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ONE-DAY CRICKET INTERNATIONALS & STOCK MARKET RETURNS: EVIDENCE FROM INDIA

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ABSTRACT
In behavioral finance, emotional and visceral factors are often considered important determinants of asset pricing. This study examines the relationship between Indian cricket team's performance in one day international cricket matches and returns of the Indian stock market. The main conclusion of the study is that there exists an asymmetric relationship between the performance of the Indian cricket team and stock market returns. It is found that win & loss by the Indian cricket team has statistically significant impact on stock market returns.

Keywords: Behavioral finance, Stock Market Return, Cricket, India

INTRODUCTION

A lot is being written on impact of sporting events on stock prices in recent past. As each passing day effect of behavioral finance is being felt in every research in general and management & economy in particular. The positive relationship is established between behavioral aspects/reactions/mood swings of human being and movement of economical indicators. It is generally believed that stock prices movement is independent of any sporting events. However, recent studies in behavioral finance suggest that large sporting events affect the sentiments of viewers cum investors resulting in upwards or downwards "mood swings" in the market, which are reflected in stock prices. In this study, we analyze the impact of the performance of the Indian cricket team in one-day international matches on the stock market using regression analysis.

This paper reports the estimates of an empirical exercise that ties the win or loss of Indian cricket team to stock market returns by using the daily data from India's oldest stock market i.e. Bombay Stock Exchange (BSE) from 1991 to 2010. The hypothesis that we tested in this paper is "BSE index return is dependent on Result of Indian ODI" can be associated with the win or loss of the team which has great impact on the psyche of viewers who happens to be brokers/traders or investors. To be specific, we are concerned with a question "Are the wins of the Indian Cricket Team associated with higher returns?" This study builds on a previous study by Vinod Mishra and Russell Smyth

(2008) which examined impact of Sachin Tendulkar's performance in one-day cricket internationals on the Indian stock market and Edmans et al. (2007), 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.

This study differs from Vinod Mishra and Russell Smyth (2008) focused on Sachin's performance in one-day cricket internationals and Indian stock market. Vinod Mishra and Russell Smyth (2008) had taken data from 1995 to 2005 where as in this study we consider all one-day matches played by India over the period 1991 to 2010. Vinod Mishra and Russell Smyth (2008) had taken data from NSE while in this paper, we have taken data from BSE and the research methodology is also differerent compare to previous paper. Taking the cue from Vinod Mishra and Russell Smyth (2008) our focus is on India because in India cricket is not only a sport it's a passion to each Indian especially one-day cricket. Cricket is the number one spectator sport in India. When India plays in one-day internationals the whole nation comes to a standstill it's like Holy & Diwali.

RESEARCH OBJECTIVE

- To identify Existence of an asymmetric relationship between the performance of the Indian cricket team and returns in the Indian stock market.
- If such relationship exist then to explore and analyze the impact of winning and losing of the match on the returns of Indian stock market.

LITERATURE REVIEW

Society attaches importance to the successes and failures of major sports teams. The supporters of an Indian Cricket Team feel proud and happy when their team wins and they feel depressed and unhappy when their team loses. The behavioral finance try to relate this mood swing of and individual/Investor and tries to understand the investment decisions a fan makes which may be affected by the performance of his or her team. The basic idea behind these studies is that after major victories in a sporting event people feel more optimistic about their chances of making a good investment or purchase, and this optimism is reflected in the relevant market. In short it is believed that when Team India wins the match viewers who may be trader or broker or investor end purchasing more or selling less because of positive mood swing and vice versa.

It has been reported that a good result in sporting event affects a trader's moods or psychological well-being. Vinod Mishra and Russell Smyth (2008) conclude the study that there exists an asymmetric relationship between the performance of the Indian cricket team and stock returns on the Indian stock market. While a win by the Indian cricket team has no statistically significant upward impact on stock market returns, a loss generates a significant downward movement in the stock market. Ashton, Gerrard, and Hudson (2003), Boyle and Walter (2003), and Whitfield (2003) argue that buoyed brokers behave bullishly, and Edmans, Garcia, and Norli (2007) point out that daily stock returns decrease after losses in Soccer World Cup elimination matches. Using Turkish data, Berument, Ceylan, and Gozpinar (2006) similarly argue that stock market returns increase with wins. Petty et al. (1991) and Wright and Bower (1992) explained this behaviour by suggesting that people who are in a buoyant mood following a victory by their sports team are more optimistic about their judgement, compared to people who are in a dispirited mood following a loss by their sports team. Studies of investor psychology have not only examined the outcome of sporting contests on investor moods, but have looked at various other events that have an impact on investor sentiment.

