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# EVIDENCE FOR HERDING IN FUTURES MARKET: AN EMPIRICAL ANALYSIS OF INDIAN INFRASTRUCTURE SECTOR

**Dr. Babu Jose**
Assistant Professor, Department of Commerce, St. Thomas College Palai, Arunapuram, Kottayam, Kerala, India.

**James Varghese**
Assistant Professor, Department of Commerce, St. Thomas College Palai, Arunapuram, Kottayam, Kerala, India

**ABSTRACT**

*Herding is the tendency to mimic the actions of others. In finance, herding stands for the market behavior, where investors herd together in investment decisions. An empirical analysis on herding behavior in Indian futures market aims to make clarity on the herding behavior of Indian futures market by considering near month daily closing return of Nifty infra futures index and 17 individual near month futures stock return which are the part of Nifty infrastructure futures index for a continuous seven years period from 2011 to 2018, by applying CSAD model and OLS linear regression. The whole study period is divided as bull and bear market and separate analysis is made to find the presence of herding behavior in those different market situations. The empirical results proved the absence of herding behavior in Indian infrastructural industrial futures market and in its bull and bear market situations.*

**KEY WORDS: -** *Herding Behavior, Futures market, Bull market, Bear market, CSAD Model, Nifty Infrastructure futures index*

## INTRODUCTION

The futures market is very keen in helping the investors to protect their investment for a short period from the unpredictable price fluctuations in the underlying spot market. For the short span of time the spot market shows different behavioral patterns causing irrational loss to the investors. Herding behavior represents the tendency for an individual to mimic the actions of others *(Chang et al. 2000)*. It describes how individuals in a group can act collectively without centralized direction *(Harminder Singh 2011)*. Herd behavior is an important concept in the field of behavioral finance which is a very commonly seen investors' psychology. Herding, when considered in financial decision making, is a phenomenon where an economic agent tends to imitate the investment choice of other investors and to forsake their own private information *(Ahmed et al. 2015)*. Herding behavior influence the market movements by change in asset prices and increasing price volatility. It is associated with nonlinearities in the structure of returns. In the case of herding, investors make investment decisions based on collective actions of the market, instead of trading based on their individual beliefs. The absence of herding behavior indicates an efficient market. The aim of the present study is to detect is the presence of herding behavior, if any, in Indian infrastructural sector futures market. Infrastructure industry plays an important role in the basic infrastructure development of the nation, which is one among key indicators of the economic growth and stability. Both spot and futures markets performance of the industry is the key indicator of the development of the sector in the country and it shows a clear idea on the expectation and response of the people towards the basic economic growth. The infrastructure sector is capable of representing the entire economy as it spread throughout all spheres of the economy, including agricultural sectors, energy and power sector, telecom, port, air, roads, railway, shipping and utility sectors, etc. But the events in the sector leads to speculation too, as it is related to the

business of giant business groups. A lot of anticipation on the political affiliations and other major socio political events leads the sector in the stock market to move irrationally. This situation creates rational investors and trades to think on the capital market irrationally and their financial decisions are influenced by various market behavior especially herding. The futures market is the replication of the spot market thus the behavioral pattern of the spot market may be existed in the futures market. This study makes an attempt to investigate the herding behavior of Indian futures market and its infrastructure sector.

## RELEVANCE OF THE STUDY

Herding behavior may be seen to be individually rational on a number of grounds although it may not necessarily lead to efficient outcomes *(Hwang and Salmon, 2004)*. Thus it is important to study the irrational behavior of investors who follow the investment decisions of others in stock market which will help the investors to make strategic investment decisions. Identifying herd behavior will helps the investors to make strategic investment decisions. In Indian context, the behavior and efficiency of stock market were studied by many researchers and found the level of efficiency, different behavioral pattern in various market situations and especially herding behavior of spot market. But it is very rare to see the study which analyses the herding behavior of Indian futures market in its depth and breadth. Thus, the primary concern of the present study is to test for the presence of herding behavior in Indian futures market. Various industrial sectors are having its own influence on the Indian economy. Thus the separate study on the herding behavior in different industrial sectors will help the investors and traders to take rational decision on their investment. Infrastructure index in the NSE, which is the biggest stock as well as futures exchange in India, represents construction, energy, telecom, services and industrial manufacturing industries at large. The role of infrastructure development industries for the development of the entire economyis to be considerd for the analysis. Separate industry base analysis on herding behavior of futures market will help the traders and investors to take rational decision on their financial executions. Bull and bear market movement and the influence of irrational behavior in its may be the issue for the study and this may be addressed by this study by applying the methodology of Cross Sectional Absolute Deviation (CSAD) of returns proposed by Chang et al. (2000) which is an extension of Cross Sectional Standard Deviation (CSSD) model by Christie and Huang (1995). The analysis is made on the daily closing prices of S&P Nifty infrastructure index, and 17 individual stocks that are constituents of the index. This result makes more clarity toward the financial decisions of the traders and investors in spot market and its corresponding futures market.

