Government's Role in Shaping the Investors' Confidence on India's Green Transport Sector

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Abstract

The government has proclaimed several measures for promotion of green transport in India. Several past studies have shown positive impact of government's measures on investors' confidence in green transport sector of India. Recent policy declaration by the government regarding green vehicle related infrastructure development in the country is narrow in scope in comparison to earlier polices. Researchers critically observed statistically insignificant impact of the latest measure on the perception of the majority of the investors of the sector. Hence, this declaration adds no extra value to the sectoral prospects as per majority of the investors' perception.

Keywords: Green Transport Sector, Electric Vehicles (EV), Indian stock market, stock return, Event Study Methodology, Cumulative Abnormal Return (CAR), Cumulative Average Abnormal Return (CAAR)

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Introduction

The transport sector of India plays an indispensable role in catering the economic, social and environmental needs of the thousands of Indians. Versatile transport sector is the strongest pillar of the modern India. Primarily, transport sector in India can be classified into two sections, commercial and non-commercial. Both the sections play an equally important role in the country's overall development (Buenk et al., 2019). According to a recent report released at LogiMAT India that India's transport sector will grow around 8.8% annually to reach around USD 485 billion by 2029. India's ranks in Global Logistics Index have been improved from 44th to 38th in 2023 (Singh & Kathuria, 2016). All these signify the vastness and depth of the India's transport sector. In spite of these bright possibilities the major issue for concern is the transport sector caused pollution. In India every year around 2 million people die from air pollution caused health issues. Air pollution related deaths in India have increased by around 60% from 1990 to 2021. Transport sector in India is highly responsible for increasing air pollution over the years, especially in urban and sub-urban areas of the country (Gupta & Garg, 2020). To counter this serious challenge the government has long been planned to implement robust infrastructures; that will promote the adoption of green or electric-vehicles in the country (Shankar & Kumari, 2019; Kumar et al., 2020 and Rajper & Albrecht, 2020). As a part of it, for past few years government of India has undertaken several measures to develop India as an international hub for green vehicle manufacturing and as a centre of excellence for diffusion of electric or green vehicle related technologies (Kumar et al., 2020).

For development of any new industry, the role of investors is very critical and significant. More the investors are reacting positively to the new government initiatives for the green or electric vehicles; more will be the chance for the sector to flourish in future. When the investors show a positive faith on government measures, they also invest more in the consent sector. This boosts the overall confidence among all the stakeholders of the sector (Kumar et al., 2020 and Yousef El Emary, 2022). For these researchers here try to identify weather recent policy declaration by the government of India on 15th of March, 2024 to promote the infrastructure and adoption of green vehicles in India have any significant impact on the investors' perception about the sector's prospect (Yousef El Emary, 2022). The growth of every new sector in any country primarily depends upon both on government support and investors' confidence. But it has been empirically proven that government's

support is very much significant in shopping investors' confidence (Inamdar and Rachchh, 2021).

Hence, researchers tried here to understand how far Government's support for green or electric vehicle is boosting investors' confidence of the sector. Green vehicle adoption in the country can only be materialised fully or significantly if investor show confidence in the sector.

Event study methodology for understanding the impact of government measure on investors' perception

In this empirical study, we intend to explore the impact of the Union Government's E-Vehicle Policy Announcement ("to promote India as a manufacturing destination for EVs") on the 'stock return' of select electric vehicle-producing companies. We made the research hypothesis that the E-Vehicle Policy Announcement has no significant impact on the 'stock return' of select electric vehicle-producing companies under study. Based on their market capitalization, we consider the top five electric vehicle-producing listed automobile companies on the Bombay Stock Exchange (BSE). We obtained the daily data of stock prices of 'TVS Motor Company Ltd.', 'TATA Motors Ltd.', 'Maruti Suzuki India Ltd.', 'Eicher Motors Ltd.' and 'Bajaj Auto Ltd.' for securities return and S&P BSE 200 index for market return from the official website of BSE.

To compute continuous securities and market returns, we used log-difference of price series with the following formula-

$$r_{it} = \ln\left(P_{it}/P_{it-1}\right) \times 100$$

Where, r_{it} denotes 'continuous daily return series' and P_{it} represents 'daily stock price series' of i-th security at time t. P_{it-1} denotes the 1-day lag value of the price series.