Grove, Hanrahan, and McInman (1991),Wann and Branscombe (1993), and Wann and Dolan (1994) suggest that fans with high team identification levels have a tendency to internalize their team's attributes after their team's wins, which, being an ego-enhancer, increases their self-esteem. Thus, the degree of team identification/fanaticism matters for the effect of soccer matches on stock market returns

Wann et al. (1994) suggested that fans often feel a positive reaction when they see their team winning and a negative reaction when they see their team losing and this positive/negative reaction effects their perceptions. Ashton et al. (2003) examined the impact of the performance of the England football team on the FTSE 100 index based on all matches played by the team from January 1984 to

July 2002 and found that good performances by the national football team was followed by good performances in market returns.

Boyle and Walter (2003) examined the effect of performance of New Zealand's rugby team on its stock market. This is the only study that has found no systematic relationship between the outcome of a sporting event and stock market returns. The authors found this result to be robust to the time period of analysis and the frequency of the data used.

Veraros et al. (2004) analyzed the impact of the news that Athens had won the right to host the 2004 Olympics on the Athens and Milan stock markets and found that the announcement had a statistically significant impact on the Athens stock exchange in general and on the stocks of infrastructure-related industries in particular. However, they found that the announcement had no impact on returns on the Milan stock exchange.

The most comprehensive study is by Edmans et al. (2007) who analyzed the impact of international football matches on the stock market of 39 countries by using 30 years of data on major football events and found the existence of a strong negative stock market reaction to losses by the national football team. However they did not find any corresponding reaction to wins by the national team. This study also looked at data for cricket, rugby, ice hockey and basketball and their results were robust across sports. The authors suggested the reason for this asymmetric behavior is that people tend to put more weight on losses in their utility function. Hence, when their team loses, they become more dejected compared to the feeling of elation that they experience when their team wins. Another possible explanation for the observed asymmetric behavior is that most of the football matches in the sample were elimination games, such that a win only advanced the team to the next stage of the tournament, whereas a loss eliminated the team from competition altogether.

RESEARCH METHODOLOGY

This is quantitative research in which we have used secondary data from different sources. The data source and period under the study is as under.

Data Collection

Stock market data:

The stock market data for this study is taken from the Bombay Stock Exchange (BSE), (www.bseindia.com).We downloaded the daily closing price data for the main index, for the period 1991 to 2010. The daily index returns were calculated using the following standard formula:

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

$$R_t = \frac{(\text{next day closing} - \text{same day closing})}{\text{Same day closing}} * 100$$

One-day cricket matches data:

The data on one-day cricket matches was collected from www.cricinfo.com. This website maintains a database of all international cricket matches played between the major cricket-playing nations. In total during 1991 to 2010 India played 546 One Day International matches. Traditionally there have been two major forms of cricket: a one-day match where each side has 50 over's and test matches where each side has two innings played over five days. Another form of cricket is Twenty-Twenty, where each team bowls 20 over's in a match that lasts for around three and half an hour. Recent world cup of T20 (Twenty- Twenty) matches have raised every ones eyebrow across the globe because of abundance of revenue generated from TV Advertisement. It seems that in the future to come we will have more T20 format matches becoming a trend. It's very difficult to ascertain the effect of test match results on stock market performance as it's played for five long days and that can

lead to ambiguity. In the current study we only use data on Indian's one-day international cricket matches played during 1991 to 2010.

Research tools

We used different statistical tools to analyze the data. We used Logistic regression model to find the conclusion and basic tools like mean, standard deviation, chi- square, skewness, kurtosis etc.

Chi-Square

The chi-square goodness-of-fit test is used to analyze probabilities of multinomial distribution trials along a single dimension. it compares the expected, or theoretical, frequencies of categories from a population distribution to the observed, or actual, frequency from a distribution to determine whether there is difference between what was and what was observed.

