

Stock Market Reaction To Environmental Regulations: Evidence From Pakistan

Rubeena Tashfeen*¹, Mubeen Asghar², Talha Zubair Ahmad Khan³, Amina Rizwan⁴

Introduction

Greenhouse gas (GHG) emission is an important contemporary issue that has resulted in global warming and environmental degradation in the world. The role of governments and individuals has been expanded to reduce GHG emission rates. However,¹ this has not been sufficient for significantly reducing fossil fuel emission rates (Tollefson, 2021). The role of individuals is not separable from organizations and therefore, organizations are facing increasing pressure in order to reduce the impact of their operations on the natural environment (Garnett and Balmford, 2022).

With respect to Pakistan, there has been an increase in GHG emissions, particularly due to an increase in CO₂ emission rates related to rapid urbanization, transportation, inappropriate disposal of wastes, and industrialization projects initiated by organizations (Hussain et al., 2019). Although, Pakistan has pledged and committed to reducing Greenhouse gas (GHG) emissions through environmental policy formulation. Recent studies have highlighted the ineffectiveness of environmental regulations and governing bodies towards environmental policy regulations (Khan et al., 2021).

These environmental-related regulations and associated news have a significant impact on capital and financial market behavior which may be evidenced by analyzing investors' behavior. For instance, Dasgupta et al. (2001) highlighted that in developing countries, capital markets react to environmental news and policies. Environmental-related regulations have a significant impact on capital and financial market behavior which may be evidenced by analyzing investors' behavior. However, there is a lack of prior studies focusing on studying the association between environmental regulations, financial development, economic growth, energy consumption, and other such factors, specifically in Pakistan (Komal & Abbas, 2015; Hussain et al., 2012; Ahmed & Long, 2012).

Previously, associations between different types of news and stocks returns have been studied such as a positive relationship between macroeconomic news and stock returns (Birz & Lott Jr, 2011), a strong relationship between positive and negative oil price news and stock returns (Heston & Sinha, 2017), health news and stock returns (Salisu & Vo, 2020), policy news and stock returns (Baker et al., 2019) and political news and stock returns (Burggraf et al., 2020),

¹Associate Professor, FOMS, University of Central Punjab, Lahore rubeena.tashfeen@ucp.edu.pk

²MS Student, FOMS, University of Central Punjab, Lahore mubeen.asghar@ucp.edu.pk

³Assistant Professor, FOMS, University of Central Punjab, Lahore talha.zubair@ucp.edu.pk

⁴Assistant Professor, FOMS, University of Central Punjab, Lahore Amina.rizwan@ucp.edu.pk

*Corresponding Author

just to name a few. While previous studies have mainly focused on the impact of CSR, CSR information disclosure, and institutional reforms on financial performance (Iqbal et al. 2012, Murtaza et al. 2014, Qazi et al. 2015).

The reason for focusing on environmental news for explaining stock market volatility in Pakistan is particularly related to the significant influence of corporations and advertising agencies on climate-change journalism (Ejaz et al., 2022). This indicates the possibility of misinformation floating in contemporary media consequently making the stock market volatile. Additionally, the gradual increase in Pakistan's greenhouse gases emissions (GHG) mainly due to carbon dioxide and mostly attributed to the agriculture sector (Ritchie, et al., 2020), has indicated the ineffectiveness of the country's environmental regulations and governing bodies, fueling further the potential market volatility. Therefore, this study focuses on investigating the impact of the announcement of environmental regulations on the stock market of Pakistan in an attempt to uncover, if any association between the two.

Literature Review

Announcement of Environmental regulations can have both news effects, and as well as value effects on a firm's market capitalization. For instant, Han et al. (2019) investigated the average news effect in the Australian Stock Market and found that the market does respond to climate news and considers it a good initiative by the government. While the news regarding new policies can impose an extra burden on existing firms in form of a carbon tax. Additionally, Robinson et al. (2018) found that stock returns of green companies are linked with news items. Stock prices significantly responded to the news items in short term, however, this response does not seem to be long-lasting. Their results also suggested that market sentiment can move investors away from these companies.

Seminal work from Tetlock et al. (2008), later from Lerman & Livnat (2010) pointed out the short-term response in stock market returns due to news. However, the impact is greater if the news is aggregated over a week (Heston & Sinha, 2017). For instant, Griffin et al. (2010) found that greenhouse gas emissions are negatively associated with the stock price and this relationship is more prominent for carbon-intensive companies. Whereas, Pham et al. (2019) also found a delayed negative response from twenty-three French industries indicating that policies are achieving their desired effect.

It is important to note that media reporting of a firm has an impact on investors' behavior, and the capital market environment. News media is one of the major sources of information for investors as companies do not report their attitudes in public filings. For instant, Hsu and Wang (2013) analyzed a sample of firms with news coverage in the Wall Street Journal (WSJ) through textual content analysis focusing on positive and negative words used in the news articles. Results of their study show that firms with more negative words on climate change in articles have a significantly positive wealth effect. This implies that investors are concerned that the costs of fighting global climate change can offset the benefits.