The "event study methodology" proposed by Fama et al, (1969) combined with the "market model" introduced by Sharpe (1963), was employed to assess the impact of the policy announcement. The 'Cross-sectional t-test' has been employed to test the 'statistical significance' of abnormal stock returns.

The full sample was divided into two sub-samples: "Estimation Window" and "Event Window". The Policy announcement date (i.e., March 15, 2024) was considered as the event day, with the "estimation window" spanned 100 days, while the "event window" covered '41 days (-20, +20)' as illustrated in the

Fig. 1.
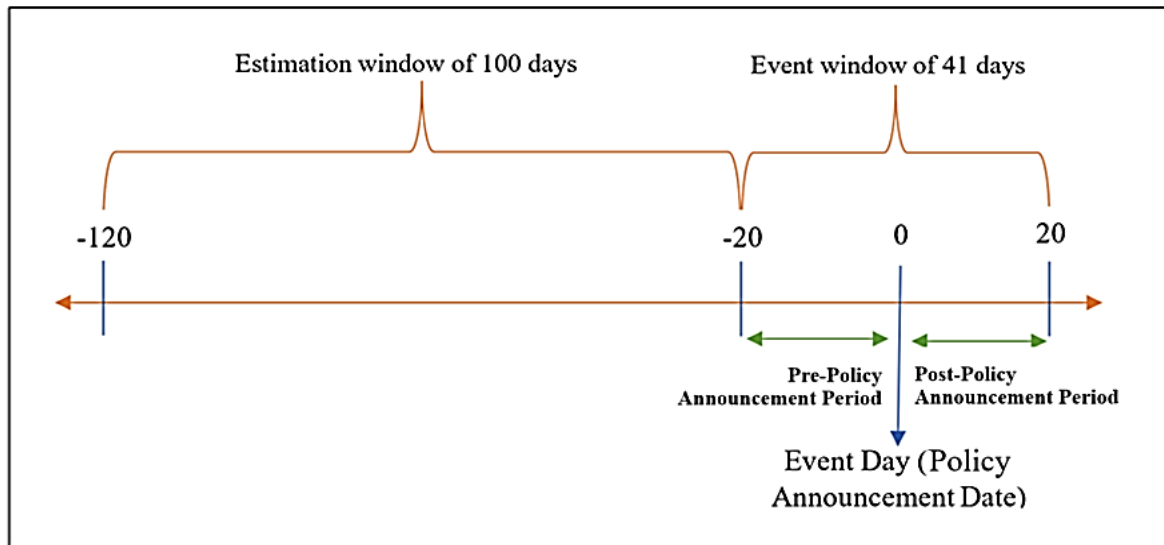
Fig-1: Framework for Estimation and Event window

Abnormal stock returns were computed as the difference between actual return (R_{it}) and estimated return (ER_{it}) using the following formula-

$$AR_{it} = R_{it} - ER_{it}$$

$$and, ER_{it} = \alpha_i + \beta_i R_{mt}$$

Where, R_{it}, AR_{it} and ER_{it} denote actual return, abnormal return and estimated return of i-th security, respectively and R_{mt} represents market return at time t. α_i denotes the 'intercept' and and β_i denotes the 'slope coefficient' of the "market model" for i-th security.

'Cumulative Abnormal Returns' (CARs) for each of the i-th security are calculated by adding all the ARs within a specific range, from t1 to t2, where-

$$CAR_{i,t1-t2} = \sum_{t=t1}^{t2} AR_{it}$$

The significance of the CAR (between t1 and t2) was inferred using the t-statistic with the following formula-

$$t_{CAR} = \frac{CAR_{i,t1-t2}}{Std.\ Error\ of\ CAR_{i,t1-t2}}$$

'Average Abnormal Returns' (AARs) are calculated by averaging the AR of all individual securities for the time t, where-

$$AAR_t = \frac{\sum_{i=1}^{n} AR_{it}}{n}$$

'Cumulative Average Abnormal Returns' (CAARs) are calculated by adding all the AARs within a specific range, from t1 to t2, where-

$$CAAR_{t1-t2} = \sum_{t=t1}^{t2} AAR_t$$

The significance of the CAAR (between t1 and t2) was inferred using the cross-sectional t-statistic with the following formula-

$$t_{CAAR} = \frac{CAAR_{t1-t2}}{Std.\ Error\ of\ CAAR_{t1-t2}}$$

Analysis and Findings:

Response to the Individual EV Manufacturing Company Stock Price

Table 1 : TVS Motor Co. Ltd.

