Scholtens and Oueghlissi (2020) took an alternative perspective on oil spills by analyzing their impact on the stock returns of fishing sector businesses compared to other natural disasters like volcanic eruptions, earthquakes, and tsunamis. They found that disasters, particularly earthquakes, had a more severe impact on fisheries corporations than oil spills due to their broader geographic effects. However, oil spills still had a significant economic impact on fishing companies.

Another study examined 65 environmentally negligent incidents from China's Ministry of Ecological and Environmental Protection between 2014 and 2018, focusing on heavy-polluting industries like extractive, chemical, steel, and building materials. The research indicated that major polluters faced negative asset returns (ARs) for environmentally irresponsible events, with the degree of impact influenced by ownership structure and industry. Additionally, the study revealed a significant intra-industry spillover effect from irresponsible firms to industry peers (Jin et al., 2020).

Investor confidence, defined as the propensity to invest based on perceived risks and returns, plays a crucial role in investment decisions (Ifeanyi O. Nwanna & Ifeoma C. Amakor, 2022). Investor positivity or investors' perspective of the risk and return related to a particular security, and investor believe, or investors' perspective that their interests are adequately protected from the profiteering of issuers and counterparties, are the primary elements of investors' confidence (Ifeanyi O Nwanna & Ifeoma C Amakor, 2022). The value of sales experts sharing corporate information could represent one of the original sources of investors' rates of return (Huynh et al., 2020). The majority of research has discovered that analysts may not be responsible for a fair evaluation of climate risks at the corporate level. This reality could be one of the factors preventing investors from accurately ex-ante pricing the risk of their portfolios, particularly on the physical risk side. On the other hand Addoum et al. (2021), documented that some sell-side analysts consider the effects of extreme temperature in their quarterly valuations in the United States. Yet, a global sample revealed that the reverse is accurate(Pankratz et al., 2023). In particular Pankratz et al. (2023)found that an increase in earnings deteriorations by firms due to extreme temperatures was systematically followed by negative performance analysts' surprises. Even before investors' reactions to such incidents are recognized, it is crucial to comprehend how they handle climate-related information (Venturini, 2022).Investor surveys provide compelling evidence on this point. According to the Certified Financial Industry expert Institute, 60% of portfolio managers do not consider climate change risks in their assessment (Robinson, 2020). The primary obstacles for investors involve a lack of understanding of climate change assimilation in the investment strategy and a lack of resources Bouchet et al. (2022) and a total absence of reporting from firms, which prevents investors from developing appropriate measuring equipment the same outcomes were discovered by Amel-Zadeh (2021). As a result, investors are still developing strategies for dealing with these consequences (Krueger et al., 2020). Despite these concerns, investor assessments appear to show that in current history, investors have really been actually participating with firms to handle the climate change exposure of their portfolio management (Venturini, 2022).

According to investor studies, investors may want to decarbonizes their investments for both financial and nonfinancial reasons (Pástor et al., 2008). The primary financial reason for investment firms appears to be track record security (Krueger et al., 2020). Investors' ultimate objective is to reduce the carbon output of their investments (Schlenker & Taylor, 2021). The

fact that investors are concerned about their portfolio's environmental impact has two huge ramifications (Venturini, 2022). Investors are additionally working with businesses to boost the quantity and quality of climate-related data (Flammer et al., 2021). Furthermore, investment firms believe that climatic change disclosure serves as the most efficient means of enhancing market efficiency in pricing physical and transition risks (Ilhan et al., 2021). As empirically demonstrated, eventually increasing firm value shown by (Flammer et al., 2021). Despite the fact that climate change risks had a substance effect on company operations, businesses chose not to include climate change risk information in their annual disclosure reports on purpose (Amel-Zadeh, 2021). Building investor trust in anticipated returns and measuring the profitability of investments require a sound policy on investments framework and incentives (Polzin et al., 2019).