## OBJECTIVES OF THE STUDY

1. To study the presence of herding behavior in Indian infrastructure sector futures market
2. To study the existence of herding behavior in bullish and bearish market trends in Indian infrastructure sector futures

## HYPOTHESIS OF THE STUDY

$H_{01}$ There is no herding behavior in Indian Futures market especially in infrastructure industry

$H_{02}$ There is no herding behavior in bullish trend of Indian infrastructure sector Futures market

$H_{03}$ There is no herding behavior when bearish trend dominates in the Indian infrastructure sector Futures market

## REVIEW OF LITERATURE

There are number of research studies all over the world relating to herd behavior in stock markets and the present study reviewed various literatures from this field. Most of the authors empirically investigated the presence of herd behavior in their studies and some others focused on the theoretical part of herding behavior. Gleason et al. (2003) observed the existence of herding behavior in commodity futures traded on European exchanges, Christie and Huang (1995), Cheng and Khorana (2000) , Mamduh M. Hanafi (2003), Chen et al. (2003), Kim et al. (2003), Hwang and Salmon (2004), Kim and Nofsinger (2005), Demirer et al. (2015), Ulussever and Demirer (2017) found no significant effect of herding behavior in different markets in developed, developing and under developed economies. Demirer and Kutan (2006) and Hachicha et al. (2007) found absence of herd formation in Chinese markets and Tunisian stock market. Kallinterakis et al. (2009), Shyu et al. (2010), Fu and Lin (2010), Chiang and Zheng (2010), Agarwal et al. (2010), Ayhan Kapusuzoglu (2011), Belhoula and Naoui (2011), Khan et al. (2011), Khoshsirat and Salari (2011) found presence of herding behavior in different developed markets. Chiang et al. (2012) in Chinese market, Mohammad Al-Shboul (2012) in Australian stock, Seetharam and Britten (2013) in the South African, Mohammad Al-Shboul (2013), Javed et al. (2013) and Ahsan and Sarkar (2013) in the Jordanian equity market showed the absence of herd behavior. The evidence of herding from developed economy in different market movement was proved by Gleason et al. (2004), Kremer and Nautz (2013), Le and Truong (2014), Ting Lan (2014), Malik and Elahi (2014), Solakoglu and Demir (2014) , Loan et al. (2014), Mobarek et al. (2014), Filip et al. (2015), Nha D., Loan T. B. and Nhung T. T. (2015), BenSaida et al. (2015) and Vieira and Pereira (2015). Hilal Humeyra Ozsu (2015) revealed that there was no evidence of herd behavior in both up and down markets. The application of Chang et al. (2000) and Christie and Huang (1995) models found no evidence for many studies made by Sias (2004), Ahmed et al. (2015), Economou et al. (2015), Zafar and Hassan (2016), Cakan and Balagyozyan (2016), Joseph Abuga Orayo (2016) and Setyawan and Ramli (2016), Guney et al. (2016), Gong and Dai (2017) and Brodocianu and Stoica (2017). Chang and Su (2017) revealed that investors in the US stock market have no herding behavior both for general stocks and high-risk stocks while significant evidence of herding was found by Arjoon and Bhatnagar (2017). Lee et al. (2018) made a study to investigate herd behavior in global stock markets and conducted an intercontinental comparison, Kim et al. (2013) and Dhaene et al. (2012) revealed that herd behavior and stock index were negatively correlated. The results of the empirical evidence made by Grinblatt, Titman and Wermers (1995), Russ Wermers (1999), Bikhchandani and Sharma (2001), Dasgupta et al. (2011), Paulo Lao and Harminder Singh (2011), Banerjee and Padhan (2017) and Kallinterakis et al. (2017) supported the presence of herding in different markets and the absence of such movement is revealed by Anandadeep Mandal (2011), Prosad et al. (2012), Garg et al. (2013), Abbi et al. (2014), Ashish Kumar et al. (2016), Ganesh et al. (2016) and Ashish Kumar and Bharti (2017). A positive influence of FII on mimic tendency was proved by Mangesh Tayde et al (2011), Archana

Patro and A. Kanagaraj (2012) and M.V.Lakshman (2013). Apart from the inconclusive evidence of herding behavior is different markets, very less number of studies in the futures market and especially absence of the same in Indian infrastructure sector futures form the base for the study.