Empirical evidence also supports the estimate that weather climate change is value relevant for investors and they incorporate weather and climate change information into the valuation of the stock. The results of Vlady (2015) are consistent with this estimate but the researcher discovered that stock prices are affected differently. They selected Oil and Gas, and ASX 200 index to investigate climate change information impact after the introduction of greenhouse gas reduction policies and found that investors are rational, they react to the financial and non-financial information, and the market is efficient. In contrast, Naila (2013) has found no significant relationship between environmental regulations compliance and the financial performance of Tanzanian manufacturing firms.

The impact of environmental policy regulation news and stock returns has been similar for Asian countries. For instant, the Vietnamese stock market showed an early negative reaction to the announcement of information disclosure policies and a positive reaction on event day and after the event days, and the announcement of these policies also caused changes in systematic risk, indicating a direct link between market anticipation of regulations and resulting stock price changes (Hoang et al., 2019).

Similarly, Zhao et al. (2016) found that environmental regulations had a significant and negative impact on the stock prices of Chinese energy firms in the short-term. As the level of government shareholding increases, the negative impact of environmental regulations decreases. Environmental regulations have varying impacts on different energy firms in different sectors, and this impact also varies with the regions. In contrast, Kong et al. (2014) concluded that Chinese investors react positively to a firm's environmental protection efforts.

Stock markets in Pakistan aren't immune to the 'news effect' similar to major Asian markets. For instance, Ghani and Chaudhary (2016) investigated the impact of the announcement of monetary policy on the stock market of Pakistan and found a significant policy announcement effect on the stock returns of banks. Similarly, in order to examine the impact of different events like political, natural disasters, and terrorism on stock prices, Gul et al. (2013) studied the financial sector of Pakistan. Their results showed that financial firms listed on KSE behaved negatively when a political and terrorism-related event occurs. While Ahmad (2015) suggested that investors are conservative to bad news but aggressive to good news regarding commercial banks in Pakistan. Analysis of the study postulates that the stock market is inefficient with respect to sudden bad news in the commercial banking sector, however, this cannot be applied to other sectors.

Literature focusing on Pakistan stock marks has mainly focused on the associations between the stock market, corporate financial performance, and corporate social responsibility (CSR). Although few studies are available on the linkage between the financial performance of firms and CSR information disclosure, none of them investigated the impact of environmental regulations announcements on stock market returns. While existing studies have examined only the financial performance of firms using ROA and ROE as the proxies and completely ignored the economic impact of CSR policies.

Environmental Regulations and Stock Market Returns:

Studies have identified several market abnormal behaviors known as market anomalies, like, the January Effect (Rozeff and Kinney, 1976), the Weekend Effect (French, 1980), the Halloween effect (Bouman and Jacobsen, 2002), Weather conditions and signs of trade (Hirshleifer and Shumway, 2003). Detection of these market anomalies provides strong evidence that events take place complete with its fundamental law. This is inconsistent with traditional finance and therefore, this phenomenon has started a real crisis for traditional finance (Causi, 2017).

Empirical evidence does not support the traditional approach of a financial market which postulates that investors change their beliefs in a correct-optimal way in response to any new market sentiment. On the other hand, recent behavioral approaches support individual preferences rather than the rationality of investors. Bounded rationality, which is the analysis of the decision-making process of individuals, describes that the common behavior of individuals is limited to their thinking capacity, available information, and time (Simon, 1982). Corresponding with the three types of efficient markets identified by Fama (1970), the most important of these limitations is the flow of information and rationality of individuals to the available information.

Several studies have tested Efficient Market Hypothesis to test the uncertainty of stock prices of individual firms but still, there are enough gaps in the literature regarding testing the random walk of the stock market. Considering these arguments and paradoxes, this study is using EMH as the base theory to test whether EMH holds in terms of environmental regulations announcements, in the context of Pakistan.

As noted earlier, environmental policies directly influence business activities with a possible increase in production costs, and damage to shareholder benefits. In addition, the effects of environmental regulations on production cost or any other cost structure may differ at a firm level while assuming firms do not have the same cost structure (Tona, 2017). Hence, this effect on costs will ultimately be incorporated into stock prices by market forces (Hoang et al. 2019, Pham et al. 2019; Jiang and Luo 2018; Chapple et al. 2013; Deák and Karali 2014; Ramiah et al. 2016; Ramiah et al. 2013). So, in order to test the Efficient Market Hypothesis with respect to environmental regulations through an event study, we can hypothesize that:

H1: Pakistan Stock Market (PSX) responds to announcements of environmental regulation.