(Geddes et al., 2018) demonstrated that state-owned investment banking institutions are essential for both facilitating private investment and enabling the financial sector to build trust in initiatives and act as early adopters to aid projects in building a track record. The dangers of prolonged decline and financial instability increase when climate change is factored in. The negative effects of climate change on the economy include decreased labor productivity (especially for outdoor workers), capital shifting from manufacturing to maintenance of infrastructure and adaptation, increased consumer and investor anxiety, rising health care expenses, and reduced growth in the economy (Burke et al., 2018).
The Paris Agreement, a pivotal outcome of the United Nations Climate Change Conference (COP21) in 2015, marks a significant milestone in global efforts to combat climate change. Rooted in the principle of common but differentiated responsibilities, the agreement seeks to unite nations in a collective endeavor to limit global temperature rise. Its overarching goal of limiting warming to well below 2 degrees Celsius above pre-industrial levels, with a pursuit of 1.5 degrees Celsius, has ignited scholarly discourse on various fronts. The importance of strengthening present commitments to be in line with the temperature goals of the Paris Agreement is stressed by academics like Rogelj et al. (2016). Victor and Kennel (2014) provide insights into the complexity of the 2-degree target in this setting. Falkner (2016) draws attention to the emergence of fresh dynamics in international climate politics and emphasizes the Agreement's influence on determining how the world is governed. Bodansky (2016) examines the Agreement's legal foundation and ramifications while highlighting its function as a catalyst for national climate measures. Keohane and Oppenheimer's (2016) analysis gives light on the pledge-and-review process of the Agreement's potential efficacy. Additionally, Fleurbaey and Helm (2017) examine the Agreement's ethical implications, particularly with reference to distributive justice. A recurring theme is how the Paris Agreement promotes sustainable development. Aldy (2017) examines the interplay between climate policy and economic growth, emphasizing the Agreement's potential to drive innovation and green investment. On adaptation, Bulkeley and Betsill (2016) discuss the need for robust mechanisms to support vulnerable nations in line with the Agreement's ambitions. As the world grapples with climate impacts, research by Schleussner et al. (2016) underscores the significance of staying within the 1.5-degree limit for avoiding severe consequences. This resonates with findings by Hoegh-Guldberg et al. (2018), which highlight the critical importance of coral reef protection.

Signaling theory proposes that corporate announcements, such as dividends, earnings, or stock splits, can convey information to the market about the future prospects of the firm Investors interpret these announcements as signals of the firm’s quality, performance, and value, and adjust their expectations and demand accordingly (Pandey et al., 2022). Similarly, the Global Shield event announcement can be regarded as a signal of the recipient country’s exposure, vulnerability, and resilience to climate risks. The announcement can indicate that the country

is facing a high level of climate threat, but also that it has access to financial assistance from the Global Shield facility to cope with the potential impacts. Depending on how the market perceives the net effect of these two factors, the announcement can have positive, negative or no impact on the stock returns of the recipient countries. Therefore, we hypothesize that
H_1: The GSF announcement impacts stock returns in recipient countries.
For the Paris Agreement event:
H_2: The Paris Agreement announcement impacts stock returns in recipient countries.

3. Methodology

For the analysis of the impact of both the Global Shield Fund announcement and the Paris Plan Agreement, data were collected from distinct periods. Specifically, data for the Global Shield Fund, country indices, and the global index were compiled from January 10, 2021, to November 30, 2022. This dataset was utilized to assess the effects of the Global Shield Fund announcement on recipient countries and the global market. Additionally, data spanning from February 2, 2015, to October 5, 2016, were gathered to examine the implications of the Paris Plan Agreement on market returns of recipient countries. The analysis focuses on the event window spanning from five days before to five days after the GSF announcement date, which occurred on November 15, 2022 for Global Shield announcement and April 22, 2016 in case of Paris plan agreement. The countries under scrutiny include Pakistan, Bangladesh, Senegal, Ghana, Costa Rica, and the Philippines. Relevant stock market indices such as the KSE 100 index for Pakistan, DSE 30 index for Bangladesh, BRVM 10 index for Senegal, GSE Composite index for Ghana, CRBCT index for Costa Rica, and an PSEi (Philippine Stock Exchange index) for Philippines are examined.

To calculate the expected returns for each respective country index, we employed the market model, a widely utilized approach in finance for estimating asset returns. In this model, the expected return of a security or index is determined based on its covariance with the market return, along with other relevant factors. Specifically, we utilized the MSCI returns as the independent variable and the respective country index returns as the dependent variable. The market model equation used in this study is a widely utilized approach in finance for estimating asset returns. The equation is formulated based on the relationship between the returns of the respective country index (Ri) and the market returns (Rm), represented by the slope coefficient (β).

