An Analysis of the Advance-Decline Indicator in the Indian Stock Market

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Abstract

This study examines predictive ability of the advance-decline indicator in the Indian stock market. Several lagged values of advance-decline ratios were calculated to examine predictive ability of these ratios on future stock return. The results demonstrate advance-decline indicator is not effective in predicting future stock return in the Indian stock market. The results were consistent when lagged values of advance-decline ratios were separated by higher and lower values for prediction purposes. Therefore, the results of this study provide support to the theory of market efficiency in the Indian stock market.

I. Introduction

Numerous researchers have examined the impact of behavioral aspects on investment returns. Many researchers have investigated if human sentiment affects financial decision process. These researchers' state human behavior and emotions may not be beneficial and may lead investors to make inferior investment decisions. Alternately, investors utilize a variety of so-called technical indicators for investment decisions that are considered unattached with personal biases and emotions.

A number of technical indicators have proliferated and are available to investors as tools to guide them for investment purposes. These technical indicators are a subject of tremendous debate as they do not rely on fundamental data. Many researchers question the usefulness of the technical indicators. Opponents of technical indicators often state application of many technical indicators appear to be straight-forward, however the signals generated by these indicators are actually less obvious in practical usage. There are some technical indicators that are simple to apply, but the question remains if they have any practical economic value.

A technical indicator that appears to be relatively straight-forward to implement is the advance-decline indicator. The advance-decline indicator is based on the relationship between the number of stocks that advanced in comparison to the number of stocks that declined during a given time period for a particular stock exchange. Accordingly, this indicator gives an indication of the future direction of the stock market. If there are more stocks that have advanced in prices than stocks that have price declines, than the advance-decline ratio indicates a signal that the stock market will increase during a subsequent period. Alternately, it is the opposite if the price declines are higher than price advances in the number of stocks.

Most of the technical indicators including the advance-decline ratio are challenged by the proponents of efficient market theory. The efficient market hypothesis states that technical analysis will not generate abnormal returns. Researchers have largely concluded that technical analysis does not outperform a simple buy and hold strategy. Despite the refutation of technical analysis by academic community, the usage of technical analysis has gained tremendous

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popularity in investment decision-making process. Technical indicators are readily available in many financial websites and also in stock exchange websites. It appears a significant number of investors are using technical indicators as either a primary tool for investment decisions or using the indicators as a supplement to fundamental analysis in decision making process. Many researchers contend technical indicators can be used effectively in emerging stock markets for enhancing stock returns. Therefore, this study examines the predictability of a popular technical indicator, namely the advance-decline ratio in the Indian stock market. The next section discusses some literature relevant to this study.

II. Literature Review

A significant number of researchers have examined the efficacy of several technical indicators in predicting stock market return. An earlier study by Zakon and Pennypacker (1968) concluded advance-decline indicator is not a useful indicator of U.S. stock returns. Doukas and Park (1995) examined the predictive accuracy of advance-decline ratio and short-term trading index. The authors believe trading rules utilizing these technical indicators can predict future stock returns although most of the information derived is during non-trading hours. Therefore, information associated with technical indicators is already reflected in stock prices. Investors cannot utilize these technical indicators to predict future stock returns.

Ahmed, Beck and Goldreyer (2000) examine the usefulness of technical indicators in emerging markets of Asia. The authors concluded emerging Asian stock markets exhibit a predictive pattern and therefore technical indicators can be useful in generating higher returns as these markets are not weak-form efficient. Bennett and Sias (2001) indicate the money flow indicator has become an increasing useful technical indicator with investors. The authors indicate money flow indicators are not only correlated with concurrent stock returns but also possess predictive ability to forecast future stock returns.

Lai, Balachandher and Nor (2003) examined the usefulness of technical indicators in the Malaysian stock market. The authors conclude technical indicators can predict future stock returns and are relevant even after considering transaction costs. They support the relevance of technical indicators in the Malaysian stock market. Wong, Manzur and Chew (2003) examine the performance of moving average ratio and relative strength index in Singapore stock market returns. The authors find evidence that these indicators can help investors to generate significant positive returns. Sehgal and Gupta (2007) examine the relevance of several technical indicators on data of sixty-nine large Indian companies. Utilizing data from 1999 to 2004, the authors conclude many technical indicators can generate significant gross returns. However, these indicators do not perform necessarily better than a simple buy and hold investment strategy on a net return basis. The authors concluded the results of their study conform to the theory of efficient market.