Carbon Intensive Industries Response and Environmental Regulation News

In addition to the Kyoto Protocol, parties under UNFCCC proposed another agreement to compete against global climate change as Paris Agreement. Which further extended the legal bindings to reduce the carbon emission of developed nations. To test whether financial markets respond positively or negatively to the Paris Agreement, Monasterolo and Angelis (2018) conducted a study in European Union, United States, and other global stock markets. They found that the overall performance of the low-carbon indices has improved after the Paris Agreement, as the systematic risk of low-carbon equity stocks decreased significantly. On the other hand, the systematic risk for carbon-intensive equities increased after the announcement of the Paris Agreement. Consistent with the emerging literature, Ramiah et al. (2016) also found that the announcement of domestic, and international green and nuclear policies has a major impact on British equity portfolio returns. Environmental policies also cause changes in the systematic risk of corporations in the short-term as well as in long term.

The impact of announcements on stock market returns appeared to be diverse across sectors. The results of Robinson (2018) suggested that complying with environmental regulations can make firms less exposed to the impact of short-run fluctuations. As investors perceive investing in these firms as a means of enhancing the long-run prospects for the firm. Evidence also suggests that response to environmental regulations varies across sectors (Hoang et al. 2019; Jiang and Luo 2018; Chapple et al. 2013).

H2: Carbon-intensive and non-carbon industries respond differently to the announcement of environmental regulation.

Methodology

This study is tests impact of each event on stock returns through an event study. We will be calculating abnormal returns around event dates to observe each event's impact and cumulative abnormal returns would also be calculated to see the aggregated effect of abnormal returns. Furthermore, to examine how the stock return effects of an event are related to firm characteristics, we briefly call attention to cross-sectional test. Cumulative abnormal returns would be compared to firm specific characteristics to test whether firm characteristics explain cross-sectional variation in market response to environmental regulation events.

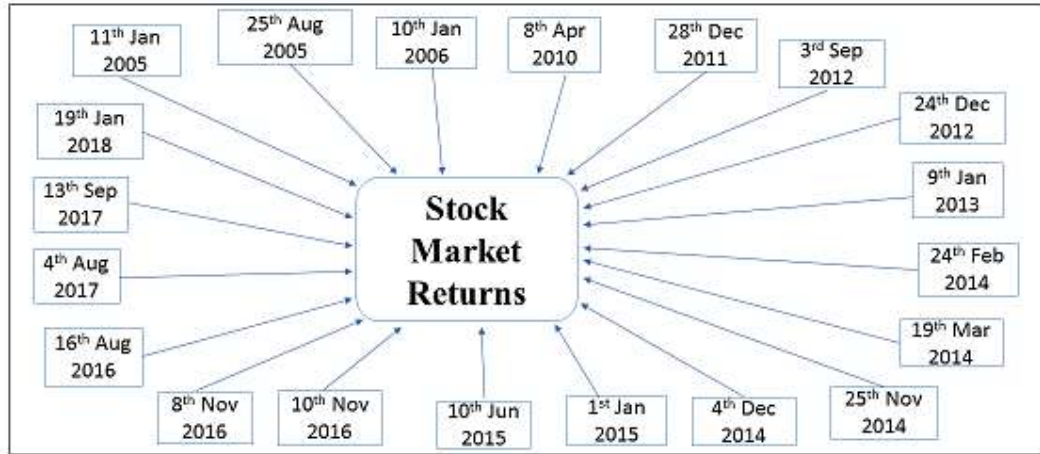


Figure 2. A Sample of Regulation Announcements with Event Dates

Figure 2 gives an idea of some event dates from 2005 to 2018 where announcements were made with respect to environment regulation.

An event study is a statistical method to capture the impact of an event on firm value. In order to measure the impact of environmental regulations on stock market. We are taking the announcement of environmental regulations as our event. We want to see whether stock returns display any abnormal returns (returns in excess of their expected return) after and before the event take place. Abnormal return is defined as the expected return minus actual return. Abnormal Return Analysis helps us to capture the effect of any type of event on the first day of trading following the event and the direction and degree of change in stock price. Figure 3 provides a depiction of how the events are measured.

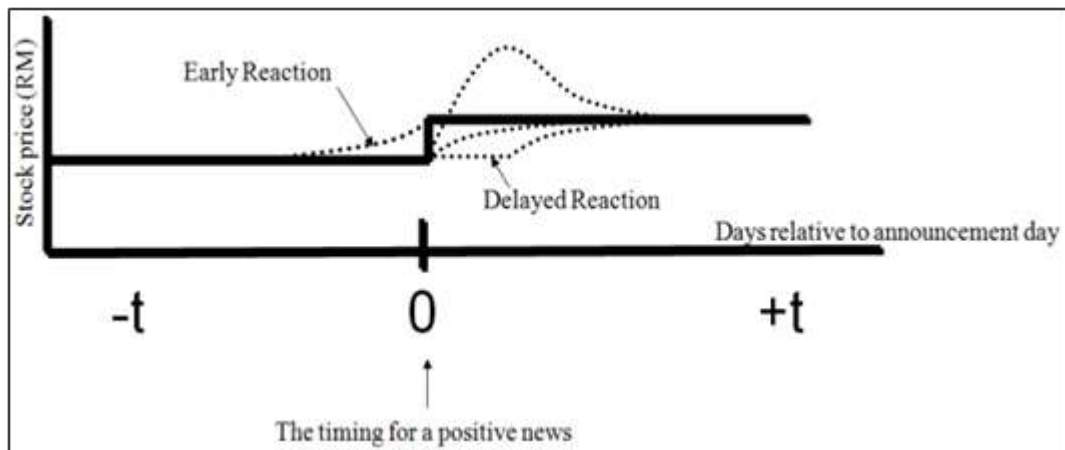


Figure 3. Reactions of Stock Prices to News (Source: Mishkin 2007)