Window range	CAR	C Std. Error	t statistic	pvalue
(-20, -1)	-2.3451	5.6762	-0.4131	0.6804
(1, 20)	-12.4667	5.6762	-2.1963	0.0304**
(-10, -1)	0.3530	4.0137	0.0880	0.9301
(1, 10)	-0.8264	4.0137	-0.2059	0.8373
(-5, -1)	-5.0373	2.8381	-1.7749	0.0790*
(1, 5)	-2.2904	2.8381	-0.8070	0.4216
(-5, 5)	-11.6770	4.2096	-2.7739	0.0066***
(-10, 10)	-4.8227	5.8163	-0.8292	0.4090
(-20, 20)	-19.1611	8.1270	-2.3577	0.0204**

"***", "**" and "*" indicate 1%, 5% and 10% significance level, respectively.

Table-1 shows TVS Motor Co Ltd.'s cumulative abnormal return (CAR), standard error, t-statistic, and p-value for various window ranges. CARs exhibit consistent fluctuations across the windows under study. The data indicates that the policy announcement had a statistically significant impact on CAR of TVS Motor Co Ltd. during several timeframes: for the window (-5, -1), CAR is significant at the 10% level, for windows (1, 20) and (-20, 20), CARs are significant at the 5% level and for the window (-5, 5), CAR is significant at the 1% level. The table also reveals that all significant CARs are negative around the event date, and also observed that CARs are more negative during the post-event period, compared to the pre-event period.

Table 2 : Tata Motors Ltd.

Window range	CAR	C Std. Error	t statistic	pvalue
(-20, -1)	-0.92464	6.0107	-0.1538	0.8781
(1, 20)	-4.29806	6.0107	-0.7151	0.4763

(-10, -1)	-1.9962	4.2502	-0.4697	0.6396
(1, 10)	0.032083	4.2502	0.0075	0.9940
(-5, -1)	-4.40995	3.0054	-1.4674	0.1455
(1, 5)	1.384693	3.0054	0.4607	0.6460
(-5, 5)	-4.99154	4.4577	-1.1198	0.2656
(-10, 10)	-3.93041	6.1592	-0.6381	0.5249
(-20, 20)	-7.18899	8.6060	-0.8353	0.4056

Table-2 exhibits Tata Motors Co Ltd.'s cumulative abnormal return (CAR), standard error, t-statistic, and p-value for various window ranges. CARs exhibits consistent fluctuations across the windows under study. The data indicates that the impact of this policy announcement on CAR is insignificant for Tata Motors Co Ltd. for all 'window ranges' in the above table.

Table 3 : Maruti Suzuki India Ltd.

Window range	**CAR**	**C Std. Error**	**t statistic**	**pvalue**
(-20, -1)	3.2218	4.6841	0.6878	0.4932
(1, 20)	7.1698	4.6841	1.5306	0.1291
(-10, -1)	2.1742	3.3122	0.6564	0.5131
(1, 10)	7.2077	3.3122	2.1761	0.0319**
(-5, -1)	-0.3028	2.3421	-0.1293	0.8974
(1, 5)	6.8729	2.3421	2.9345	0.0042***
(-5, 5)	7.6296	3.4738	2.1963	0.0304**
(-10, 10)	10.4415	4.7998	2.1754	0.0320**
(-20, 20)	11.4512	6.7067	1.7074	0.0909*

'***', '**' and '*' indicate 1%, 5% and 10% significance level, respectively.

Table-3 shows Maruti Suzuki India Ltd.'s cumulative abnormal return (CAR), standard error, t-statistic, and p-value for various window ranges. CARs exhibit consistent fluctuations across the windows under study. The data indicates that the policy announcement had a statistically significant impact on CAR of Maruti Suzuki India Ltd. during several timeframes: for the window (-20, 20), CAR is significant at the 10% level, for windows (-5, 5), (-10, 10) and (1, 10), CARs are significant at the 5% level and for the window (1, 5), CAR is significant at the 1% level. The table also reveals that all significant CARs are positive around the event date, and also observed that CARs are more positive during the post-event period, compared to the pre-event period.

Table 4 : Eicher Motors Ltd.