Qi and Zhao (2008) investigate if market breadth and trin statistic technical indicators have ability to predict future stock returns. Qi and Zhao state the predictive power of these technical indicators has decreased over recent years and with large stocks. Canbas and Kandir (2009) analyzed the relationship of investor sentiment with stock returns of the Istanbul stock exchange from 1997 to 2005. They concluded investor sentiment variables do not have potential to

forecast future stock returns. Anghel (2013) examined the usefulness of moving average technical indicator in the Romanian stock market from 2001 to 2011. The author indicates moving average indicator have generated excess return and lower risk in comparison to a buy and hold investment strategy in the Bucharest stock exchange. The authors conclude their results indicate Romanian stock market is not weak-form efficient. On the other hand, Metghalchi, Pinho and Sarmento (2014) conclude technical indicators have predictive ability to forecast future return in the Polish stock market. However, these technical indicators cannot outperform buy and hold strategy after inclusion of transaction related costs and therefore the Polish stock market is efficient. The review of the literature indicates mixed results on the effectiveness of technical indicators in predicting stock returns. The literature also highlights possible effectiveness of utilizing certain technical indicators in some developing stock markets. Therefore, this study provides important contribution in examining the effectiveness of the advance-decline indicator in the Indian stock market. The next section describes empirical results.

III. Empirical Results

The National Stock Exchange of India (NSE) is one of the two premier stock exchanges of India. The NSE has more than 1000 listed securities and provides data of various NSE stock indices. The specific data of the companies listed in the exchange that advanced or declined in each month is available from April 2000 in the NSE website. The relevant data of companies that advanced as well as declined were collected for the period April 2000 to December 2013 resulting in 165 months of data. Also, data of the NSE 500 stock index values for the same period were collected from the NSE website. Monthly NSE 500 stock returns were calculated using the standard formula resulting in 165 index returns for comparable purposes. The NSE 500 stock index is a broad based stock index that is considered representation of the overall Indian stock market.

The advance-decline ratio is calculated as total number of companies that advanced in a given month divided by number of companies that declined in that month. Therefore, the ratio is 1 if the numbers of companies that advanced as well as declined are same. The ratio will be greater (less) than 1 if the numbers of companies that advanced will be greater (less) than the number of securities that declined.

The mean monthly value of the advance-decline ratio is 0.93 during the overall period from April 2000 to December 2013. The advance-decline ratio represents the overall breadth of the stock market. The advance-decline ratio of 0.93 indicate more companies generated negative returns than positive returns during this time period. During this 165 month overall period, the advance-decline ratio was lower than 1 during 107 months whereas higher or equal to 1 in the other 58 months. During this period, the minimum monthly advance-decline ratio was 0.55 whereas the highest monthly advance-decline ratio was 1.80.

This study separated the high months in which the advance-decline ratio is 1 or higher in comparison to the low months when the advance-decline ratio is lower than 1. For the 107 low months, the minimum ratio is 0.55 whereas the maximum ratio is 0.99. The mean value of the

advance-decline ratio during low months is 0.80. For the high months, the mean value of the 58 months is 1.16 with a minimum ratio of 1.00 and maximum ratio is 1.80.

Table 1
Summary Statistics of Advance-Decline Ratio
National Stock Exchange of India
April 2000 to December 2013

Ratio	N	Minimum	Maximum	Mean
All Months	165	0.55	1.80	0.93
Low Months	107	0.55	0.99	0.80
High Months	58	1.00	1.80	1.16

Note: Low is when the Advance-Decline Ratio is lower than 1. High is when the ratio is 1 or higher.

The purpose of this study is to investigate if prior advance-decline ratios can predict future stock return. However, it is important to initially examine the relationship of advance-decline ratio with concurrent stock returns of the NSE 500 stock index returns. The result of this particular analysis gives some validity of possible relationship between advance-decline ratio and monthly returns in the Indian stock market. These results are reported in Table 2. The specific OLS regression equation utilized for this purpose is as follows:

$$\text{NSE 500 Stock Return}_t = \beta_0 + \beta_1 \text{ (concurrent months advance-decline ratio)} + \varepsilon_t$$

The result indicates the coefficient of 30.51 of the independent variable is positive and statistically significant. The F-value of 287.60 is highly statistically significant and the adjusted R square (0.636) explains much of the variation in explaining concurrent stock returns. The results illustrate the significance of the advance-decline ratio in explaining the concurrent return of the Indian stock market. The advance-decline ratio is highly related with the stock return of the same month in the Indian stock market.