In an event study, there are four types of reactions to test for any evidence (i) Early reaction, (ii) Delayed reaction, (iii) Under reaction, and (iv) Over reaction around the event as shown in the above figure. Response of stock market to any event, that affect stock prices, cannot be predicted. Thus, security prices or returns can be used as a measure of an event’s economic effect because security prices are recognized over a relatively short period (Mishkin 2007).

However, in the manner of Frank (2007) we tailor the study of the events in our sample:

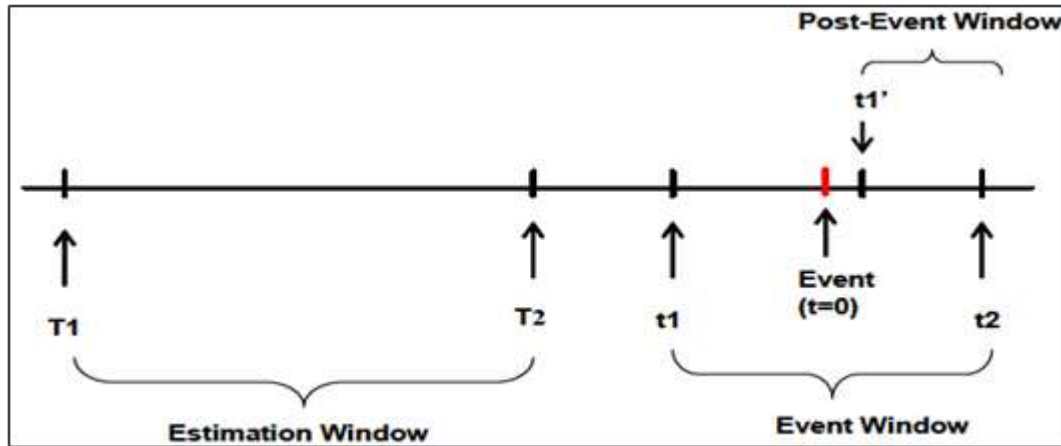


Figure 4. Timeline for the Event Study (Source Frank, 2007)

Abnormal Return is defined as the difference between expected return (ER) and actual return (AR). In order to determine the expected return, estimation of some parameters is required. Estimation window is the period which is used to calculate expected or normal return, as shown in figure 4 denoted as T1 to T2, and returns that are required to be compared with normal returns are calculated during period called Event window also shown in figure above as t1 to t2. Where $t=0$ is the day when an event takes place, t1 to $t=0$ is pre-event and $t=0$ to t2 is the post-event window. Abnormal return on the event date is denoted in the study as $AR_{i,0}$ and abnormal returns around event dates is denoted as $AR_{i,t}$.

Prior to the considered event, event window is used to estimate the expected or normal returns of the firms that should be at any time before, after, and on event day. After that the methodology subtracts expected return from the actual return to obtain abnormal returns attributed to the event. Event studies, however, might vary with reference to their measurement of normal returns. We will be using daily returns from days -180 to -5 , for or estimation window, relative to the policy announcement. Assuming that returns more than 20 days prior to the event are not influenced by the event itself, we think of this window as a “normal” period. Furthermore, if any other firm specific event happens during the year like expansion, acquisition, dividend announcement, etc. would be set off by using a yearlong estimated window.

4.2 Data Sample:

The data of announcements of environmental regulations as events that are directly reflective of the Pakistani government’s carbon policies is collected by searching for the terms: Pakistan Kyoto Protocol, Pakistan GHG Emission, Carbon Policies in Pakistan, GHG Emission Reduction in Pakistan, Environmental Degradation and Preservation in Pakistan, Clean Development Mechanism, Environmental Protection Act 1997, Pakistan Climate Change Act, and Policy. By searching for these key words, initially, list of twenty independent events was made. The timing, content and possible directional effect of these events were independently checked. Thus, seven events were finally identified and confirmed to conduct our analyses. Daily stock price data was collected from Pakistan Stock Exchange’s website. Period for the study is selected was from 2012 to 2018, mainly due to the impacts of the regulations.

Sample of the Study:

Non-Financial sector firms listed in KSE100 index were selected for the study sample. For the purpose of segregation of industries into carbon and non-carbon intensive stocks, International Institute for Sustainable Development, Economic Survey of Pakistan 2014 to 2018, was used showing each company's contribution to the country's total carbon emission. This was also reported by Pakistan's Intended Nationally Determined Contribution (INDC) report 2016.