## METHODOLOGY

### Variables used in the study

Near Month Daily closing prices and return of Nifty Infra futures index and near month daily return of 17 sample stocks which are continuously there in the Nifty Bank futures index from 2011 to 2018. Dependent Variable – Cross Sectional Absolute Deviation (CSAD), Independent Variable – Market Return (*Rmt*) of Nifty Bank futures index . Market Return *(Rmt)* is the return of the Nifty Bank futures index for the study period. OLS Regression is used to find the presence of Herd Behavior in Indian Futures market for the period of 2011-2018.

### Model Applied for the Analysis

For the purpose of testing the herding behavior in the market the least squares regression analysis is performed using the methodology of Cross Sectional Absolute Deviation (CSAD) proposed by *Chang et al. (2000).* The daily CSAD values of futures stock returns were computed by using the following equation:

$$CSAD_t = \frac{1}{n}\sum_{i=1}^{n} | R_{it} - R_{mt} |$$

The study uses the following *OLS* regression equation to demonstrate the herd behavior.

$$CSAD_t = \beta_0 + \beta_1 |R_{mt}| + \beta_2 (R_{mt}{}^2) + \epsilon_t$$

For herding should be present, $\beta 2$ should be negative and significant. Herding is also examined during bull and bear markets by using the following regression equations:

$$CSAD_t{}^{up} = \beta_0 + \beta_1{}^{up} |R_{mt}{}^{up}| + \beta_2{}^{up} (R_{mt}{}^{2^{up}}) + \epsilon_t$$

$$CSAD_t{}^{down} = \beta_0 + \beta_1{}^{down} |R_{mt}{}^{down}| + \beta_2{}^{down} \left(R_{mt}{}^{2^{down}}\right) + \epsilon_t$$

In this case, the negative and significant $\beta_2{}^{up}$ and $\beta_2{}^{down}$ indicates the presence of herding.

## ANALYSIS & INTERPRETATION

In order to identify the herding nature of the Nifty infrastructure futures market, the futures return data has been collected and analyzed for its normality and stationarity. Then the Chang et.al. (2000) model was used to identify the presence of herding, if any, in the futures market.