Table 2
OLS Regression of returns of the NSE 500 Index on concurrent value of the Advance-Decline Ratio: April 2000 to December 2013
$\text{Return}_t = \beta 0 + \text{Ratio}_t + \varepsilon t$

Constant	Coefficient	F-Statistics	Significance	Adj. R Square	df
-27.18	30.51	287.60	0.000	0.636	164
[-15.87]	[16.96]				
(0.000)	(0.000)				

Note: T-statistics and *p*-values are in brackets and parenthesis.

For practical purposes, it is however important to examine the relationship of prior advance-decline ratios with future stock return. The next analysis therefore investigates the effectiveness of prior values of advance-decline ratio on future stock return. Investors are really interested if past advance-decline ratio can predict the direction of future stock market return. Different values of advance-decline ratios are utilized to investigate the significance of these ratios to

future stock return. Specifically, the following three regression equations are utilized to examine the relationship between stock returns and previous advance-decline ratios.

Model 1: $Return_t = \beta_0 + \beta_1$ (previous months ratio) + ε_t
Model 2: $Return_t = \beta_0 + \beta_1$ (average of previous three months ratio) + ε_t
Model 3: $Return_t = \beta_0 + \beta_1$ (average of previous six months ratio) + ε_t

The initial equation (Model 1) examines the effectiveness of previous month's advance-decline ratio in prediction of next month's stock return. The results reported in Table 3 indicate the coefficient of the previous month's ratio is positive but not statistically significant in explaining subsequent month's stock return. This study also calculated averages of prior month's advance-decline ratios to investigate if these ratios can effectively predict future stock return. The next two models consequently utilize different averages of prior advance-decline ratios as independent variables. In Model 2, the average value of previous three months advance-decline ratio is utilized as an independent variable to predict future stock return. The results reveal the coefficient (average of previous three months) is positive but not statistically significant. The regression utilizing average of previous six months (Model 3) of advance-decline ratios were also used to examine predictive ability on future stock return. The results continue to demonstrate previous values of advance-decline ratios are not significant in predicting future return performance in the Indian stock market. These results remain consistent whether previous month or average of prior three or six months of advance-decline ratios is used in the analysis to predict future stock return.

Table 3
OLS Regressions of returns of NSE 500 Index on lagged values of Advance-Decline Ratio: April 2000 to December 2013
Returnt = β0 + Ratio + εt

Constant	Coefficient	F-Statistics	Significance	Adj. R Square	df
Model 1: $\beta_0 + \beta_1$ (previous months ratio) + ε_t					
-1.89	3.40	1.34	0.248	0.002	163
[-0.68]	[1.16]				
(0.499)	(0.248)				
Model 2: $\beta_0 + \beta_1$ (average of previous three months ratio) + ε_t					
-4.63	6.36	1.58	0.211	0.004	161
[-0.98]	[1.26]				
(0.329)	(0.211)				
Model 3: $\beta_0 + \beta_1$ (average of previous six months ratio) + ε_t					
-4.70	6.55	0.90	0.345	-0.001	158
[-0.73]	[0.95]				
(0.466)	(0.345)				

Note: T-statistics and *p*-values are in brackets and parenthesis.

This study wants to examine the impact of advance-decline ratio on future stock return in more detail. This analysis investigates if prior high (equal or higher than 1) or alternately prior low

(lower than 1) average values of advance-decline ratios has better ability to predict future stock return. Therefore, this analysis utilizes previous OLS regressions with independent variables of high as well as low ratios of advance-decline ratios separately. Therefore, the advance-decline ratio of previous month, mean of previous three months and six months ratios are divided into two groups. The first group termed "low" includes all months that have advance-decline ratio lower than 1. The "high" category consists of all months that have the ratio of 1 or higher. Table 4 reports the results of the above regressions when the advance-decline ratios of averages of prior months are either high (Panel A) or low (Panel B) separately. The three regression equations (Models 1 through 3) analyzed earlier on overall data are now used separately for high as well as on low advance-decline months. Therefore, a total of six regression equations are performed for this analysis. The results are reported in Table 4.

