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Shri Dharmasthala Manjunatheshwara Institute for Management Development, Mysuru, India
11th International Economics Conference on Economic Growth and Sustainable Development: Innovation, Inclusion and Resilience – November 26-27, 2026

Did India's Carbon Targets Hurt Polluting Companies' Share Prices? Evidence from the 2025 Carbon Credit Trading Scheme Targets

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Abstract

Background and Rationale: India's climate policy moved from design to binding obligation on 8 October 2025. On this day, the Ministry of Environment, Forest and Climate Change notified legally binding greenhouse gas emission intensity targets under the Carbon Credit Trading Scheme (CCTS), first notified in 2023, for industrial units in four polluting sectors: aluminium, cement, chlor-alkali, and pulp and paper. These targets may impose real costs for companies. To meet legal requirements, firms must make major investments in green technologies, buy carbon credits to offset emissions, or otherwise risk substantial financial penalties. In principle, investors are expected to account for these added costs, which could lower affected companies' share prices. Most existing Indian research has focused on the scheme's 2023 announcement, so how investors have responded to the finalised targets remains largely unexplored.

Objectives: This study aims to examine whether the Indian stock market reacted to the notification. Specifically, it seeks to (i) measure abnormal returns of covered firms around the notification date, (ii) compare the reaction across the four sectors, and (iii) test whether firms facing larger required reductions in emission intensity experienced stronger negative reactions.

Proposed Methodology: We conducted an event study of 30 National Stock Exchange (NSE)-listed firms whose plants are covered by the Greenhouse Gases Emission Intensity Target Rules, 2025. Expected returns came from a market model estimated over 250 trading days, with the Nifty 500 as the benchmark. Abnormal returns were actual minus expected returns, and cumulative abnormal returns (CARs) were computed over the (0,0), (−1,+1) and (−2,+2) windows. Day 0 was 10 October 2025, the first trading day after the Rules were notified, and 8 October 2025 was used as a robustness check. Average CARs were tested with the cross-sectional t-test and the Wilcoxon signed-rank test. Because all firms share one event date, we also applied the Boehmer–Musumeci–Poulsen and Kolari–Pynnönen tests, which allow for cross-correlation, and a placebo test on 134 non-event dates. A cross-sectional regression with heteroskedasticity-robust standard errors related each firm's CAR to its required reduction in emission intensity, firm size and sector. Firm-level CARs for the largest company in each sector are reported, and firms with other major news near the event date were screened out as a robustness check. Analysis was carried out in R.

ISBN code 978-81-999803-3-4

Research Implications: The results show that investors in an emerging market priced carbon regulation only weakly: the average fall was about 0.9% over three days, and it is marginally significant after adjusting for firms sharing one event date. Smaller firms fell more, and firms with larger required cuts did not fall more. For policymakers, this suggests that target-setting did not impose a clear extra cost on investors in proportion to ambition. For investors, it suggests that firm size mattered more than a firm's own required cut. For firms planning decarbonisation, it suggests that the market did not penalise them for the targets alone.

Keywords: Carbon Credit Trading Scheme, Emission Intensity Targets, Event Study, Carbon Risk, Abnormal Returns, Indian Stock Market.

1. Introduction

When a new climate rule can raise a company's costs, investors have reason to care. India is now moving from voluntary schemes to binding limits. On 8 October 2025 the Ministry of Environment, Forest and Climate Change (2025) published the Greenhouse Gases Emission Intensity Target Rules, 2025. The Rules give 282 industrial plants a target for how much greenhouse gas they may emit for each unit they produce. A plant that beats its target earns carbon credits. A plant that misses it must buy credits under the Carbon Credit Trading Scheme (CCTS).

This leads to a simple question: did the market treat the targets as bad news for the companies that own these plants? If so, their share prices should have fallen when the Rules came out, and fallen more for companies facing bigger required cuts.

We test both ideas with an event study of 30 companies listed on the National Stock Exchange (NSE). The paper adds three things. First, earlier Indian studies looked at other events, such as the June 2023 launch of the CCTS, and we found none on the October 2025 company targets. Second, it measures each company's required cut from the plant table in the Gazette, instead of just using the sector. Third, because every company has the same event date, it reports a test that adjusts for this and a placebo check, besides the usual t-tests. We find a mild fall in prices that is only borderline once these checks are applied, a clear size pattern, and no link between the required cut and the price reaction.