According to their identification, carbon intensive industries are; Power, Generation, Refinery, Oil and Gas Exploration Companies, Fertilizer, Transport, Chemical, Cement, Oil and Gas Marketing Companies, Cable and Electrical Goods, Textile Composite, Synthetic and Rayon, Tobacco, Automobile Assembler, Paper and Board, Automobile Parts and Accessories, Sugar and Allied Industries, Textile Spinning, Textile Weaving, and Woollen. And Non-carbon intensive industries are, Commercial Banks, Technology and Communication, Real Estate Investment Trust, Inv. Banking/ Inv. Cos. / Securities Cos., Vanaspati and Allied Industries, Glass and Ceramics, Engineering, Insurance, Pharmaceutical, Close-End Mutual Fund, Modarabas, Leasing companies, Food and Personal Care Products, Miscellaneous, and Leather and Tanneries.

Table 1: Sample of Events - Pakistan Environmental Regulations Announcements

Sr. No.	Dated	Policies Announced
2	1 st Jan. 2015	Announcement of framework for implementation of climate change policy 1 st Jan. 2015 (2014-2030)
3	10 th June 2015	Federal MOCC Mushahidullah khan gave an interview to Thomson Reuters Foundation and explained about submission of INDC report
4	16 th Aug 2016	Pakistan Access to Genetic Resources and Benefit-sharing Act, 2012 (Draft)
5	10 th Nov 2016	Pakistan ratified the Paris agreement
6	4 th Aug 2017	Pakistan Climate Change Act
7	19 th Jan, 2018	UN climate change published a report about Pakistan's consideration about putting price on emissions.

Source: Ministry of climate change, Dawn News, UNFCCC.

4.3 The Quantitative Research Model:

This study follows the traditional event study methodology of Fama, Fisher, Jensen, and Roll (1969) which involves calculating cumulative average abnormal returns (“CAARs”).

There are three steps of this process:

1. Calculate daily abnormal returns (“ARs”) for each firm in the days surrounding the announcement of the event being studied. Daily ARs can be calculated using various benchmarks: (1) market model (MM); (2) mean adjusted return model (MAR); (3) market adjusted returns or index model (IM); or (4) an equilibrium asset pricing model, such as the CAPM.

This study uses the statistical market model to estimate expected returns. As the market model is most commonly used to generate expected returns and no better substitute has so far been found regardless of the weak relationship between beta and actual returns (Armitage 1995; Cable and Holland 1999). Then, we can compare those expected returns to actual returns to find daily abnormal returns. The market model assumes that the only factor determining the return on stock i , at time t , is the return on the market at time t . This relation is modeled linearly, as in equation (1).

$$E(R_{it}) = \alpha_i + \beta_i (R_{mt}) + \epsilon_{it} \quad (1)$$

This model is very similar to CAPM, except that the intercept is taken to be a constant rather than the risk-free rate. The market model parameters, α_i and β_i , can be estimated through ordinary least squares regression. As our data for the regression, we use daily returns from days -180 to -5 relative to the policy announcement. This is the estimation window. Assuming that returns more than 20 days prior to the event are not influenced by the event itself, we think of this window as a “normal” period. Once we have our estimated values of α_i and β_i , we can find expected returns in our event window by plugging in the market return.

The market model predicts what the return should be on the stock in normal conditions; by taking the difference between actual and predicted returns for each security at each point in time during the event window, as in equation (2), we find daily abnormal returns. The event window is often sometimes used by studies as -10 to 10 and mostly -5 to 5 days relative to the earnings announcement at day 0. We have used 11 days event window consisting of 5 days before and 5 days after an event takes place.

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \quad (2)$$

2. Then we calculate the average abnormal return (“AAR”) for each day in the event window. This aggregates the abnormal returns for all N stocks to find the average abnormal return at each time t . This helps eliminate idiosyncrasies in measurement due to particular stocks.

$$AAR_t = \frac{1}{N} \sum_{i=1}^N AR_{i,t} \quad (3)$$

3. Finally, sum the average abnormal returns over the T days in the event window (i.e. over all times t) to form the cumulative average abnormal return

$$CAAR_t = \sum_{T=1}^T AAR_t \quad (4)$$

The CAAR is a useful statistical analysis in addition to the AAR because it helps us get a sense of the aggregate effect of the abnormal returns. Particularly if the influence of the event during the event window is not exclusively on the event date itself, the CAAR can prove very useful.

Results

Here we can elaborate results sector wise, or positive or negative results wise, or each event wise effect in different firms.

Table 2 reports statistically significant abnormal returns, as well as their t statistics, on the first day of trading following the announcement of green policies. We document statistically significant negative responses in approximately all sectors.