The market model equation can be represented mathematically as follows:

$$R_i=\alpha_i+\beta R_m+\varepsilon_i$$

Whereas, Ri denotes the returns of the respective country index, Rm represents the returns of the MSCI market index, β is the slope coefficient measuring the sensitivity of the country index returns to changes in the market returns.

The estimation of expected returns utilizing the market model, the subsequent step involved the computation of abnormal returns (AR) and cumulative abnormal returns (CAR).
To ascertain the statistical significance of the abnormal returns returns, T-tests were employed. These tests determine whether the mean abnormal returns are significantly different from zero, indicating abnormal performance relative to the market model. (Cowan, 1993).

$$AR_i=R_i-E[R_i]$$
$$CAR_t=\sum^{t}_{i=t} AR_i$$

Through the utilization of these statistical tests, an evaluation was conducted to determine whether the observed returns surrounding the Global Shield Fund announcement and the Paris Plan Agreement exhibited statistical differences from what would be anticipated based on the market model. This approach provided insights into the significance of these events on market performance.

4. Results

This section reports the results of the event study analysis that examines the impact of the Global Shield Financing (GSF) on the stock returns of the Pakistan stock market KSE 100 index. The event window for the GSF is [-5, +5], meaning five days before and five days after the announcement date, which was 15 November 2022. The table below shows the expected returns (ER), abnormal returns (AR), cumulative abnormal returns (CAR), test statistics, and significance values for the KSE 100 index for the event window and the estimation window.

Table 1.

Stock market reactions to Global Shield Announcement

Day	AR	CAR	T Value	Significance
Pakistan (R^2=0.02)				
+5	0.0017	-0.0095	0.1709	NO
+4	-0.0025	-0.0120	-0.2425	NO
+3	-0.0029	-0.0149	-0.2869	NO
+2	0.0054	-0.0095	0.5294	NO
+1	-0.0022	-0.0117	-0.2115	NO
0	-0.0047	-0.0164	-0.4663	NO
-1	0.0028	-0.0136	0.2737	NO
-2	0.0107	-0.0030	1.0491	NO
-3	0.0019	-0.0011	0.1840	NO
-4	0.0046	0.0035	0.4506	NO
-5	0.0036	0.0071	0.3576	NO
+5	-0.007	-0.007	-0.872	NO
+4	0.006	-0.001	0.722	NO
+3	-0.006	-0.007	-0.740	NO
+2	-0.007	-0.014	-0.875	NO
+1	0.010	-0.004	1.311	NO
0	-0.006	-0.009	-0.714	NO
-1	0.017	0.008	2.220	YES
-2	0.042	0.050	5.304	YES
-3	-0.015	0.035	-1.854	NO
-4	0.008	0.043	0.979	NO
-5	0.011	0.054	1.353	NO
Senegal (R^2=0.000312)				
+5	0.0040	0.0040	0.7185	NO
+4	-0.0013	-0.0013	-0.2416	NO
+3	0.0044	0.0044	0.7942	NO

+2	-0.0004	-0.0004	-0.0664	NO
+1	-0.0004	-0.0004	-0.0738	NO
0	-0.0123	-0.0123	-2.2177	YES
-1	0.0015	0.0015	0.2641	NO
-2	-0.0026	-0.0026	-0.4630	NO
-3	-0.0119	-0.0119	-2.1465	YES
-4	-0.0107	-0.0107	-1.9350	NO
-5	0.0029	0.0029	0.5196	NO
Ghana (R^2= 0.00187)				
+5	-0.08377	-0.08377	-0.06101	NO
+4	-0.08231	-0.16608	-0.05995	NO
+3	-0.08231	-0.2484	-0.05995	NO
+2	-0.10543	-0.35382	-0.07678	NO
+1	-0.08231	-0.43613	-0.05995	NO
0	-0.0845	-0.52063	-0.06154	NO
-1	-0.06002	-0.58065	-0.04371	NO
-2	-0.08413	-0.66479	-0.06127	NO
-3	-0.08231	-0.7471	-0.05995	NO
-4	-0.08231	-0.82941	-0.05995	NO
-5	-0.08231	-0.91172	-0.05995	NO
Cost Rica (R^2= 0.00418)				
+5	-0.000001	-0.000001	-0.052252	NO
+4	0.000000	0.000000	0.014061	NO
+3	-0.000002	-0.000002	-0.162221	NO
+2	-0.000002	-0.000002	-0.110141	NO
+1	-0.000004	-0.000004	-0.250037	NO
0	-0.000002	-0.000002	-0.103415	NO
-1	0.000001	0.000001	0.076407	NO
-2	-0.000005	-0.000005	-0.314725	NO
-3	-0.000001	-0.000001	-0.093146	NO
-4	0.000000	0.000000	-0.032942	NO
-5	0.000001	0.000001	0.040317	NO
Philippines (R^2= 0.0000013)				
+5	-0.0051	-0.0051	-0.2836	NO
+4	0.0050	0.0050	0.2744	NO
+3	-0.0020	-0.0020	-0.1093	NO
+2	0.0012	0.0012	0.0655	NO
+1	0.0018	0.0018	0.0986	NO
0	0.0056	0.0056	0.3111	NO
-1	-0.0046	-0.0046	-0.2514	NO
-2	-0.0114	-0.0114	-0.6293	NO
-3	-0.0250	-0.0250	-1.3772	NO

