An Econometric Analysis of India's Performance in International Cricket and Returns in Indian Stock Market

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Abstract - This research paper examines the impact of the performance of the Indian cricket team in international cricket matches on the returns of the Indian stock market. The study is based on the concept of behavioural finance, which suggests that large sporting events can influence the sentiments of viewers and investors, leading to mood swings in the market and reflected in stock prices. The paper explores two potential reasons why the stock market may react to the sporting performance of the national team: the "feel-good" factor associated with national sporting success and the economic benefits derived from international tournaments. The study uses a dummy variable regression model to analyze the data from the period 2005-2015, considering one-day international and T-twenty matches played by the Indian cricket team. The results indicate that cricket match outcomes and the location of the matches have a significant impact on stock market returns. The findings provide insights into the linkages between sporting events, investor behavior, and market volatility, contributing to the existing literature on the subject.

Keywords – Dummy Variable Regression Model, Sporting Events, Stock Market Performance, Indian Cricket Team, Investor Behavior

1. Introduction

The examination of the influence of sporting events on stock market performance is a relatively recent development within financial literature. It falls within the broader domain of behavioral finance, which investigates the effects of events capable of altering investor sentiment and subsequently impacting stock prices. Although sporting events are non-economic in nature, it is erroneous to assume that they do not affect stock prices. Behavioral finance contends that major sporting events can sway the sentiments of viewers cum investors, leading to fluctuations in the market, reflected in stock prices.

There are two plausible reasons why the stock market might respond to the performance of the national team in sporting events. Firstly, a "feelgood" factor may emerge from national sporting achievements, fostering increased confidence in the future. Secondly, considering the growing commercial significance of international tournaments, an efficient stock market will reassess expectations regarding the potential economic benefits derived from national team performance, considering individual match outcomes. Consequently, this study aims to analyze the impact of the Indian cricket team's performance in international matches on returns within the Indian stock market.

Rationale

The study expects that when an investor watches his cricket team win an international cricket match, he will feel optimistic about his prospects and hence end up purchasing more (or selling less) stocks than he would have otherwise done. Similarly, if an investor watches his team lose an international cricket match, he will feel pessimistic and hence end up selling more (or buying less) stocks than what otherwise would have been the case based on a cognitive analysis of the stock market. Because a cricket match is such a substantial event in India and affects the mood of so many people, the optimism or pessimism caused by the result of the game may be large enough to make the market swing in an upward or downward direction reflecting the mood of the nation. However, market swings may not be symmetric in size. As people put a bigger emphasis on losses, the downward movement in the market following a loss should be much larger than an upward swing following a victory.

2. Related Work

There are many studies in psychology literature which have found that people in a good mood make optimistic judgments and choices and that people in a bad mood make pessimistic judgements and choices [1],[2]. Many studies indicate that people feel optimistic after good news and

pessimistic after bad news, the effect may not be symmetric. The pain of loss is stronger than the pleasure of equal-sized gains [3]. Brain imaging studies conducted by [4], [5] suggested that gains and losses are fundamentally different as there are differences in the areas of the brain that are active during gain and loss. There are only a few studies which have empirically analyzed the effect of sporting events on the stock market. [6] analyzed the impact of the Super Bowl results on the New York Stock Exchange and found that the results of the Super Bowl were an accurate predictor of the stock market. [7] analyzed the impact of the Melbourne Cup (one of the southern hemisphere's premier horse races, which is run in the first Tuesday in November) on returns on the Australian Stock Exchange and found that mean Melbourne Cup Day returns were significantly higher than returns on other Tuesdays in November and that of Tuesdays in other months.

The present study is built on a previous study by [8] which examined the effect of one day international cricket on volatility of Indian stock market. Even [9] which examined the effect of cricket match outcomes on stock market sentiment as part of a broader study considering the outcome of a range of sporting events on stock markets in several countries. The study of [8] differs from [9] in several respects. First, [9] focused on World Cup matches. The World Cup is only played every four years. [8] considered all one-day matches played by India over the period 1995 to 2005. Second, their study also makes a methodological contribution to the literature on the impact of sporting events on stock markets by using the SD method. Their focus was on India because in this country cricket, especially one-day cricket, is the number one spectator sport. When India plays in one-day internationals the whole nation comes to a standstill. T20 is a new phenomenon and had made a significant space for it in minds of Indian fans. The study focuses on India's one day international cricket match and international T-twenty matches. The nature of the game makes cricket very different from other sports and its impact needs to be tested on stock markets.

3. Objectives

The main objective of the research is to find out the impact of International Cricket match played by Indian Cricket team on returns of the stock market.
The objectives are as follows: -
- To examine the behavioural impact in national sentiment generated by feeling optimistic or pessimistic following a win or defeat of the Indian cricket team on movements in the national stock market.
- To study the impact of mood fluctuations on the decision-making process of investors when Indian cricket team win or lose.

- To examine the Indian Stock market volatility when Indian cricket team play an international cricket match.