2. Policy Background and Event Date

The CCTS was announced in June 2023 under the Energy Conservation Act, 2001. It asks selected industrial units to meet limits on their emission intensity, which means tonnes of carbon dioxide equivalent per unit of output. Draft Rules were published on 16 April 2025 (G.S.R. 234(E)) so that people could send objections and suggestions. The final Rules (G.S.R. 739(E)) appeared in the Gazette of India, Extraordinary, No. 655, dated 8 October 2025. They include a table with each plant's starting emission intensity and its targets for 2025–26 and 2026–27.

The Rules took effect on the day of publication, but investors probably could not trade on them on 8 October. The Gazette copy we use carries a digital signature time of 16:25 IST on 9 October 2025, which is after the NSE closes at 15:30. The earliest news coverage we found is dated 10 October. So we treat Friday 10 October 2025 as Day 0 and use 8 October as a second check. Because the draft Rules came out in April 2025, some of the news may already have been in prices. We come back to this under the limitations.

ISBN code 978-81-999803-3-4

3. Earlier Research and Hypotheses

An event study checks how fast share prices react to news (Fama et al., 1969; MacKinlay, 1997). Brown and Warner (1985) showed that simple methods work well with daily returns.

Earlier studies found that markets do react to environmental news. Hamilton (1995) found that firms named in a public pollution database lost value, and Klassen and McLaughlin (1996) found that environmental crises lowered returns while environmental awards raised them. Konar and Cohen (2001) found that firms with poor environmental records had lower market values. The evidence on carbon rules is mixed. Oberndorfer (2009) linked European carbon permit prices to the returns of power companies. Bushnell et al. (2013) found that when the European carbon price fell, carbon-heavy firms lost value, which suggests that free permits had been a gain for them. Ramiah et al. (2013) found that stock markets reacted to green policy announcements, and that the reaction depended on the announcement and the industry. Other work finds that firms with higher emissions earn higher returns, which may be a reward for carbon risk (Bolton & Kacperczyk, 2021, 2023; Hsu et al., 2023). Three Indian studies are closest to ours, but each looks at a different event. Lamba and Aggarwal (2024) found a negative abnormal return of 0.49% on the day 52 firms announced carbon-neutrality pledges. Priyadarshani et al. (2026) studied the June 2023 launch of the CCTS in 365 firms and found a CAR of −2.04% over 15 days, smaller for firms with higher ESG scores. Upadhyaya and Singh (2026) studied listed power companies at the same date and found no robust repricing. None of them uses the plant-level targets published in October 2025.

Theory does not give a clear direction either. Rules can add costs (Palmer et al., 1995), or they can push firms to innovate in ways that pay back (Porter & van der Linde, 1995). Ambec et al. (2013) find only mixed support for the second view. Under a scheme with tradable credits, efficient firms may even gain. We therefore build our hypotheses on the cost argument and treat the rest as exploratory.

H1: The average abnormal return around the notification is negative.

H2: Companies with a bigger required cut have more negative abnormal returns.

H3 (exploratory): Abnormal returns differ by company size and by sector.

4. Data and Method

Sample and required cut: We picked 30 NSE-listed companies that own plants in the Gazette table: 15 in cement, 3 in aluminium, 6 in chlor-alkali and 6 in paper. We matched plant names to listed owners and linked 167 of the 282 plants to these companies. The rest belong to other or unlisted owners. A company's required cut is 1 − Σ(output × 2026–27 target intensity) / Σ(output × starting intensity) across its matched plants, shown in percentage points. The matching was done by name and may contain mistakes.

Prices: We use daily adjusted closing prices from Yahoo Finance for September 2024 to October 2025, and the Nifty 500 index as the market. We removed 18 March 2025 because the prices of all stocks were stale that day while the index rose 1.8%. We work with log returns.

Abnormal returns: For each company we fit the market model $R_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt} + \varepsilon_{it}$ on days −260 to −11 before Day 0, which is 250 trading days. The abnormal return is the actual return minus the return the model expects. The cumulative abnormal return (CAR) adds these up over three windows: day 0 only, days −1 to +1, and days −2 to +2.