-4	0.0154	0.0154	0.8470	NO
-5	0.0137	0.0137	0.7530	NO

The results indicate that the GSF announcement had no significant impact on the stock returns of the KSE 100 index. None of the AR values are statistically significant at the 5% level, meaning that the null hypothesis of no abnormal returns cannot be rejected. This suggests that the market did not react to the GSF announcement, either because it was already anticipated or because it was perceived as irrelevant for the future performance of the companies.

The outcomes of the event study analysis show that the GSF announcement had a significant influence on the stock returns of the DSE 30 index, but only on two days before the announcement date. Two of the CAR values are statistically significant at the 5% level, implying that the market anticipated the GSF announcement, and that the anticipation was positive and strong. The CAR values for Bangladesh show a sharp rise on the second day before the announcement (-2) and the day before the announcement (-1), indicating that the market expected the GSF to benefit the Bangladesh economy and the companies. The CAR values for the other days in the event window are not significant, implying that the market did not react to the GSF announcement on the announcement date (0) or after it was made.

This section presents the event study analysis of Global Shield Financing (GSF) on Senegal stock market BRVM 10 index stock returns. The event study found that the GSF announcement affected BRVM 10 index stock returns solely on the day of the announcement and 3 days earlier. Two CAR values are statistically significant at the 5% level, indicating that the market strongly and negatively responded to the GSF news. The Senegal CAR values dropped sharply on the day of the announcement (0) and 30 days earlier (-3), indicating that the market expected the GSF to hurt the economy and companies. The other days in the event window have insignificant AR values, indicating that the market did not respond to the GSF announcement before or after it was made.

The findings of the Ghana Stock Exchange event study analysis show that the GSF announcement had no significant effect on the stock returns of the GSE Composite index. None of the AR values are statistically significant at the 5% level, implying that the market did not respond to the GSF announcement, either before or after it was made. This implies that the market did not expect the GSF to affect the Ghana economy and the companies.

In case of Costa Rica, findings indicate that the introduction of the GSF had no notable impact on the stock returns of the CRBCT index. None of the AR values exhibit statistical significance at the 5% level, indicating that the market did not demonstrate any response to the GSF news, both prior to and following its release. Consequently, the market had not anticipated that the GSF would have an impact on the economy of Costa Rica and its enterprises.

GSF announcement also did not have a statistically significant impact on the stock returns in the Philippines. The market did not respond to the GSF news either before or after its release, suggesting that the market did not expect the GSF to significantly affect the Philippine stock market.

4.1 Paris plan agreement

The impact of the Paris Agreement on the KSE 100 index in the Pakistan stock market, measured over an 11-day event window from 5 days before to 5 days after the Agreement, showed minimal and statistically insignificant changes in stock returns. The average returns (AR) exhibited slight fluctuations throughout this period, with some notable increases on days

+3 and +4, but none of these changes met the statistical criteria for significance as indicated by the consistently low t values. The cumulative average returns (CAR) also displayed minor variations, rising slightly from 0.0749 on Day -5 to a peak of 0.0830 on Day 0, and then remaining stable in the post-event period. These results indicate that the Paris Agreement had a negligible and statistically non-significant impact on the stock returns of the KSE 100 index, implying either a prior market adjustment to the Agreement expectations or a perception of the Agreement as a non-critical factor for market performance in this context.

Dhaka Stock exchange also showed no statistically significant abnormal return on any of the examined days, as indicated by the T-values. This suggests that there is no evidence of abnormal stock price movements in relation to the agreement on the Dhaka Stock Exchange during the studied period.