Regression

In multiple regressions, we explored a technique to assess the impact of a set of predictors on a dependent variable. In that case, the dependent variable was measured as continuous variable. There are many research situations, however, when the dependent variable of interest is categorical (e.g. Positive/Negative Return). Unfortunately, multiple regression is not suitable when you have categorical dependent variables. Logistic regression allows you to test models to predict categorical outcomes with two or more categories. Your predictor means independent variables can be either categorical or continuous, or both in the one model. Efficient method to separate the effects of different events on the stock market is employing a Logistic regression model, which is the approach we have used in the current study, after doing the chi square tests at the preliminary stage. To begin with we specify the following regression model: Result of the match is coded as win is equal to "1" and lose is equal to "2". Matches that are drawn, tied or abandoned (due to rain or some other factor) are treated as the control group.

In our logistic regression model, independent variable is result of the match (i.e. a one-day match in which the Indian team won or a one-day match in which the Indian team lost). And dependent variable is Index return of the Bombay stock exchange. First, we find out the median of index return, values which are above the median value is coded as "1" and values which are below the median value is coded as "0".

ANALYSIS OF DATA AND RESULTS

Chi-Square

Result / Return	Win	Lose	Total
Positive	160	124	284
Negative	134	128	262
	294	252	546

Hypothesis

Ho= BSE index return is dependent on Result of Indian ODI.

H_1= BSE index return is not dependent on Result of Indian ODI.

$$x^2 = \sum \frac{(fo - fe)^2}{fe}$$

$d_f = (r-1)(c-1)$
$\alpha = 0.05$

	fe	fo	$(fo - fe)^2$
Win-Positive	152.9231	160	0.327503
lose-Positive	131.0769	124	0.382087
Win-Negative	141.0769	134	0.355004
lose-Negative	120.9231	128	0.414171
		∑=	1.478766

Df= (r-1) (c-1)
= (2-1) (2-1) =1

∴ Ho: BSE index return is dependent on Result of Indian ODI, it fails to reject.

It means there is some significance impact of Indian ODI result on BSE index return.

As the first step of our analysis we calculated the Chi-square. Now, on the basis of acceptance of null hypotheses will go further.

Descriptive Statistics of Returns

TABLE 1: On The First Trading Day After A One Day Match

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
All Matches	546	-7.2276	10.4574	-.039274	1.8146951	-.054	3.423
Win	294	-5.8315	5.6571	.027592	1.7509247	-.129	1.448
Lose	252	-7.2276	10.4574	-.117285	1.8868810	.033	5.196
Matches Played In India	183	-5.7142	5.4928	-.059584	1.7439722	.071	1.893
Won In India	113	-5.4528	5.4928	.083520	1.6818156	.164	2.111
Lost In India	70	-5.7142	5.4784	-.290595	1.8285171	.016	1.794
Matches Played Outside	363	-7.2276	10.4574	-.029035	1.8516037	-.108	4.049
Won Outside	181	-5.8315	5.6571	-.007324	1.7964386	-.271	1.144
Lost Outside	182	-7.2276	10.4574	-.050627	1.9095997	.030	6.408

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 one day Match in which India played. As found in many other studies we also found the impact of cricket match win and loss on the Stock market return. The data shows that mean returns on days following a cricket match in which India lost are negative and the mean returns on days following a match in which India won is positive.

From 1991 to 2010 the Indian cricket team won 294 one-day international cricket matches and the average return after these matches was 0.027. In the 252 matches India lost over this two decade the average returns on the following day was -0.117, indicating that match win is creating a positive mood and match loss is creating negative mood in investors/traders influencing their investment decisions. Examining the higher order moments in Table 1 we observe that the standard deviation of returns is quite high compared to the mean returns, suggesting that large dispersion is present in the data. The high dispersions or volatility in financial returns is a commonly observed phenomenon and

could have been caused by various market or non-market factors which are not the focus of the current study.

The high value of Kurtosis statistic for some cases in the last columns of Table 1 indicates that the returns distribution differs significantly from the normal distribution. There is only one positively skewed distribution, when Indian team played in India and won the match.