Consider first announcement 1, Announcement of National Climate Change Policy on 3rd Sep 2012. This report provides a gloomy picture of Pakistan at the end of this century if no adequate measures are adopted to reduce greenhouse gas emissions. It predicts that ecological and economic damage will follow if no actions are undertaken. The results presented in Table 2 show that the stock market did react negatively to the release of this report, as significantly negative abnormal return followed the announcement. However, 9 firms out of 34 reacted positively. A plausible explanation for the positive reaction of the industrial engineering and general industrial sectors is that it is these sectors that will produce environmentally-friendly machinery. Consider now the effect of the development of a plan to transform Pakistan into a low-carbon economy by implementing climate change policy 1st Jan 2015 (2014-2030) as well as the submission of INDC report.

On 10th June 2015, Federal Minister of Climate Change Mushahidullah Khan gave an interview to Thomson Reuters Foundation and explained about submission of INDC report. The results show negative abnormal return in more than 88% of the firms on the same day. However, four firms out of our sample shows positive abnormal returns.

Abnormal returns vary directly with revenue and cost. If we consider the health care sector, for example, it is plausible to suggest that the introduction of the CPRS provides a better environment whereby people will be healthier, which in turn reduces the future revenue of the health care sector. In addition, the introduction of an emission trading scheme leads to a higher cost of production. The combination of these two factors provides a potential explanation for the negative abnormal return of this sector.

The Pattern of CAARs:

According to the efficient market hypothesis (EMH), the stock market reacts immediately to any new information. If this is true, then abnormal returns can be observed on the first day of information message arrival but not in the following days. However, the principles of behavioral finance tell us that market participants with conservatism bias (representativeness bias) may experience under-reaction or over-reaction to new information.

Tables 2 and 3 present the CAARs for the sample firms and also segregate the CAAR for the carbon intensive and non-carbon intensive firms.

Table 2: CAAR of Stocks for All Companies

No.	11 DAYS CAAR				Firm Response	
	YEAR	NO. OF FIRMS	CAAR	T-STATISTICS	Positive	Negative

1	2012	34	-0.26349	-9.23896637	9	28
2	2015	37	0.56693	-29.6130565	4	33
3	2015	37	-0.4738	-37.4591476	4	33
4	2016	37	-0.2045	-12.6006361	2	35
5	2016	37	0.20653	-17.7443081	3	34
6	2017	37	0.21671	-9.02823203	2	35
7	2018	37	0.22943	-10.0744872	7	30

Table 3: CAAR of Stocks for Carbon Intensive and Non-Carbon Intensive Companies -

11 DAYS CAAR								
	Carbon Intensive				Non Carbon Intensive			Diff in CAAR
N o.	YEA R	CAAR	T- STATISTIC S		YEA R	CAAR	T- STATISTICS	(Non- Carbon less Carbon
1	2012	-0.264446	-8.2635502		2012	0.26036	-8.750646359	0.004082417
2	2015	-0.612079	-32.688017		2015	0.40328	-13.85069445	0.208799585
3	2015	-0.491982	-30.644826		2015	0.40789	-19.65246754	0.084088687
4	2016	-0.214351	-11.125441		2016	0.16879	-7.941312487	0.045564172
5	2016	-0.201928	-17.417656		2016	0.22321	-11.71548429	-0.021283964
6	2017	-0.232268	-8.1158235		2017	0.16033	-6.660479251	0.071933947

7	2018	- 0.223575	-9.6739053	2018	- 0.25065	-7.19360047	- 0.0270717 16

Information on environmental regulations and carbon tax legislation may be leaked or the market may anticipate the news before it is released officially. This section differentiates our study from previous studies in the literature whereby we examine the possible market anticipation of environmental regulations. The alternative energy sector, for instance, recorded the highest positive cumulative abnormal return of 126.09% (with a t-statistic of 2.77) five days before the carbon pricing bill was passed in Parliament on 20 March 2018. This result indicates that green sectors applying nature-friendly technology may produce positive abnormal returns as their rewards. In support of the market anticipation hypothesis, we find that eight sectors (including automobiles and parts; electrical equipment and services; forestry and papers; general retailers; industrial engineering; personal goods; fixed line telecommunication; and travel and leisure) experienced positive CARs five days before announcement on 20 February 2017. For example, the automobiles and parts sector and the electrical equipment and services sector experienced positive CAR(-5)s of 6.44% (with a t-statistic of 2.42) and 5.96% (with a t-statistic of 2.30), respectively. A possible explanation of these favourable outcomes is that these sectors follow the trend to produce eco-friendly recycled and bio-based parts.

The findings shown in Tables 2&3 reflect market anticipation and delayed reaction five days before or five days after the announcements (as measured by the cumulative abnormal return, CAR(-5) and CAR5 respectively). Overall, 22 sectors in Table 3 accounted for over 50% of total sectors that experienced positive CAR(-5), while the numbers of sectors exhibiting negative and mixed results are 2 and 1, respectively. We observe conservatism-biased traders have a tendency to react slowly to new information, leading to the phenomenon of a delayed reaction. We can see that sectors with positive CAR5 held an impressive 30% of the total sectors of the stock market, whereas four and three sectors experienced negative CAR5 and mixed outcomes, respectively.