The abnormal returns of the BRVM composite index for Senegal Stock Exchange and Philippine Stock Exchange were not statistically significant in the event window. This implies that the Senegalese investors did not react strongly to the news.

The event study analysis of the Paris plan agreement on Ghana stock market GSE Composite Index stock returns revealed that the Paris plan agreement announcement did not have a significant impact on GSE Composite Index stock returns in the event window. All the AR values in the table are statistically insignificant, indicating that the market did not respond to the Paris plan agreement news before or after it was made. This suggests that the Paris plan agreement did not affect the expectations or performance of the economy and companies in Ghana.

The results show that the Paris Agreement announcement had a positive and significant impact on the stock returns of the BNV index for Costa Rica Stock Exchange, but only 2 days before the announcement date. The AR value for this day is 2.1997, which is statistically significant at the 5% level. This implies that the Costa Rican investors anticipated the Paris Agreement announcement and expected it to benefit the Costa Rican economy and the companies. The AR values for the other days in the event window are not significant, indicating that the market did not react strongly to the Paris Agreement announcement on the announcement date or after it was made.

Table 2.

Stock Market reactions to Paris Plan Agreement

Day	AR	CAR	T Value	Significance
Pakistan (R^2=0.036)				
+5	0.0017	-0.0095	0.1709	NO
+4	-0.0025	-0.0120	-0.2425	NO
+3	-0.0029	-0.0149	-0.2869	NO
+2	0.0054	-0.0095	0.5294	NO
+1	-0.0022	-0.0117	-0.2115	NO
0	-0.0047	-0.0164	-0.4663	NO
-1	0.0028	-0.0136	0.2737	NO
-2	0.0107	-0.0030	1.0491	NO
-3	0.0019	-0.0011	0.1840	NO
-4	0.0046	0.0035	0.4506	NO

-5	0.0036	0.0071	0.3576	NO
Bangladesh (R^2=0.007)				
+5	-0.0104	2.0217	-1.6427	NO
+4	-0.0099	2.0119	-1.5625	NO
+3	-0.0089	2.0030	-1.4067	NO
+2	-0.0037	1.9993	-0.5842	NO
+1	-0.0005	1.9987	-0.0853	NO
0	-0.0001	1.9986	-0.0169	NO
-1	-0.0044	1.9942	-0.6917	NO
-2	0.0006	1.9948	0.0934	NO
-3	-0.0068	1.9880	-1.0725	NO
-4	-0.0003	1.9877	-0.0480	NO
-5	-0.0032	1.9846	-0.5011	NO
Senegal (R^2=0.0087)				
+5	0.0029	-0.0342	0.4071	NO
+4	0.0035	-0.0308	0.4954	NO
+3	-0.0076	-0.0384	-1.0852	NO
+2	-0.0003	-0.0386	-0.0380	NO
+1	-0.0067	-0.0453	-0.9568	NO
0	0.0119	-0.0335	1.6958	NO
-1	0.0068	-0.0267	0.9679	NO
-2	-0.0036	-0.0303	-0.5175	NO
-3	0.0014	-0.0289	0.1957	NO
-4	-0.0032	-0.0322	-0.4612	NO
-5	0.0004	-0.0318	0.0503	NO
Ghana (R^2= 0.0024)				
+5	0.0004	-0.0086	0.0956	NO
+4	-0.0001	-0.0086	-0.0192	NO
+3	0.0007	-0.0079	0.1625	NO
+2	-0.0050	-0.0129	-1.0913	NO
+1	0.0003	-0.0126	0.0754	NO
0	-0.0020	-0.0146	-0.4354	NO
-1	-0.0087	-0.0233	-1.8978	NO
-2	-0.0054	-0.0287	-1.1813	NO
-3	-0.0050	-0.0338	-1.0972	NO
-4	0.0033	-0.0304	0.7219	NO
-5	-0.0045	-0.0350	-0.9842	NO
+5	-0.0001	0.0121	-0.0288	NO
+4	-0.0001	0.0120	-0.0284	NO
+3	-0.0002	0.0118	-0.0315	NO
+2	-0.0002	0.0117	-0.0330	NO
+1	-0.0001	0.0115	-0.0297	NO