**Table 1 Descriptive statistics of futures return of Nifty Infra index and 17 sample stocks for the period 2011-2018**

| Stock | | Mean | Median | Std. Dev. | Skewness | Kurtosis | Jarque-Bera | Prob. | Obs. |
|---|---|---|---|---|---|---|---|---|---|
| NIFTYINFRA | Whole | 0.693 | 0.000 | 71.119 | -0.002 | 40.67 | 96736.73 | 0.00 | 1636 |
| | Bull | 136.126 | 84.250 | 144.483 | 1.623 | 5.29 | 70.98 | 0.00 | 108 |
| | Bear | -152.442 | -104.000 | 149.515 | -1.624 | 6.31 | 79.83 | 0.00 | 89 |
| ADANIPORTS | Whole | 0.155 | 0.000 | 5.707 | 0.171 | 6.42 | 803.08 | 0.00 | 1636 |
| | Bull | 1.734 | 1.700 | 4.902 | -0.481 | 5.28 | 27.49 | 0.00 | 108 |
| | Bear | 1.746 | 0.950 | 6.767 | 1.599 | 7.25 | 104.89 | 0.00 | 89 |
| ADANIPOWER | Whole | -0.034 | 0.000 | 1.369 | -0.096 | 10.29 | 3628.16 | 0.00 | 1636 |
| | Bull | 0.525 | 0.550 | 2.049 | -0.117 | 9.90 | 214.72 | 0.00 | 108 |
| | Bear | 0.207 | 0.100 | 1.546 | 1.981 | 9.49 | 214.27 | 0.00 | 89 |
| BHARTIARTL | Whole | 0.003 | -0.200 | 6.774 | 0.334 | 5.68 | 519.12 | 0.00 | 1636 |
| | Bull | 0.858 | 0.800 | 7.132 | -0.113 | 3.04 | 0.24 | 0.89 | 108 |
| | Bear | -0.210 | -0.300 | 8.956 | 0.018 | 3.47 | 0.82 | 0.66 | 89 |
| BHEL | Whole | -0.120 | 0.000 | 4.901 | -0.347 | 11.50 | 4961.55 | 0.00 | 1636 |
| | Bull | 1.258 | 1.450 | 6.826 | 1.647 | 11.16 | 348.36 | 0.00 | 108 |
| | Bear | -0.526 | -0.700 | 5.145 | 0.075 | 3.60 | 1.40 | 0.50 | 89 |
| CGPOWER | Whole | -0.040 | 0.000 | 4.500 | -9.187 | 222.72 | 3313866.79 | 0.00 | 1636 |
| | Bull | 1.107 | 1.050 | 4.472 | 0.911 | 8.80 | 166.17 | 0.00 | 108 |
| | Bear | 0.265 | 0.250 | 3.397 | -0.727 | 4.74 | 19.11 | 0.00 | 89 |
| GMRINFRA | Whole | -0.003 | 0.000 | 0.646 | 0.126 | 8.73 | 2245.99 | 0.00 | 1636 |
| | Bull | 0.290 | 0.250 | 0.929 | 0.121 | 11.26 | 307.23 | 0.00 | 108 |
| | Bear | 0.141 | -0.050 | 0.735 | 0.736 | 4.06 | 12.24 | 0.00 | 89 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| IDEA | Whole | -0.021 | 0.000 | 2.879 | 0.215 | 6.46 | 830.27 | 0.00 | 1636 |
| | Bull | -0.031 | 0.025 | 2.804 | -0.864 | 6.10 | 56.75 | 0.00 | 108 |
| | Bear | 0.079 | 0.100 | 3.002 | -0.596 | 4.77 | 16.84 | 0.00 | 89 |
| IRB | Whole | 0.039 | 0.150 | 5.104 | -0.241 | 6.27 | 746.40 | 0.00 | 1636 |
| | Bull | 1.303 | 1.900 | 6.255 | -0.767 | 5.72 | 44.00 | 0.00 | 108 |
| | Bear | 0.553 | 0.550 | 4.390 | 0.063 | 3.00 | 0.06 | 0.97 | 89 |
| LT | Whole | 0.007 | -0.575 | 30.344 | -5.782 | 106.27 | 736048.28 | 0.00 | 1636 |
| | Bull | 9.830 | 8.725 | 28.194 | 0.123 | 3.34 | 0.81 | 0.67 | 108 |
| | Bear | 0.570 | 0.350 | 28.622 | 0.625 | 3.85 | 8.44 | 0.01 | 89 |
| NHPC | Whole | 0.001 | 0.000 | 0.442 | -1.339 | 29.25 | 47455.09 | 0.00 | 1636 |
| | Bull | 0.126 | 0.125 | 0.543 | 0.783 | 8.51 | 147.48 | 0.00 | 108 |
| | Bear | 0.138 | 0.100 | 0.454 | 0.851 | 4.49 | 18.92 | 0.00 | 89 |
| NTPC | Whole | 0.000 | 0.000 | 2.314 | -0.242 | 7.08 | 1148.37 | 0.00 | 1636 |
| | Bull | 0.888 | 0.625 | 2.746 | 0.862 | 6.34 | 63.57 | 0.00 | 108 |
| | Bear | 0.306 | 0.300 | 2.599 | 0.292 | 3.14 | 1.34 | 0.51 | 89 |
| POWERGRID | Whole | 0.054 | 0.000 | 1.955 | 0.104 | 5.71 | 505.22 | 0.00 | 1636 |
| | Bull | 0.752 | 0.825 | 2.090 | -0.412 | 3.96 | 7.19 | 0.03 | 108 |
| | Bear | 0.093 | 0.250 | 2.021 | 0.034 | 2.53 | 0.83 | 0.66 | 89 |
| RELINFRA | Whole | -0.003 | 0.200 | 13.437 | 0.211 | 7.20 | 1214.04 | 0.00 | 1636 |
| | Bull | 6.137 | 5.075 | 18.666 | 1.307 | 10.55 | 287.33 | 0.00 | 108 |
| | Bear | 1.656 | -0.050 | 14.125 | 0.459 | 3.62 | 4.57 | 0.10 | 89 |
| RPOWER | Whole | -0.032 | 0.050 | 1.820 | 0.170 | 9.09 | 2537.14 | 0.00 | 1636 |
| | Bull | 0.840 | 0.900 | 2.675 | 0.687 | 8.90 | 165.13 | 0.00 | 108 |
| | Bear | -0.137 | 0.000 | 2.083 | -0.131 | 4.00 | 3.94 | 0.14 | 89 |
| SIEMENS | Whole | 0.180 | 0.125 | 19.271 | -0.455 | 9.53 | 2962.57 | 0.00 | 1636 |
| | Bull | 6.901 | 4.250 | 20.763 | 0.821 | 4.92 | 28.68 | 0.00 | 108 |
| | Bear | 3.015 | -0.550 | 17.222 | 0.936 | 4.44 | 20.73 | 0.00 | 89 |
| TATAPOWER | Whole | -0.012 | -0.050 | 1.704 | -0.215 | 6.27 | 741.98 | 0.00 | 1636 |
| | Bull | 0.755 | 0.475 | 2.326 | 0.223 | 3.88 | 4.39 | 0.11 | 108 |
| | Bear | 0.265 | 0.250 | 2.118 | 0.031 | 3.86 | 2.75 | 0.25 | 89 |
| VOLTAS | Whole | 0.262 | 0.125 | 6.704 | 0.036 | 7.62 | 1452.96 | 0.00 | 1636 |
| | Bull | 1.486 | 1.100 | 6.682 | 0.964 | 6.44 | 70.13 | 0.00 | 108 |
| | Bear | 0.800 | 0.050 | 5.094 | 0.332 | 6.05 | 36.04 | 0.00 | 89 |