Table 4
OLS Regressions of returns of NSE 500 Index on lagged values of Advance-Decline Ratio: April 2000 to December 2013
High and Low Ratios

Constant	Coefficient	F-Statistics	Significance	Adj. R Square	df
Panel A: High (1 or more) Ratios					
Model 1: $\beta_0 + \beta_1$ (previous months ratio) + ε_t					
-4.48	5.35	0.47	0.498	-0.010	56
[-0.49]	[0.68]				
(0.627)	(0.498)				
Model 2: $\beta_0 + \beta_1$ (average of previous three months ratio) + ε_t					
-1.31	3.38	0.06	0.816	-0.026	38
[-0.08]	[0.24]				
(0.934)	(0.816)				
Model 3: $\beta_0 + \beta_1$ (average of previous six months ratio) + ε_t					
-4.20	5.61	0.06	0.814	-0.032	30
[-0.17]	[0.24]				
(0.868)	(0.814)				
Panel B: Low (Less than 1) Ratios					
Model 1: $\beta_0 + \beta_1$ (previous months ratio) + ε_t					
-4.02	6.26	0.97	0.326	0.000	106
[-0.78]	[0.99]				
(0.437)	(0.326)				
Model 2: $\beta_0 + \beta_1$ (average of previous three months ratio) + ε_t					
-5.28	7.07	0.60	0.440	-0.003	122
[-0.66]	[0.77]				
(0.512)	(0.440)				
Model 3: $\beta_0 + \beta_1$ (average of previous six months ratio) + ε_t					
-9.29	11.81	1.14	0.287	0.001	127
[-0.94]	[1.07]				
(0.350)	(0.287)				

Note: T-statistics and *p*-values are in brackets and parenthesis.

The results confirm earlier conclusions that prior values of advance-decline ratios do not have any ability to predict future stock return. The results presented in Panel A of Table 4 demonstrate high values of prior averages of advance-decline ratios (equal or greater than 1) do not have any ability in predicting future stock return. All the coefficients of the independent variable in each of the three equations are not statistically significant. Panel B of Table 4 presents results when averages of prior advance-decline ratios are low (lower than 1). The results are again consistent with earlier findings. The results utilizing all three regressions indicate low values of prior advance-decline averages do not also have any predictive ability to forecast future return.

Next, this study compares subsequent stock return performance when previous advance-decline ratios have high in comparison to low values. In other words, this study investigates if NSE 500 monthly stock returns are significantly different when previous advance-decline ratios are high (equal or greater than 1) versus low (lower than 1). The results are reported in Table 5. The returns are greater when previous advance-decline ratios are high in comparison when the previous advance-decline ratios are low. However, all these comparisons are not statistically significant. These results indicate previous advance-decline ratios are not related with future stock return.

Table 5
Significance Test Results of NSE 500 Stock Returns Over Prior Advance-Decline Ratios
April 2000 to December 2013

	Previous Month		**Previous 3 Months**		**Previous 6 Months**	
	Mean	**N**	**Mean**	**N**	**Mean**	**N**
Low Ratios	1.01	107	0.91	123	1.28	128
High Ratios	1.73	57	2.38	39	1.76	31
T-Statistics	0.55		1.00		0.30	
Significance	0.587		0.319		0.767	

Note: Low is when the advance-decline ratio is lower than 1. High is when the ratio is 1 or higher. Significance results from Mann-Whitney Tests were similar as that of T-tests.

This study is interested in exploring the effectiveness of the predictive ability of advance-decline ratios on stock return in further detail. Earlier analysis separated averages of prior advance-decline ratio with a cutoff value of 1. It is of course reasonable to divide the ratios by two groups with high (1 or more) and low (less than 1) prior advance-decline ratios for the analysis. However, it is conceivable that extreme high or low values of previous advance-decline ratios may be able to better predict future stock return.

The ratios are now separated by top 25% and bottom 25% of values of prior advance-decline ratios for further analyses. Summary statistics of top 25% and bottom 25% of prior advance-decline values are reported in Table 6. Panel A of Table 6 reports the values of top 25% and bottom 25% of previous month's advance-decline ratio. The bottom 25% of 41 months have advance-decline ratio ranging from 0.55 to 0.78 resulting in mean of 0.68. The range of top 25%

is from 1.07 to 1.80 with a mean of 1.22. The summary results for other lagged ratios are also reported in Table 6.

Table 6
Summary of Advance Decline Ratios by Top 25% and Bottom 25%
April 2000 to December 2013

Ratio	N	Minimum	Maximum	Mean
Panel A: Previous Month				
Bottom 25%	41	0.55	0.78	0.68
Top 25%	40	1.07	1.80	1.22
Panel B: Average of Previous Three Months				
Bottom 25%	39	0.59	0.85	0.78
Top 25%	39	1.00	1.44	1.09
Panel C: Average of Previous Six Months				
Bottom 25%	39	0.70	0.87	0.82
Top 25%	39	0.98	1.24	1.05

The analysis now uses a narrower criterion in calculating higher and lower values of averages of prior advance-decline ratios. The higher values consider only those month's values that are top 25% and lower values are months with bottom 25% ratios only. The three regression models are now utilized on higher (top 25%) and lower values (bottom 25%) of averages of prior advance-decline ratios separately. The results are reported in Table 7.