TABLE 2: On The First Trading Day After A One Day Match: Breakdown According To Major Opponents

Opponents	All Matches			India Won			India Lost		
	N	Mean	Std. Deviation	N	Mean	Std. Deviation	N	Mean	Std. Deviation
Australia	66	.1250	2.43786	23	-.2661	2.59322	43	.3343	2.35513
England	45	.0707	2.01717	28	.3070	2.20646	17	-.3185	1.64790
New Zealand	55	.2318	1.08424	30	.2810	1.04316	25	.1728	1.15044
Pakistan	83	-.3962	1.88661	36	-.2836	1.77923	47	-.4824	1.97957
South Africa	58	-.4368	1.69583	22	-.0262	1.36589	36	-.6877	1.84213
Sri Lanka	94	.3540	1.66642	51	.4149	1.69851	43	.2818	1.64459
West indies	59	-.1120	1.75609	32	-.0750	1.90871	27	-.1558	1.59120
Zimbabwe	45	-.1502	1.96136	35	-.1284	1.77147	10	-.2266	2.63513
Other	41	-.1786	1.23942	37	-.1694	1.21938	4	-.2630	1.62144

Table 2 presents the descriptive statistics for the returns categorized on the basis of matches played with India's opponents in one-day international cricket. The rationale for tabulating the descriptive statistics based on major opponents is the fact that some nations are regarded as more prominent archrivals than others in the Indian psyche, and winning or losing a match against a prominent archrival might be expected to have a greater positive or negative impact on the stock market compared to other teams. India and Pakistan have one of the strongest rivalries in international cricket. Since partition India and Pakistan have continually been involved in some form of political or military tension. This tension is manifested in cricket matches played between the two countries.

Another reason for distinguishing between opponents is that the International Cricket Council (ICC) compiles a ranking of nations. The Indian cricket team was lower in these rankings than Australia in most of the study period, which was ranked first. One might expect that cricket fans would not be hopeful of an Indian win against Australia. Thus a loss to Australia may not have as big a negative impact on investor sentiment as a win, while if India wins a match against Australia it may have a large positive impact. The reverse is true for the cricket minnows such as Bangladesh or Kenya. Most Indian cricket fans would expect India to beat these countries so a win may have little positive effect on investor sentiment, while a loss may have a big negative effect on the stock market.

The results in Table 2 confirm the results from Table 1. There is a clear-cut difference between winning and losing matches. The mean returns on the BSE Sensex after losing a match against any opponent is much lower than the mean returns after winning a match against the same opponent except Australia. In some cases, such as in matches against England this difference is relatively large and significant. However, there is no sizeable difference between winning and losing returns for cricket matches played against Pakistan. As discussed earlier, one might expect a bigger difference in matches played against Pakistan because of the intense rivalries between the two countries. One possible explanation for the result is that over the period of the study India and Pakistan were of roughly similar standing in terms of strength, meaning Indian fans anticipated the chance of each

team winning or losing the match with an equal probability. Thus, if India loses against Pakistan, the result is not totally unanticipated.

Logistic Regression:

For applying logistic regression first we have to convert continuous variable into the categorical variable and for that we used descriptive statistics median.

TABLE 3: Descriptive Statistic

			Statistic	Std. Error
Return		Mean	-.0393	.07766
	95% Confidence Interval for Mean	Lower Bound	-.1918	
		Upper Bound	.1133	
		Median	.0471	
		Variance	3.293	
		Std. Deviation	1.81470	
		Minimum	-7.23	
		Maximum	10.46	
		Range	17.68	
		Inter quartile Range	1.76	
		Skewness	-.054	.105
		Kurtosis	3.423	.209

Block: 0

The output of block 0 is the result of the analysis without any of the independent variable used in the model. This will serve as a baseline later for comparing the model with our predictor variables included.

TABLE 4: Classification Table [a,b] Block:0

Observed			Predicted		
			Return		
			.00	1.00	Percentage Correct
Step 0	Return	.00	0	273	.0
		1.00	0	273	100.0
		Overall Percentage			50.0

a. Constant is included in the model.

b. The cut value is .500

In this table, values of return which are above the median value are coded as "1" and values of return which are below the median value are coded as "0". Median value is 0.0471 (from the table 3).Without introducing Independent variable (Result of the match) there are 50% chances that return goes above or below to the median value.