Therefore, the findings reject the null hypotheses and support the alternative hypotheses: H1 and H2, to show that environmental regulations and announcements have an impact on the Pakistan Stock Market.

References:

1. Ahmad, S. A. (2015). Stock market's reaction to unanticipated events—a study of Pakistan. *IOSR Journal of Economics and Finance*, 6(1), 50-61.
2. Ahmed, K., & Long, W. (2012). Environmental Kuznets curve and Pakistan: an empirical analysis. *Procedia Economics and Finance*, 1, 4-13.
3. Armitage, S. (1995). Event study methods and evidence on their performance. *Journal of economic surveys*, 9(1), 25-52.
4. Bouman, S., & Jacobsen, B. (2002). The Halloween indicator, "Sell in May and go away": Another puzzle. *American Economic Review*, 92(5), 1618-1635.
5. Baker, S. R., Bloom, N., Davis, S. J., & Kost, K. J. (2019). Policy news and stock market volatility (No. w25720). National Bureau of Economic Research.
6. Birz, G., & Lott Jr, J. R. (2011). The effect of macroeconomic news on stock returns: New evidence from newspaper coverage. *Journal of Banking & Finance*, 35(11), 2791-2800.
7. Burggraf, T., Fendel, R., & Huynh, T. L. D. (2020). Political news and stock prices: evidence from Trump's trade war. *Applied Economics Letters*, 27(18), 1485-1488.

8. Cable, J., & Holland, K. (1999). Modelling normal returns in event studies: a model-selection approach and pilot study. *The European Journal of Finance*, 5(4), 331-341.
9. Causi, G. L. (2017). *Theories of investor behavior: From the Efficient Market Hypothesis to Behavioral Finance*. Tallinn University of Technology.
10. Chapple, L., Clarkson, P. M., & Gold, D. L. (2013). The cost of carbon: Capital market effects of the proposed emission trading scheme (ETS). *Abacus*, 49(1), 1-33.
11. Dasgupta, S., Laplante, B., & Mamingi, N. (2001). Pollution and capital markets in developing countries. *Journal of Environmental Economics and management*, 42(3), 310-335.
12. Deák, Z., & Karali, B. (2014). Stock market reactions to environmental news in the food industry. *Journal of Agricultural and Applied Economics*, 46(2), 209-225
13. Ejaz, W., Ittefaq, M., & Arif, M. (2022). Understanding influences, misinformation, and fact-checking concerning climate-change journalism in Pakistan. *Journalism Practice*, 16(2-3), 404-424.
14. Fama, E. F. (1970). Efficient capital markets. *Journal of finance*, 25(2), 383-417.
15. Mishkin, F. S. (2007). *The economics of money, banking, and financial markets*. Pearson education.
16. Frank, J. (2007). *Event Studies: A Methodology Review*. Empirical Finance and Investment Cases. Tilburg University.
17. French, K. R. (1980). Stock returns and the weekend effect. *Journal of financial economics*, 8(1), 55-69.
18. Garnett, E. E., & Balmford, A. (2022). The vital role of organizations in protecting climate and nature. *Nature Human Behaviour*, 6(3), 319-321.
19. Ghani, M., & Chaudhary, G. M. (2016). Stock market response to policy announcement: Evidence from banking sector of Pakistan. *Developing Country Studies*, 6(1), 1-14.
20. Griffin, P. A., Lont, D. H., & Sun, E. Y. (2017). The relevance to investors of greenhouse gas emission disclosures. *Contemporary Accounting Research*, 34(2), 1265-1297.
21. Gul, S., Khan, M. T., Saif, N., Rehman, S. U., & Roohullah, S. (2013). Stock market reaction to political events (Evidence from Pakistan). *Journal of economics and sustainable development*, 4(1), 165-174.
22. Han, J., Linnenluecke, M. K., Pan, Z. T., & Smith, T. (2019). The wealth effects of the announcement of the Australian carbon pricing scheme. *Pacific-Basin Finance Journal*, 53, 399-409.
23. Heston, S. L., & Sinha, N. R. (2017). News vs. sentiment: Predicting stock returns from news stories. *Financial Analysts Journal*, 73(3), 67-83.
24. Hoang, T. C., Pham, H., Ramiah, V., Moosa, I., & Le, D. V. (2019). The Effects of Information Disclosure Regulation on Stock Markets: Evidence from Vietnam. *Research in International Business and Finance*, 101082
25. Hirshleifer, D., & Shumway, T. (2003). Good day sunshine: Stock returns and the weather. *The Journal of Finance*, 58(3), 1009-1032.
26. Hsu, A. W. H., & Wang, T. (2013). Does the market value corporate response to climate change?. *Omega*, 41(2), 195-206.
27. Hussain, M., Irfan Javaid, M., & Drake, P. R. (2012). An econometric study of carbon dioxide (CO₂) emissions, energy consumption, and economic growth of Pakistan. *International Journal of Energy Sector Management*, 6(4), 518-533
28. Hussain, M., Butt, A. R., Uzma, F., Ahmed, R., Islam, T., & Yousaf, B. (2019). A comprehensive review of sectorial contribution towards greenhouse gas emissions and progress in carbon capture and storage in Pakistan. *Greenhouse Gases: Science and Technology*, 9(4), 617-636.
29. Iqbal, N., Ahmad, N., Basheer, N. A., & Nadeem, M. (2012). Impact of corporate social responsibility on financial performance of corporations: Evidence from Pakistan. *International journal of learning and development*, 2(6), 107-118.
30. Jiang, Y., & Luo, L. (2018). Market reactions to environmental policies: Evidence from China. *Corporate Social Responsibility and Environmental Management*. doi:10.1002/csr.1505
31. Komal, R., & Abbas, F. (2015). Linking financial development, economic growth and energy consumption in Pakistan. *Renewable and sustainable energy reviews*, 44, 211-220.
32. Lerman, A., & Livnat, J. (2010). The new Form 8-K disclosures. *Review of Accounting Studies*, 15, 752-778.
33. Monasterolo, I., & De Angelis, L. (2018). Are financial markets pricing carbon risks after the Paris Agreement? An assessment of low-carbon and carbon-intensive stock market indices. *An Assessment of Low-Carbon and Carbon-Intensive Stock Market Indices* (December 9, 2018).