ISBN code 978-81-999803-3-4

Test: We use the usual *t*-test, the Wilcoxon signed-rank test, a sign test and the standardised test of Patell (1976). We also use the test of Boehmer et al. (1991), which allows for bigger price swings on event days, and the adjustment of Kolari and Pynnönen (2010) for companies moving together. Because all companies share one date, the adjusted tests are our main reference. As a placebo check we repeat the days −1 to +1 calculation on 134 ordinary dates, using a 120-day window because we lack more history, and count how often the average CAR is as negative as the one we observed.

Differences across companies: We regress the CAR for days −1 to +1 on the required cut, LogSize and sector dummies, with aluminium as the base group. LogSize is the natural log of market value in ₹ crore at the 7 October close. The share counts behind it are approximate. We also looked for other news in the event window using a volume rule (trading at least 2.5 times normal together with a price move of at least 1.5 standard deviations). This flagged two companies, The Ramco Cements and NALCO, and we repeat the regression without them. We ran the analysis in R.

5. Results

5.1 Table 1 shows that required cuts rise from cement to paper, and so does the average price fall.

Table 1. Sample, required cut and average CAR by sector

Sector	Firms	Mean required cut (pp)	Mean CAR(−1,+1), %
Cement	15	2.64	−0.63
Aluminium	3	4.96	−0.49
Chlor-alkali	6	6.51	−0.88
Pulp and paper	6	6.88	−2.02
All firms	30	4.50	−0.94

Note. pp = percentage points. CAR = cumulative abnormal return, Day 0 = 10 October 2025.

5.2 Returns around the event: Table 2 shows the average CARs. On Day 0 alone the reaction is small and not significant. Over days −1 to +1 the average CAR is −0.94% (t = −4.20, p < 0.001), and over days −2 to +2 it is −1.36% (t = −3.67, p = 0.001). In the first window 23 of 30 companies fell, and in the second 25 did. The Wilcoxon test agrees. Taken at face value, H1 is supported.

Table 2. Average CARs and test statistics, Day 0 = 10 October 2025

Window	Mean CAR %	*t* (*p*)	Wilcoxon *p*	BMP *t* (*p*)	KP *t* (*p*)	Negative
(0,0)	−0.19	−1.17 (0.252)	0.294	−1.32 (0.199)	−0.65 (0.519)	16/30
(−1,+1)	−0.94	−4.20 (<0.001)	<0.001	−3.94 (<0.001)	−1.95 (0.060)	23/30
(−2,+2)	−1.36	−3.67 (0.001)	0.002	−3.59 (0.001)	−1.78 (0.086)	25/30

Note. BMP = Boehmer et al. (1991); KP = Kolari and Pynnönen (2010). N = 30. The average correlation between the companies' residuals in the estimation period is 0.09.

5.3 Shared date and placebo: The result is much weaker once we allow for companies moving together. The Kolari–Pynnönen tests give p = 0.060 for days −1 to +1 and p = 0.086 for days −2 to +2,. The result also depends on the event date. If Day 0 is 8 October, the CAR for days −1 to +1 is only

ISBN code 978-81-999803-3-4

−0.32% (*t* = −0.85, *p* = 0.40), though the CAR for days −2 to +2 is −1.82% (*p* = 0.06 after the Kolari–Pynnönen adjustment). In the placebo test, 134 ordinary periods have an average CAR of +0.09% with a standard deviation of 1.18%. About 17% of them are at least as negative as the observed −0.96% on the same 120-day basis (two-sided *p* = 0.36). So a fall of this size is not unusual for these stocks, and H1 gets weak rather than strong support. These *p*-values are approximate.

5.4 Differences across companies: Table 3 shows that the required cut has no significant effect on CAR for days −1 to +1, so H2 is not supported. Size matters: a company with one unit higher LogSize had a CAR 0.37 percentage points higher, so bigger firms fell less. The sector dummies are not significant, and a Kruskal–Wallis test finds no sector difference (χ^2 = 5.52, *p* = 0.137), although paper falls most (Figure 1). The model explains 36% of the variation (adjusted R^2 = 0.23; $F(5, 24)$ = 2.72, *p* = 0.044). Variance inflation factors are low (all below 1.9 after adjustment) and the largest Cook's distance is 0.36. Without the two flagged companies, LogSize is still significant (coefficient 0.37, *p* = 0.049) and the required cut is not (−0.10, *p* = 0.54). The size effect is therefore borderline.