4. Methodology

This study analysed the impact of the performance of the Indian cricket team in one-day international matches on the stock market using regression analysis (Dummy Variable regression model). The data was taken from the national stock exchange (NSE), the daily closing price has been taken for the period of 2005-2015 and then the daily index return has been calculated by using the following standard formula:

$$R_t = \ln (P_t/P_{t-1}) \times 100$$

The data on cricket matches has been collected from www.testmatchstats.com. All international cricket matches played by Indian Cricket team has been taken, be it one-day or T20 and details like who won the match and where was match conducted in which country and stadium has been considered. To measure the impact of team performance on stock returns the study used the stock market index on the first trading day following the match. This is to ensure that the game results are known before trading begins so we have the full one-day (close to close) returns, reflecting the results incorporated in prices.

The methodology used is the standard event study model (i.e., dummy variable regression). The standard event study analysis model entails calculating the mean index after a one-day match in which the Indian team won or a one-day match in which the Indian team lost. Once the mean returns are calculated one can compare these mean returns with the unconditional mean return on all trading days.

Dummy Variable Regression Model
The effects of different events on stock market by assigning a dummy variable. This is done in the following manner:
- $R = \beta_0 + \beta_1 d_1 + \mu$ …………. (1)
  where, 'R' represents stock market returns during the period 2005 to 2015. 'd_1' represents dummy for occurrence of match, that is, whether on the day match happened or not. For this 1 is assigned to the returns on the first trading day after a match and 0 is assigned to the returns when there was no match.
- $R = \beta_0 + \beta_1 d_2 + \mu$ ………….. (2)
  Where, 'R' represents stock market returns on the first trading day after a match. 'd_2' represents dummy for whether Indian cricket team won or lost the match. For this 1 is assigned to the returns when Indian cricket team won the match and 0 to returns when the team lost.

- $R = \beta_0 + \beta_1 d_3 + \mu$ …………. (3)
  Where, 'R' represents stock market returns on the

first trading day after a match. 'd_3' represents dummy for whether match played in India or Overseas. For this 1 has been assigned to matches played in India and 0 to matches played outside India that is overseas.

- $R = \beta_0 + \beta_1 d_2 + \beta_2 d_3 + \beta_3 d_2 d_3 + \mu$ .... (4) where 'R' represents stock market returns on the first trading day after a match. 'd_2' and 'd_3' are same as in equations (2) and (3) and '$d_2 d_3$' is the multiplication of d_2 and d_3 which represents that India won the match when they played in India.

Matches that are drawn, tied or abandoned (due to rain or some other factors) are not taken into consideration.

5. Results And Discussion
At the first step of the study, the summary statistics for the data has been calculated. This is showed in the following table:

Table 1: Summary Statistics of Returns on The First Trading Day After an International Match

Match	N	Mean	Std. Dev.	Skewness	Kurtosis
NSE Nifty index					
Overall	2730	0.00049	0.01529	-0.04478	12.19264
No Matches	2398	0.00055	0.01536	0.04980	12.93352
All Matches	332	0.00044	0.01473	-0.83047	5.65947
Winning Matches	197	-0.00030	0.01531	-0.84556	6.05514
Lost Matches	133	0.00055	0.01403	-0.83415	4.64647
Matches Played In India	123	0.00193	0.01376	0.11274	5.48727
Matches Played Overseas	209	-0.00106	0.01520	-1.21417	5.35379
Matches Won In India	81	0.00238	0.01472	0.13400	5.67624
Matches Lost In India	44	0.00139	0.01304	-0.40624	3.31402
Matches Won Overseas	122	-0.00193	0.01527	-1.45124	5.86749
Matches Lost Overseas	89	0.00013	0.01455	-0.96447	4.92715

Table 1 presents the mean returns, standard deviation, skewness, and kurtosis statistics on the day after a cricket match, categorized according to the type of match in which India played. The data shows that mean returns on the day following a cricket match in which India lost are higher than the mean returns on days following a match in which India won. In Table 1 one observes that the standard deviations of returns are quite high as compared to the mean returns, suggesting that a large dispersion is present in the data. The high dispersions or volatility in financial returns is a commonly seen phenomenon and could have been caused by various market or non-market factors which are not the focus of the study. The concerned data is more symmetrical, as its skewness value is near to zero. Table 1 exhibits that data is not normally distributed and rather has a high positive kurtosis value especially in the first two rows when returns of all trading day and all non-match trading day have been considered.

Further in the analysis we estimated the dummy variable regression model as an estimation Technique.

Equation (1) - $R = \beta_0 + \beta_1 d_1 + \mu$, where 'R' represents stock market returns during the period 2005 to 2015. 'd_1' represents dummy for occurrence of match on a particular day.

Table 2: Effect of Occurrence of India's Cricket Match on Stock Returns

Variables	Coefficients	p-value
Match Day	$\beta_1 = 0.3819$	0.0567
Constant	$\beta_0 = -0.6647$	0.0337
N = 2730;	$R^2 = 0.2841$	

The above table represents the results of dummy applied on equation (1). One can observe that the probability (P-value) is significant showing that the null hypothesis has been rejected and thus there is approximately 38% impact of cricket match over returns of the stock market. The R-squared statistic measures the success of the regression in predicting the values of the dependent variable within the sample. In the above case returns are affected to the level of 28% by the occurrence of the cricket match.