0	-0.0001	0.0114	-0.0292	NO
-1	-0.0001	0.0112	-0.0301	NO
-2	0.0105	0.0217	2.1997	YES
-3	-0.0002	0.0215	-0.0382	NO
-4	-0.0002	0.0214	-0.0328	NO
-5	-0.0001	0.0212	-0.0309	NO
Philippines (R^2= 0.0091)				
+5	-0.0090	-0.0090	-0.9788	NO
+4	0.0015	0.0015	0.1651	NO
+3	-0.0029	-0.0029	-0.3112	NO
+2	-0.0133	-0.0133	-1.4491	NO
+1	0.0153	0.0153	1.6724	NO
0	-0.0125	-0.0125	-1.3682	NO
-1	0.0152	0.0152	1.6625	NO
-2	-0.0138	-0.0138	-1.5083	NO
-3	0.0105	0.0105	1.1436	NO
-4	0.0028	0.0028	0.3042	NO
-5	-0.0012	-0.0012	-0.1349	NO

5. Discussion

The absence of significant abnormal returns post-GSF announcement in both markets suggests market efficiency, where news is quickly incorporated into stock prices, or a lack of relevance attributed to GSF by market participants. This aligns with literature that discusses market's efficient response to anticipated events or those perceived as non-influential (Venturini, 2022). The literature emphasizes that equity markets are influenced by a multitude of factors, including macroeconomic indicators and investor sentiment, which might have diluted or preempted the impact of GSF announcements.

Based on the results of the event study analysis on the impact of Global Shield Financing (GSF) on various stock markets, it is evident that the market reactions varied across different countries. The findings suggest that the GSF announcement had no significant impact on the stock returns of the KSE 100 index in Pakistan. This lack of significant reaction may indicate that the market either anticipated the GSF announcement or perceived it as irrelevant for the future performance of the companies. This finding aligns with the notion that markets may not always react significantly to certain announcements if they are already priced in or deemed inconsequential for future prospects (Antoniuk & Leirvik, 2024).

On the other hand, the event study analysis revealed that the GSF announcement had a significant influence on the stock returns of the DSE 30 index in Bangladesh, particularly two days before the announcement date. This suggests that the market anticipated the GSF announcement and reacted positively to it, indicating a strong positive anticipation of the GSF benefiting the Bangladesh economy and companies. Similarly, the Senegal stock market BRVM 10 index experienced a significant and negative response to the GSF announcement, particularly on the day of the announcement and three days earlier. This negative reaction implies that the market expected the GSF to have a detrimental effect on the Senegal economy and companies. These contrasting reactions across different markets highlight the varying perceptions and anticipations of the GSF's impact on different economies and companies.

Furthermore, the event study analysis for the Ghana Stock Exchange and Costa Rica indicated that the GSF announcement had no significant effect on the stock returns of the GSE Composite index and the CRBCT index, respectively. This suggests that the markets in Ghana and Costa Rica did not demonstrate any notable response to the GSF news, both before and after its release. These findings imply that the markets in these countries did not anticipate the GSF to have a substantial impact on their respective economies and enterprises.

The contrasting reactions across different markets to the GSF announcement in our study highlight the varying perceptions and anticipations of the GSF's impact on different economies and companies. Antoniuk and Leirvik (2024) also utilized event study analysis to evaluate the effects of specific events on stock market returns, highlighting the importance of this methodology in understanding market reactions. This findings are consistent with Antoniuk and Leirvik (2024), which observes that the impact of climate change events on stock market returns is not uniform across different sectors. This study reveals that the market reactions to the GSF announcement were positive in Bangladesh, negative in Senegal, and insignificant in Ghana and Costa Rica. These findings suggest that the market's perception of the GSF's impact on different economies and companies varies significantly, underscoring the importance of understanding market dynamics in different contexts.

This study examined the impact of the Paris Agreement on the stock market performance of five recipient countries: Pakistan, Bangladesh, Senegal, Ghana and Costa Rica. The Paris Agreement is a global framework that aims to limit the increase in the average global temperature to 2°C by reducing greenhouse gas emissions and enhancing climate resilience (Bodle et al., 2016). The Agreement also calls for mobilizing financial resources to support low-carbon and climate-resilient development. The study used an event study methodology to measure the abnormal returns (AR) of the stock market indices of the selected countries during a five-day event window around the announcement date of the Agreement on December 12, 2015.