Window range	**CAR**	**C Std. Error**	**t statistic**	**pvalue**
(-20, -1)	-4.6900	6.5776	-0.7130	0.4775
(1, 20)	13.0128	6.5776	1.9783	0.0507*
(-10, -1)	-3.0718	4.6511	-0.6605	0.5105

(1, 10)	1.0003	4.6511	0.2151	0.8302
(-5, -1)	1.2719	3.2888	0.3867	0.6998
(1, 5)	5.2599	3.2888	1.5993	0.1130
(-5, 5)	6.4361	4.8781	1.3194	0.1901
(-10, 10)	-2.1672	6.7401	-0.3215	0.7485
(-20, 20)	8.2271	9.4177	0.8736	0.3845

'*' indicates 10% significance level.

Table-4 shows Eicher Motor Ltd.'s cumulative abnormal return (CAR), standard error, t-statistic, and p-value for various window ranges. CARs show consistent fluctuations across the windows under study. Table-4 also indicates that there is a significant impact of this policy announcement only for the window range (1, 20) where CAR is statistically significant at 10% level of significance. It is also observed from the above table that Eicher Motor Ltd. shows a significant cumulative average abnormal positive return during the post-event period.

Table 5 : Bajaj Auto Ltd.

Window range	CAR	C Std. Error	t statistic	pvalue
(-20, -1)	-5.7844	6.7647	-0.8551	0.3946
(1, 20)	-2.0492	6.7647	-0.3029	0.7626
(-10, -1)	-2.1367	4.7834	-0.4467	0.6561
(1, 10)	4.2008	4.7834	0.8782	0.3820
(-5, -1)	-3.5242	3.3824	-1.0419	0.3000
(1, 5)	4.1686	3.3824	1.2325	0.2207
(-5, 5)	0.1239	5.0168	0.0247	0.9804
(-10, 10)	1.5435	6.9318	0.2227	0.8243
(-20, 20)	-8.3542	9.6856	-0.8625	0.3905

Table-5 exhibits Bajaj Auto Ltd.'s cumulative abnormal return (CAR), standard error, t-statistic, and p-value for various window ranges. The CAR exhibits consistent fluctuations across the windows under study. The data indicates that the impact of this policy announcement on CAR is insignificant for Bajaj Auto Ltd. for all 'window ranges' in the above table.

Table 6: The overall response to the above five EV Manufacturing Companies' Stock Prices

Window range	CAAR	C Std. Error	t statistic	pvalue
(-20, -1)	-2.1045	1.5819	-1.3304	0.2542
(1, 20)	0.2737	4.4635	0.0613	0.9540
(-10, -1)	-0.9355	0.9608	-0.9737	0.3853
(1, 10)	2.3229	1.4883	1.5607	0.1936
(-5, -1)	-2.4005	1.2276	-1.9554	0.1222

(1, 5)	3.0792	1.6130	1.9089	0.1289
(-5, 5)	-0.4958	3.6034	-0.1376	0.8972
(-10, 10)	0.2130	2.7801	0.0766	0.9426
(-20, 20)	-3.0052	5.6669	-0.5303	0.6240

CAR = 'Cumulative Abnormal Return'

CAAR = 'Cumulative Average Abnormal Return'
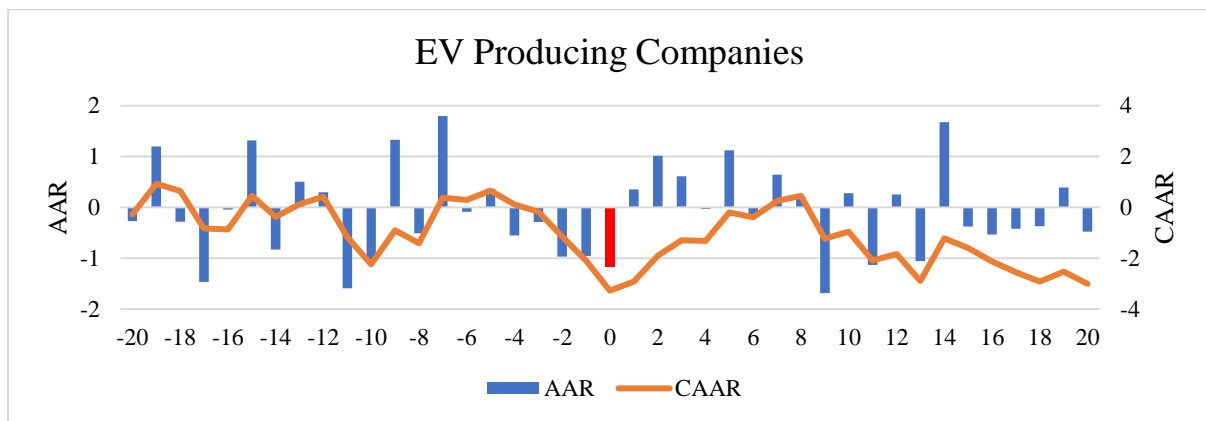
Fig-2: AAR and CAAR of EV Companies around the Policy Announcement Date