34. Murtaza, I. A., Akhtar, N., Ijaz, A., & Sadiqa, A. (2014). Impact of corporate social responsibility on firm financial performance: A case study of Pakistan. *International Review of management and business research*, 3(4), 1914.
35. Naila, D. L. (2013). The effect of environmental regulations on financial performance in Tanzania: A survey of manufacturing companies quoted on the Dar Es Salaam Stock Exchange. *International Journal of Economics and Financial Issues*, 3(1), 99-112.
36. Pham, H. N. A., Ramiah, V., & Moosa, I. (2019). The effects of environmental regulation on the stock market: the French experience. *Accounting & Finance*.
37. Qazi, S., Ahmed, M., Kashif, S., & Qureshi, Z. (2015). Company's financial performance and CSR: Pakistan context. *Global Advanced Research Journal of Management and Business Studies*, 4(5), 196-202.
38. Ramiah, V., Martin, B., & Moosa, I. (2013). How does the stock market react to the announcement of green policies? *Journal of Banking & Finance*, 37(5), 1747-1758.
39. Ramiah, V., Morris, T., Moosa, I., Gangemi, M., & Puican, L. (2016). The effects of announcement of green policies on equity portfolios: Evidence from the United Kingdom. *Managerial Auditing Journal*, 31(2), 138-155.
40. Ritchie, H., Roser, M., & Rosado, P. (2020). CO₂ and greenhouse gas emissions. Our world in data. Retrieved from: <https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions>. (Online Resource)
41. Robinson, J., Glean, A., & Moore, W. (2018). How does news impact on the stock prices of green firms in emerging markets? *Research in International Business and Finance*, 45, 446-453.
42. Rozeff, M. S., & Kinney Jr, W. R. (1976). Capital market seasonality: The case of stock returns. *Journal of financial economics*, 3(4), 379-402.
43. Khan, A. R., Ditta, A., Mehmood, M. S., MaoSheng, Z., & Natalia, M. (2021). Determinants and implications of environmental practices for waste management and the minimization in the construction industry: a case study of Pakistan. *Environmental Science and Pollution Research*, 28(41), 58221-58231.
44. Kong, D., Liu, S., & Dai, Y. (2014). Environmental policy, company environment protection, and stock market performance: Evidence from China. *Corporate Social Responsibility and Environmental Management*, 21(2), 100-112.
45. Salisu, A. A., & Vo, X. V. (2020). Predicting stock returns in the presence of COVID-19 pandemic: The role of health news. *International Review of Financial Analysis*, 71, 101546.
46. Simon, H. (1957). *A Behavioral Model of rational choice*, in *Models of Man*. New York: Wiley.
47. Tollefson, J. (2021). COVID curbed 2020 carbon emissions-but not by much. *Nature*, 589(343).
48. Tona, E. (2017). The effects of environmental disasters and pollution alerts on stock markets: evidence from China.
49. Tetlock, P. C., Saar-Tsechansky, M., & Macskassy, S. (2008). More than words: Quantifying language to measure firms' fundamentals. *The journal of finance*, 63(3), 1437-1467.
50. Vlady, S. (2015). The Effect of Climate Change on Australian Stock Equity Returns. *International Journal of Economics and Business Administration*, III (3), 88-109.
51. Zhao, X., Fan, Y., Yu, X., & Fang, M. (2016, October). The Impacts of Environmental Policies on Stock Prices of Energy Companies in China. In *Implications of North American Energy Self-Sufficiency, 34th USAEE/IAEE North American Conference*, Oct 23-26, 2016. International Association for Energy Economics.