The table 1 shows the descriptive statistics of daily futures returns of Nifty Infra index and 17 sample stocks listed under the index for the period 2011-2018. The normality of the return series is checked by measuring the mean, median, skewness, kurtosis, jarque-bera test statistic and p-value. The average return of Nifty Infra index shows a positive value for both whole period and bull period which is 0.693 and 136.126 respectively while for the bear period the mean return is -152.442. The mid value of the data series is also positive for both whole period of the study and bull period and it shows a negative value for the bear period. Standard deviation is the measure of dispersion in the series and it is 71.119, 144.483 and 149.515 for the whole period, bull period and bear period respectively. Skewness which is the degree of asymmetry of the data series shows that the return series is negatively skewed for the whole period as well as for the bear period whereas for the bull period it shows a positively skewed distribution. The data series is peak or leptokurtic during the whole period of the study (40.67) as well as for the bull (5.29) and bear periods (6.31) as the value of kurtosis is more than the standard value of 3. The jarque-bera test value is 96736.73, 70.98 and 79.83 for the whole period, bull period and bear period respectively and the value of probability is 0.00 at all the times. Thus, the value skewness, kurtosis, jarque-bera test, and probability reveal that the return series of Nifty Infra series is non-normal in nature.

The behavior of return series of each of the sample stocks is also analyzed. The table shows that among the 17 sample stocks, nine stocks have a positive mean return while the other eight stocks have a negative mean return. VOLTAS (0.262) offers the highest average mean return for the whole period of the study while for the bull and bear phases the highest mean return is for ADANIPORTS (1.734 and 1.746 respectively). The least mean return during the whole period of the study is for BHEL (-0.120). The highest mid value for the whole period is for RELINFRA (0.200). The value of skewness shows that nine stocks are negatively skewed for the whole period of the study whereas for the bull period only six stocks have negative skewness. The return series of

the sample stocks are positively skewed for the bear period excluding one stock namely, RPOWER (-0.131). The value of kurtosis reveals that the data series of all the stocks are peak for the whole period of the study. The jarque-bera test value which is based on the measure of skewness and kurtosis show that the return series is not normal. The p-value is significant for all the stocks during the whole period of the study that also reveal the non-normality of the series.

**Table 2 Stationarity test results daily futures price series of Nifty Infra index and 17 sample stocks for the period 2011-2018**