Higher Ratios (top 25%) of prior advance-decline ratios cannot predict future stock return. The coefficients of all the independent variables (reported in Panel A of Table 7) in each of the three regression models are not statistically significant. Similarly, lower ratios (bottom 25%) also have no predictive ability to forecast future stock return. The results reported in Panel B of Table 7 reveal all the coefficients of averages of prior advance-decline ratios are not statistically significant in predicting future stock return. These results concur with previous analysis that prior values of advance-decline ratios cannot predict future stock return.

The final analysis compares stock return when prior advance-decline ratios are categorized as higher months (top 25%) in comparison to lower months (bottom 25%). The results reported in Table 8 indicate future return is substantially higher when the previous advance-decline ratios are high (top 25%) in comparison to return when the previous advance-decline ratios are low (bottom 25%). However, the significance results utilizing parametric t-tests as well as non-parametric Mann-Whitney test statistics indicate these differences are not statistically significant. Therefore, the results reported in Table 8 demonstrate subsequent stock returns are not significantly different when prior months have very high (top 25%) in comparison to very low (bottom 25%) advance-decline ratios. These results reinforce earlier findings that prior advance-decline ratios do not have any significant relation with future stock return.

Table 7
OLS Regressions of returns of NSE 500 Index on lagged values of Advance-Decline Ratio: April 2000 to December 2013
Higher (Top 25%) and Lower (Bottom 25%) Ratios

Constant	Coefficient	F-Statistics	Significance	Adj. R Square	df
Panel A: Higher Ratios (Top 25%)					
Model 1: $\beta_0 + \beta_1$ (previous months ratio) + ε_t					
3.98	-0.93	0.01	0.926	-0.026	39
[0.324]	[-0.09]				
(0.748)	(0.926)				
Model 2: $\beta_0 + \beta_1$ (average of previous three months ratio) + ε_t					
-1.31	3.38	0.06	0.816	-0.026	38
[-0.08]	[0.24]				
(0.934)	(0.816)				
Model 3: $\beta_0 + \beta_1$ (average of previous six months ratio) + ε_t					
-3.08	4.58	0.04	0.852	-0.026	38
[-0.12]	[0.19]				
(0.905)	(0.852)				
Panel B: Lower Ratios (Bottom 25%)					
Model 1: $\beta_0 + \beta_1$ (previous months ratio) + ε_t					
-6.87	10.03	0.32	0.575	-0.017	40
[-0.57]	[0.57]				
(0.574)	(0.575)				
Model 2: $\beta_0 + \beta_1$ (average of previous three months ratio) + ε_t					
15.53	-19.15	0.68	0.416	-0.009	38
[0.85]	[-0.82]				
(0.402)	(0.416)				
Model 3: $\beta_0 + \beta_1$ (average of previous six months ratio) + ε_t					
3.54	-4.24	0.01	0.906	-0.027	38
[0.12]	[-0.12]				
(0.904)	(0.906)				

Note: T-statistics and *p*-values are in brackets and parenthesis.

Table 8
Significance Test Results of NSE 500 Stock Returns Over Prior Advance-Decline Ratios
April 2000 to December 2013

	Previous Month		Previous 3 Months		Previous 6 Months	
	Mean	**N**	**Mean**	**N**	**Mean**	**N**
Bottom 25% Ratios	-0.04	41	0.51	39	0.08	39
Top 25% Ratios	2.85	40	2.38	39	1.72	39
T-Statistics	-1.51		-0.98		-0.79	
Significance	0.134		0.329		0.432	

Note: Significance results from Mann-Whitney Tests were similar as that of T-tests.

IV. Summary and Conclusion

This study examined the predictive ability of previous month's advance-decline ratio on future return of the Indian stock market. More specifically, previous months as well as averages of previous three and six month's advance-decline ratios were utilized as predictor variables to investigate impact on future stock return. The results indicate advance-decline ratio do not predict stock returns in the Indian stock market. These results remained remarkably consistent when advance-decline ratios of averages of prior months were separated by high and low values. The results of analysis in this study concur with the theory of stock market efficiency.

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