As the null hypothesis has been rejected, therefore further study has a relevant impact that Indian cricket team's performance in international matches certainly affects the returns of the stock market. Now for the further analysis only matches played by the Indian team over the period of 10 yrs. from 2005 to 2015 has been considered.

Equation (2) - $R = \beta_0 + \beta_1 d_2 + \mu$, where 'R' represents stock market returns on the first trading day after a match. 'd_2' represents dummy for whether Indian cricket team won or lost the match. The following table (Table 3) shows the results obtained by applying dummy estimation technique to the equation (2).

Table 3: Effect of Indian Cricket Team's Win/Loss on Stock Returns

Variables	Coefficients	p-value
Win/Loss	$\beta_1 = 0.3149$	0.0877
Constant	$\beta_0 = -0.5187$	0.0476
N = 318; $R^2 = 0.3671$		

As the P-value or dummy of win/loss, where win has been assigned with value of one and loss with value of zero, is 8.77% which is less than the significance level, that is, 10%, proving that this model can be significant and p-value for constant is highly significant with a value of 4.76%. Now that the model is significant, the values of coefficients could be considered for further analysis. The β_1 is 0.3149 saying that the impact of India winning an international cricket match has positive effect of 31.49% on the stock returns. The β_0 is -0.5187 saying that the impact of losing an international match has a high negative effect of -51.87% on the stock returns.

It is clear by the dummy variable model results in Table 3 that the coefficients for the loss dummy are negative and significant, whereas the win dummy, although positive is not much significant. Looking at this we see that investors does take losing a match into their consideration while deciding a trade on the stock market, whereas a victory of the Indian cricket team does not affect their decisions much.

Now that the model showed that Indian cricket team winning a cricket match is not much affecting the returns of the stock market, let us check in next part of the study whether Indian cricket team playing an international cricket match in India or overseas is having an impact on returns or not.

Table 4: Effect of Cricket Match Played in India or Overseas on Stock Returns

Variables	Coefficients	p-value
India/Overseas	$\beta_1 = 0.4251$	0.0485
Constant	$\beta_0 = -0.1367$	0.1289
N = 318; $R^2 = 0.4827$		

Table 4 provides results of the location dummy regressed with returns on the first trading day after an international cricket match. One can observe that the p-value of match playing in India is 0.485 showing that the model is significant. The β_1 is 0.4251 showing that the impact of Indian cricket team playing an international cricket match in India has positive effect of 42.51% on stock returns. The β_0 is -0.1367 suggests that Indian cricket team playing international cricket match outside India, that is, in other countries does not affect the stock returns and is insignificant. One can interpret from the Table 4 that when Indian cricket team play an international cricket match on Indian land then it definitely affects the stock return of NSE that too positively showing that the 'feel good' factor has been recognised.

In the next section of the study the main regression has been examined while considering both the dummies that is, India won the match but that too on Indian land.

Equation (4) - $R = \beta_0 + \beta_1 d_2 + \beta_2 d_3 + \beta_3 d_2 d_3 + \mu$, where 'R' represents stock market returns on the first trading day after a match. 'd_2' and 'd_3' are same as in equations (2) and (3) and '$d_2 d_3$' is the multiplication of d_2 and d_3.

Table 5: Effect of Indian Cricket Team Winning the Match in India on Stock Returns

Variables	Coefficient	p-value
Constant	$\beta_0 = 0.2682$	0.0582
Win/Loss	$\beta_1 = -0.7891$	0.0218
India/Overseas	$\beta_2 = 0.3625$	0.8192
Matches Won in India	$\beta_3 = 0.4201$	0.0485
N = 318; $R^2 = 0.7325$		

From the p-values of Table 5, the model applied is significant enough to take consideration of the beta values. This table shows the interaction between d_2 and d_3, that markets are showing positive upward trend when Indian cricket team win an international cricket match in India, but a high negative downward trend has been observed when Indian cricket lose. The β_3 is 0.4201, showing that matches won in India are having an impact of 42.01% over the returns of the stock market. The nature of this impact was found to be asymmetric, that is, victory by the Indian cricket team does not have a large positive impact on the stock market returns but the defeat of the Indian cricket team does have a relatively large negative impact on the stock market returns.

Thus, towards the end of the analysis we got to know that the impact of performance of Indian cricket Team on stock market returns does have a significant effect, but stock market is affected by many other market and non-market factors which are not the focus of the study.

6. Conclusion

In the study the effect of the performance of the Indian cricket team in international matches (one-day and T20 matches) on the main market index (Nifty index) from the NSE has been examined. The Traditional regression analysis was performed using dummy variable model. The results obtained using regression analysis suggests that the performance of the Indian cricket team in international matches moderately affects the Indian stock market. The nature of this impact was found to be asymmetric, that is, a victory by the Indian cricket team does not have a large positive impact on the stock market but the defeat of the Indian cricket team does have a relatively large negative impact on the Indian stock market. The asymmetric results obtained in the analysis proves that people value losses differently from gains, that is, the wave of optimism introduced by a win is not as big on magnitude as the wave of pessimism following a loss.

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