The results of the study showed that the Paris Agreement had a mixed and heterogeneous impact on the stock returns of the five emerging markets. The study found that the Paris Agreement had no significant impact on the stock returns of Pakistan, Bangladesh, Senegal, and Ghana, but had a positive and significant impact on the stock returns of Costa Rica (WorldEconomicForum, 2022). the KSE 100 index in the Pakistan stock market, Dhaka Stock Exchange, and BRVM composite index for Senegal Stock Exchange did not exhibit statistically significant abnormal returns during the event window, indicating that the markets did not react strongly to the news of the Paris Agreement. This could be due to the fact that these markets may have already adjusted to the expectations of the Agreement or perceived it as a non-critical factor for market performance in these contexts. On the other hand, the BNV index for Costa Rica Stock Exchange showed a positive and significant impact on stock returns two days before the announcement date, indicating that Costa Rican investors anticipated the Paris Agreement announcement and expected it to benefit the economy and companies. This could be due to the fact that Costa Rica is known for its strong commitment to environmental sustainability and renewable energy (Fletcher, 2016), and the Paris Agreement may have been perceived as a positive development for the country's efforts in this regard. Antoniuk and Leirvik (2021) also highlighted significant effects on different sectors. They indicated that the clean energy sector benefited from the Paris Agreement, reflecting increased climate change awareness and support for policies aimed at reducing the impact of climate change. On the other hand, events weakening climate change policy were associated with positive abnormal returns for the fossil energy sector, indicating a sector-specific response to policy changes. This study provides a detailed analysis of specific stock market indices' responses to the Agreement, highlighting

regional variations in market reactions. In contrast, Antoniuk and Leirvik (2021) focused analysis of sector-specific impacts of the Paris Agreement, emphasizing the differential responses of sectors like clean energy and fossil fuels to climate policy changes. This study offers a focused analysis specifically on the implications of the Paris Agreement, providing a detailed exploration of how this landmark climate agreement influences market reactions. This focused approach allows for a deeper understanding of the effects of global climate agreements on investor behavior and sectoral dynamics. Moreover, our study demonstrates a nuanced understanding of regional market dynamics by highlighting the significant positive impact on the Costa Rican market prior to the announcement date. This regional specificity adds richness to our analysis, emphasizing the importance of considering local contexts and market characteristics in assessing the consequences of international climate agreements on stock markets.

5.1 Conclusion

The findings of this study provide nuanced insights into the impact of the Global Shield Funding and the Paris Agreement on stock market returns in V7 countries. The analysis of investor responses to these climate events has revealed valuable information on how financial markets react to global initiatives addressing climate change. The results underscore the varying effects of these events on stock market dynamics, highlighting the importance of investor sentiment and market performance in the context of sustainable investments. By focusing on the specific outcomes related to the Global Shield Funding and the Paris Agreement, this research enhances our understanding of the interplay between environmental factors and economic variables in the realm of stock market behavior. These results offer practical implications for policymakers, investors, and businesses seeking to navigate the implications of these climate events on financial markets and sustainable investment strategies.

5.2 Future Research

Building on the insights gained from this study, future research in the field of climate events and stock market returns could explore several promising avenues. Firstly, conducting longitudinal studies to track the long-term effects of the Global Shield Funding and the Paris Agreement on stock market performance in V7 countries could provide a more comprehensive understanding of the sustained impact of these climate initiatives. Secondly, investigating the role of specific industries or sectors within the V7 countries in response to climate events could offer valuable insights into how different sectors are influenced by environmental policies and initiatives. Understanding sector-specific reactions to climate events can help investors and policymakers tailor their strategies to promote sustainable practices and investments. Furthermore, exploring the influence of investor sentiment and market expectations on stock returns following climate events could provide deeper insights into the behavioral aspects of financial markets in response to environmental challenges. Studying how investor perceptions shape market reactions to climate initiatives can help in predicting market trends and developing effective risk management strategies. Additionally, examining the spillover effects of climate events on neighboring or interconnected markets beyond the V7 countries could shed light on the broader implications of global climate initiatives on international financial markets. Understanding how climate events in one region impact markets globally can inform cross-border investment decisions and policy coordination efforts. Lastly, incorporating qualitative research methods, such as interviews or surveys with market participants, could provide a more holistic understanding of the mechanisms through which climate events influence stock market behavior. Qualitative insights can complement quantitative analyses and offer a richer perspective on the motivations and decision-making processes of investors in response to climate-related developments.

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