| Stock | Period | Augmented Dickey-Fuller Test | | | | Phillips-Perron Test | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Level | | 1st Difference | | Level | | 1st Difference | |
| | | t-Statistic | Prob. | t-Statistic | Prob. | Adj. t-Stat | Prob. | Adj. t-Stat | Prob. |
| NIFTYINFRA | Whole | 0.0296 | 0.6921 | -32.1302 | 0.0000 | 0.4216 | 0.8043 | -50.8821 | 0.0001 |
| | Bull | 0.3558 | 0.7858 | -12.2532 | 0.0000 | 0.4954 | 0.8208 | -12.2575 | 0.0000 |
| | Bear | 0.2568 | 0.7584 | -10.8582 | 0.0000 | 0.5059 | 0.8229 | -10.9872 | 0.0000 |
| ADANIPORTS | Whole | 0.5835 | 0.8423 | -41.5210 | 0.0000 | 0.8665 | 0.8965 | -42.1210 | 0.0001 |
| | Bull | 1.0604 | 0.9238 | -2.5463 | 0.0112 | 1.2335 | 0.9439 | -11.5165 | 0.0000 |
| | Bear | 1.8490 | 0.9839 | -3.1750 | 0.0018 | 1.0955 | 0.9280 | -11.4047 | 0.0000 |
| ADANIPOWER | Whole | -1.6767 | 0.0886 | -39.1948 | 0.0000 | -1.6709 | 0.0897 | -39.1948 | 0.0000 |
| | Bull | -1.3915 | 0.1518 | -8.7391 | 0.0000 | -1.3947 | 0.1509 | -8.6066 | 0.0000 |
| | Bear | -1.3598 | 0.1602 | -10.3597 | 0.0000 | -1.3830 | 0.1538 | -10.3802 | 0.0000 |
| BHARTIARTL | Whole | -0.3654 | 0.5531 | -41.4504 | 0.0000 | -0.3576 | 0.5562 | -41.4489 | 0.0000 |
| | Bull | -0.4026 | 0.5365 | -11.4619 | 0.0000 | -0.3230 | 0.5669 | -11.8236 | 0.0000 |
| | Bear | -0.3403 | 0.5598 | -9.6221 | 0.0000 | -0.3319 | 0.5630 | -9.6225 | 0.0000 |
| BHEL | Whole | -1.4091 | 0.1481 | -37.9225 | 0.0000 | -1.3948 | 0.1519 | -37.8933 | 0.0000 |
| | Bull | -1.3221 | 0.1713 | -9.8091 | 0.0000 | -1.3631 | 0.1596 | -9.8200 | 0.0000 |
| | Bear | -1.4107 | 0.1465 | -9.4922 | 0.0000 | -1.4440 | 0.1380 | -9.5052 | 0.0000 |
| CGPOWER | Whole | -0.9525 | 0.3044 | -43.0633 | 0.0001 | -0.8814 | 0.3343 | -43.7823 | 0.0001 |
| | Bull | -0.8415 | 0.3491 | -12.6723 | 0.0000 | -0.8992 | 0.3245 | -12.5273 | 0.0000 |
| | Bear | -0.9709 | 0.2942 | -6.8985 | 0.0000 | -0.8654 | 0.3383 | -6.8798 | 0.0000 |
| GMRINFRA | Whole | -0.8461 | 0.3494 | -39.4959 | 0.0000 | -0.8428 | 0.3509 | -39.4858 | 0.0000 |
| | Bull | -0.7656 | 0.3824 | -10.3870 | 0.0000 | -0.7630 | 0.3836 | -10.3870 | 0.0000 |
| | Bear | -0.7794 | 0.3758 | -9.9488 | 0.0000 | -0.6744 | 0.4222 | -10.1886 | 0.0000 |
| IDEA | Whole | -0.6654 | 0.4290 | -39.1402 | 0.0000 | -0.6565 | 0.4330 | -39.1373 | 0.0000 |
| | Bull | -0.6886 | 0.4165 | -11.8012 | 0.0000 | -0.6752 | 0.4224 | -11.7659 | 0.0000 |
| | Bear | -0.6249 | 0.4439 | -9.0887 | 0.0000 | -0.6259 | 0.4435 | -9.0857 | 0.0000 |
| IRB | Whole | -0.2365 | 0.6012 | -38.4958 | 0.0000 | -0.2241 | 0.6056 | -38.4537 | 0.0000 |
| | Bull | -0.0770 | 0.6548 | -10.5009 | 0.0000 | -0.0407 | 0.6670 | -10.5062 | 0.0000 |