TABLE 5: Classification Table[a]

Observed			Predicted		
			Return		
			.00	1.00	Percentage Correct
Step 1	Return	.00	154	119	56.4
		1.00	140	133	48.7
		Overall Percentage			52.6

a. The cut value is .500

After introducing the independent variable there is a 2.6% change in the dependent variable. Independent variable is the result of the one day match played by India. Result of the match is coded as win is equal to "1" and lose is equal to "2". Matches that are drawn, tied or abandoned (due to rain or some other factor) are treated as the control group. The overall accuracy of this model to predict return (with a predicted probability of 0.5 or greater) is 52.6% (Table VI). The sensitivity of the model is the percentage of the group that has the characteristic of interest that has been accurately indentified by the model. And in this model sensitivity is 133/273 = 48.7% and the specificity of the model is the percentage of the group without the characteristic of interest that is correctly identified. In this model specificity is 154/273 = 56.4%.

Positive predictive value (PPV) is the percentage of cases that the model classifies as having the characteristic that is actually observed in this group. Therefore the positive predictive value is 154/294 = 52.4%. Negative predictive value (NPV) is the percentage of cases predicted by the model not to have the characteristic that is actually observed not to have the characteristic. In our case negative predictive value is 133/252 = 52.8%.

TABLE: 6 Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp (B)
Step 1[a]	result(1)	-.207	.172	1.443	1	.230	.813
	Constant	.111	.126	.777	1	.378	1.118

a. Variable(s) entered on step 1: result.

Probability (Change in return) = where e denotes the exponential function With Z.

z = 0.111 + (-0.207) * Result (Win=1 or Lose=2).

From above equation,

If India win, z = 0.111 + (-0.207) * (1) = -0.096 *Win:* $\underline{e^{-win}} = e^{-(-0.096)} = 1.1008$

Prob (return>0.0471): $= \left(\frac{1}{1+1.1008}\right) = 0.4760 = 47.60\%$

If India lose, z = 0.111 + (-0.207) * (2) = -0.303 Win: $\underline{e^{-lose}} = e^{-(-0.303)} = 1.3539$

Prob (return<0.0471): $= \left(\frac{1}{1+1.3539}\right) = 0.4248 = 42.48\%$

It means there is 47.6% probability that return will go above the 0.0471 if India wins the match, and 52.4% probability that return will go below the 0.0471.And if India lose the match there is 42.48% probability that return will go below the 0.047 and 57.52% probability

CONCLUDING REMARKS

In the current study we examined the effect of the performance of the Indian cricket team in one-day internationals on the main market index (SENSEX) from the BSE. The results obtained using Chi Square & regression analysis method suggested that the performance of the Indian cricket team in one-day matches strongly affects the Indian stock market. A victory by the Indian cricket team has a large positive impact on the stock market but the defeat of the Indian team has relatively large negative impact on the Indian stock market. The asymmetric result obtained in the analysis is consistent with the view that people value losses differently from gains. The results suggest that the wave of optimism introduced by a win is not as big in magnitude as the wave of pessimism following a loss.

AREAS FOR FURTHER RESEARCH

- As T-20 format of cricket is gaining popularity each passing day, similar type of research can be done for T-20 matches.
- The research can also be done by studying the matches played on the particular day of week and return related to the result of the match on that day. In short combing calendar effect with cricket match outcome to find out stock market return.
- The further research can also be done by using this method to design an experimental setup where one can measure the pre- and post-game mood of investors and examine its impact on the stock market by collecting their responses in a simulated investment decision game.
- Similar line of research can be done in other events taking place regularly which can influence the behavior of investor like release of Hindi moving, State elections, Monsoon pattern etc.
- The research can be done to measure the impact of Hindi movies getting released and being hit or flop on stock market. Further the study can be done to find the impact of Hindi movies released having certain range of budgets like small budget or big budget etc. This line of research can also be used to examine the effect of the outcome of the performance of specific superstars in Hindi movies i.e. Shah Rukh Khan, Salman Khan, Aamir Khan, Akshay Kumar etc. on stock market return in India.

LIMITATIONS

One limitation of this study that we considered that all "mood swings" are either negative or positive deviations from some baseline mood and will have an upward or downward effect on the stock market. In a more realistic psychological setting one may expect that the mood deviation from the baseline in a negative direction might take several different forms. For example, if a team loses, supporters may experience a range of negative emotions, including sadness, disappointment, anger or frustration. While all these are negative deviations, each may have a different behavioural consequence when it comes to making an investment decision. For example, a feeling of sadness might make investors withdraw from the world (and the stock market, thus resulting in reduced trading) for a while whereas anger might make them behave in an impulsive manner which might involve selling of a lot of the stocks.

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