Table 3. Regression of CAR(−1,+1) on required cut, size and sector (N = 30)

Variable	Coefficient	Std. error	*t*	*p*
Intercept	−4.282	2.337	−1.83	0.079
Required cut (pp)	−0.089	0.158	−0.56	0.578
LogSize	0.365	0.169	2.17	0.040
Cement (vs aluminium)	0.229	0.842	0.27	0.788
Chlor-alkali (vs aluminium)	0.611	0.870	0.70	0.490
Pulp and paper (vs aluminium)	0.168	1.038	0.16	0.873

Note. Dependent variable: CAR(−1,+1) in percent. R^2 = 0.362.

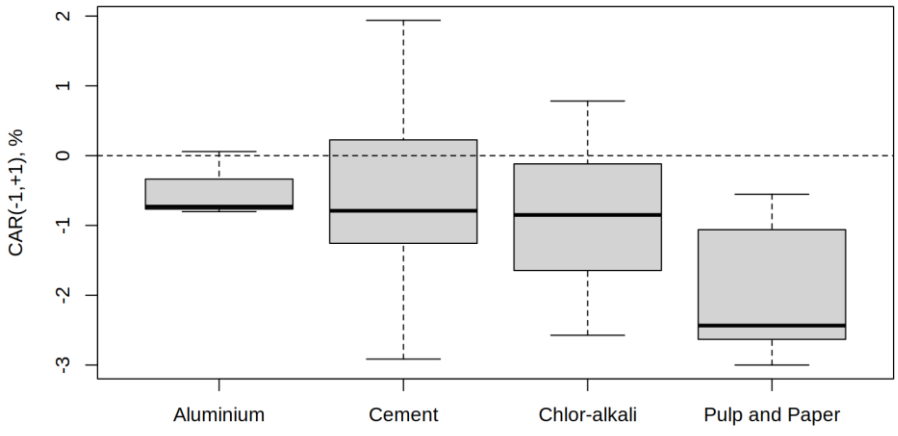


Figure 1. CAR(−1,+1) by sector (percent). The dashed line marks zero.

ISBN code 978-81-999803-3-4

6. Discussion

The average reaction was small and negative, but not strong enough to show that the Rules, and not ordinary movement in these stocks, moved prices. There are several possible reasons. Investors may have expected the Rules after the draft in April 2025. The targets for 2026–27 may be modest: the average required cut in our sample is 4.5 percentage points, and sector averages run from 2.6 in cement to 6.9 in paper. Also, in a credit-trading scheme, companies that beat their targets earn credits, so what a company gains or loses depends on how it compares with others and not only on the size of its own target. This fits our finding that the required cut does not explain the reaction.

The size pattern is the clearest result: smaller companies fell more. Possible reasons are that their shares are traded less, they have fewer lines of business, or they find it harder to pay for cleaner equipment. We did not test any of these, and the effect is borderline once the flagged companies are removed. Paper had both the biggest cuts and the biggest average fall, but with only six companies, and with sector and required cut moving together, we cannot separate the two.

7. Limitations

The sample is small (30 companies, with 3 to 15 per sector), so the tests have little power. All companies share one event date, so the company-level significance is overstated, and the placebo periods overlap. The results depend on whether Day 0 is 8 or 10 October. We did not test the April 2025 draft Rules as an event, so we cannot rule out that the news was expected. Plants were matched to companies by name, and some groups, such as Ambuja and ACC, are linked. For diversified companies (Grasim, Hindalco, Vedanta and DCM Shriram) only part of the business is covered by the Rules. We screened for other news with a volume and price rule, not a full news review, and the share counts behind LogSize are approximate. The findings show a pattern around one announcement and do not prove cause.

8. Conclusion

After India published its 2025 emission targets, the covered companies' share prices fell mildly, about 0.9% over three days. The fall is only borderline once we allow for companies moving together, and a placebo test shows that falls like this are not rare. Smaller companies fell more, and companies with larger required cuts did not fall more. Investors therefore did not seem to punish companies in line with the size of their targets. Future work should add the April 2025 draft as a second event, use checked share counts and a news-based check for other events, and widen the sample as more sectors join the scheme.

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ISBN code 978-81-999803-3-4