| | Bear | -0.1105 | 0.6429 | -3.7552 | 0.0003 | -0.1137 | 0.6418 | -10.0085 | 0.0000 |
| LT | Whole | -0.4248 | 0.5301 | -38.7976 | 0.0000 | -0.4404 | 0.5240 | -38.7935 | 0.0000 |
| | Bull | -0.4794 | 0.5059 | -10.3435 | 0.0000 | -0.4037 | 0.5360 | -10.5385 | 0.0000 |
| | Bear | -0.3485 | 0.5567 | -9.4206 | 0.0000 | -0.3450 | 0.5581 | -9.4205 | 0.0000 |
| NHPC | Whole | -0.3373 | 0.5638 | -38.3543 | 0.0000 | -0.3484 | 0.5597 | -38.3558 | 0.0000 |
| | Bull | -0.3358 | 0.5621 | -9.3802 | 0.0000 | -0.3665 | 0.5504 | -9.4232 | 0.0000 |
| | Bear | -0.0585 | 0.6606 | -9.0307 | 0.0000 | -0.0585 | 0.6606 | -9.0307 | 0.0000 |
| NTPC | Whole | -0.3073 | 0.5751 | -41.8168 | 0.0000 | -0.2876 | 0.5824 | -41.8930 | 0.0000 |
| | Bull | -0.2849 | 0.5811 | -10.1200 | 0.0000 | -0.2427 | 0.5966 | -10.4727 | 0.0000 |
| | Bear | -0.2078 | 0.6086 | -12.3440 | 0.0000 | -0.1841 | 0.6171 | -12.3745 | 0.0000 |
| POWERGRID | Whole | 0.8978 | 0.9015 | -44.0706 | 0.0001 | 1.0268 | 0.9205 | -44.4609 | 0.0001 |
| | Bull | 1.5551 | 0.9701 | -8.6089 | 0.0000 | 1.1763 | 0.9378 | -9.0046 | 0.0000 |
| | Bear | 1.7264 | 0.9791 | -8.3393 | 0.0000 | 1.3985 | 0.9588 | -8.5202 | 0.0000 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| RELINFRA | Whole | -0.5514 | 0.4784 | -41.1733 | 0.0000 | -0.5466 | 0.4804 | -41.1703 | 0.0000 |
| | Bull | -0.5917 | 0.4588 | -12.1316 | 0.0000 | -0.5771 | 0.4651 | -11.9825 | 0.0000 |
| | Bear | -0.5006 | 0.4967 | -10.1288 | 0.0000 | -0.5089 | 0.4933 | -10.0945 | 0.0000 |
| RPOWER | Whole | -1.1448 | 0.2303 | -20.9279 | 0.0000 | -1.1431 | 0.2309 | -42.3346 | 0.0001 |
| | Bull | -1.0667 | 0.2572 | -10.8706 | 0.0000 | -1.0667 | 0.2572 | -10.8562 | 0.0000 |
| | Bear | -1.0444 | 0.2652 | -11.2909 | 0.0000 | -1.0473 | 0.2641 | -11.1228 | 0.0000 |
| SIEMENS | Whole | -0.0719 | 0.6587 | -39.5981 | 0.0000 | -0.0788 | 0.6564 | -39.5957 | 0.0000 |
| | Bull | -0.0719 | 0.6565 | -10.9422 | 0.0000 | -0.0273 | 0.6715 | -10.9290 | 0.0000 |
| | Bear | -0.0536 | 0.6622 | -10.1148 | 0.0000 | 0.0261 | 0.6885 | -10.1511 | 0.0000 |
| TATAPOWER | Whole | -0.6842 | 0.4207 | -42.5983 | 0.0001 | -0.6842 | 0.4207 | -42.6822 | 0.0001 |
| | Bull | -0.6815 | 0.4196 | -9.8988 | 0.0000 | -0.6809 | 0.4199 | -9.8996 | 0.0000 |
| | Bear | -0.5411 | 0.4799 | -11.5569 | 0.0000 | -0.5290 | 0.4850 | -11.5582 | 0.0000 |
| VOLTAS | Whole | 1.2742 | 0.9490 | -44.5256 | 0.0001 | 1.2499 | 0.9466 | -44.4887 | 0.0001 |
| | Bull | 3.0704 | 0.9994 | -3.5602 | 0.0005 | 2.3164 | 0.9950 | -12.1760 | 0.0000 |
| | Bear | 1.4331 | 0.9615 | -8.8698 | 0.0000 | 1.7487 | 0.9801 | -8.9315 | 0.0000 |