Table-6 represents the CAARs of various window ranges of five E-Vehicle producing companies' stock returns under study. The CAAR values are negative for anticipation windows and positive for adjustment windows, and noticeably, values for all the window ranges are found insignificant. Figure 1 depicts AARs and CAARs of E-Vehicle producing companies around the policy announcement date. Horizontal-axis of the chart represents the days in the event window, ranging from -20 to +20, where day 0 exhibits the announcement date. Here, AARs are displayed in blue coloured bar chart and fluctuate around the event date showing mixed positive and negative values. While day 0 is highlighted in red coloured bar, and experiences a noticeable negative value, reflecting an adverse market reaction on the event day. CAARs incline downward and show negative values most of the time around the event day, implying the cumulative negative effect over the event window.

Discussion and Conclusion

It has been observed from the above findings that the performance of TVS Motor Co. Ltd. depicts significant negative 'cumulative abnormal returns' (CARs). This company mainly produces and marketed two-wheeler electric vehicles. This new scheme of the central government to promote adoption of two and three wheelers in India fails to bring positivity among investors of

TVS Motor Co. Ltd. The prime reason is: there have already been several announcements have been made by the government to promote the culture and infrastructure for adoption of private and commercial electric vehicles in the country. Past studies exhibit several positive returns for TVS Motor Co. Ltd. post green vehicle related announcements, since adoption of FAME-I in 2015. Investors may perceive this event does not create any extra prospect for the company or company can't make any extra advantage of this policy unlike other manufacturers considering its present overall situation. Moreover, recently Tesla announced opening of electric vehicle production facility in India to cater both national and international demands. In respect to this announcement investors may perceive that Tesla can outperform TVS Motor Co. Ltd. in two-wheeler segment in future because of this new policy.

It has also been observed from the above findings that the performance of Maruti Suzuki India Ltd exhibits Cumulative Abnormal Returns significant and positive around the event date, and also observed that CARs are more positive during the post-event period, compared to the pre-event period. This signifies that the company stocks exhibit a positive change in return between the post and pre-event period. The prime reason is: this new policy may give positivity possibly due to strategic alignment with green vehicles policy incentives in India. Hence, investors of these companies may perceive that this policy declaration will have a significant impact on the operational prospects of the companies. The Eicher Motors Ltd has also been experienced a positive and significant cumulative abnormal return in the longer adjustment window. This may be due to the ability of Eicher Motors to adapt to green vehicle incentives more effectively over time suggesting it may have benefited from the long-term implications of the policy.

Furthermore, it has been revealed from the above findings that the performance of Tata Motors Ltd and Bajaj Auto Ltd depicts an insignificant Cumulative Average Return. This signifies that the company stocks exhibit no abnormal change in return between the post and pre-event period. The prime reason is: this new policy is to promote adoption of two and three wheelers green vehicles in India and these three companies mainly produces four and more than four wheelers private and commercial vehicles. Hence, investors of these companies may perceive that this policy declaration will have no impact on the operational prospects of these companies, as because there already many announcements concerning e-vehicles in India. Several past studies show positive return for Bajaj Auto Ltd post e-vehicles related announcements. Secondly, investor may perceive company can't make any extra advantage of this considering its present overall situation. It can be also true; that prospect created by this policy is being nullified by Tesla's new announcement.

Finally, the study observed; new policy has comparatively narrow scope in comparison to previous announcements related to green vehicles and there is also high propensity of arising external competitors in this segment in future. All these issues create no extra hope in the minds of investors of Indian e-vehicle sector. Hence, industry average return does not depicts any significant abnormal return around the event period.

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