Table 2 shows the stationarity test results of futures price series of Nifty Infra index and 17 sample stocks listed under the index for the period 2011-2018 as well as for the bull and bear periods. The stationarity test of the data series is performed by applying the ADF and PP unit root tests. The data series of Nifty Infra index is non-stationary in its level form and thus there is long term information in the data series of index while the data series show stationarity behavior at the first difference form.

The unit root test of data series of sample stocks are also analyzed in order to check the stationarity of each of the sample stocks separately. The futures price series of all the sample stocks are non-stationary in its level form unlike the test at difference form in which the data series show stationarity behavior. All the variables are stationary in both ADF and PP test at first difference form as the probability value is significant for the whole period of the study as well as for the bull and bear periods and thus there is no possibility of accepting the null hypothesis that there is unit root in the variable.

**Table 3 Regression analysis results Nifty Infra futures market for the period 2011-2018**

| Stock | Whole period | | Bullish period | | Bearish period | |
|---|---|---|---|---|---|---|
| | ?? | Significance | ?? | Significance | ?? | Significance |
| ADANIPORTS | 1.32911949 | 0.00000000 | 1.77587794 | 0.00011460 | 0.52027209 | 0.36808443 |
| ADANIPOWER | 1.07225270 | 0.00005866 | 1.66223445 | 0.01007716 | -0.55312841 | 0.35791927 |
| BHARTIARTL | 1.02307984 | 0.00000000 | 0.66751627 | 0.10944926 | 0.36996247 | 0.39692159 |
| BHEL | 0.77287630 | 0.00174217 | 0.48671899 | 0.38012346 | -0.20925887 | 0.60235747 |
| CGPOWER | 1.76657788 | 0.00006417 | 2.46025529 | 0.00002903 | 0.36318877 | 0.41359452 |
| GMRINFRA | 1.23848338 | 0.00000599 | 2.13918578 | 0.00230212 | -0.02802448 | 0.96339791 |
| IDEA | 1.29692534 | 0.00000000 | 0.77793130 | 0.10196999 | 0.49962497 | 0.19724536 |
| IRB | 0.88167090 | 0.00064287 | 0.93406884 | 0.19453556 | -0.28611978 | 0.55061488 |
| LT | 0.98882696 | 0.00000907 | 1.29507884 | 0.00158810 | -0.16521663 | 0.66620187 |
| NHPC | 0.94800937 | 0.00000009 | 1.14139853 | 0.00781837 | -0.02062910 | 0.95654656 |
| NTPC | 0.91674392 | 0.00000000 | 0.67396030 | 0.03354278 | 0.31879402 | 0.33396763 |
| POWERGRID | 1.09357797 | 0.00000000 | 1.10710982 | 0.00140812 | 0.43580166 | 0.15564496 |
| RELINFRA | 0.76683939 | 0.00095770 | 0.85366520 | 0.18413900 | -0.11054016 | 0.83984126 |
| RPOWER | 1.35627447 | 0.00000000 | 1.43404158 | 0.01415006 | 0.72835865 | 0.12138196 |
| SIEMENS | 1.10384480 | 0.00000000 | 1.38716502 | 0.00094765 | -0.05496149 | 0.88029594 |
| TATAPOWER | 1.29734911 | 0.00000000 | 1.57100986 | 0.00108586 | 0.58217478 | 0.12821916 |
| VOLTAS | 0.71812662 | 0.00101070 | 0.68126858 | 0.29507354 | -0.37800867 | 0.44509923 |

Table 3 shows the regression analysis results of 17 sample stocks listed under the Nifty Infra futures index for the period 2011-2018. Herd behavior is the idea that one is doing something just because everyone else is doing it. It can be defined as an investor's imitation of the actions of others. In financial markets, herd behavior refers to investors' tendency to follow and copy what most other investors are doing. They are largely influenced by emotion and instinct, rather

than by their own independent analysis. According to *Kim and Nofsinger (2005)* herding occurs when a group of investors buy or sell the same security based on the same, or correlated, information signals, over some period of time. The methodology of Cross Sectional Absolute Deviation (CSAD) model developed by *Chang et al. (2000)* is employed for the purpose of identifying the evidence of herd behavior in the Nifty Infra futures market during the whole period of the study as well as during the bullish and bearish periods. The value of CSAD increases if the stock return deviates from the market return and vice versa. The significant negative coefficient of squared market return, $\beta_2$ indicates the presence of herding behavior in the market. According to *Chang et al. (2000)*, the relationship between CSAD and market return should be negative and non-linear when there is herding behavior in the market.

The table 3 shows that, nine sample stocks during the bearish period show a negative but insignificant coefficient of $\beta_2$. The empirical results confirms that herding is absent in the Nifty Infra futures market during the whole period as well as during the bullish and bearish periods as none of the stocks have both negative and significant coefficients of $\beta_2$. The results of the study are in accordance with the findings of *Ganesh et al. (2016)* which examined the herd behavior in Indian industrial sectors. The study by *Garg and Gulati (2013)* also provides the similar results as herding is not present in the Indian stock market. The findings are in contradictory with the findings of *Lao and Singh (2011)* which identified the presence of herd behavior in Chinese and Indian stock markets.

## CONCLUSIONS

The empirical analysis of the study reveals that there is no evidence of herding behavior in Indian futures market by considering Nifty Infrastrucure futures index and its listed individual futures socks. Near month daily closing returns are taken for the analysis and it is found that the mimic individual behavior of the market is not prevailed in Indian infrastructre industrial futures market. The methodology based on the Cross Sectional Absolute Deviation (CSAD) of returns proposed by *Chang et al. (2000)* is employed in order to detect herd behavior in the market. The regression analysis results provide evidence for the absence of herding behavior in Indian Futures market for the period of the study which is in consistent with the study by *Garg and Gulati (2013)* who found evidence against the presence of herding in Indian stock market. Even though the bull and bear market movements are separately analyzed using the same methodology, there is no evidence for the presence of herding in the ups and downs movements of Indian infrastructure industrial sector. For the short span of time, the developed markets are also evidenced the presence of herding in the stock market *Christie and Huang (1995), Nofsinger et al. (1999), Cheng and Khorana (2000), Kim and Nofsinger (2005), Ulussever and Demirer (2017)*. But the absence of the following tendency of futures markets are to be studied in different manner to find the reason of the results derived through the empirical analysis.

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