

# The Size Effect Anomaly in the Indian Stock Market

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*The size effect in stock market implies that small firm stocks generate higher risk-adjusted returns from that of large firm stocks. We did not find a size effect in the Indian stock market for the period of October 2005 to September 2023. We also examined the prevalence of size effect separately by calendar months. Small firm stocks generated significantly higher returns from than of large firms in April and December. Alternately, we did not find a size effect during January, November-December and March to May. We conclude only April and December months' exhibit a size effect in the Indian stock market.*

*Keywords: size effect, Indian stock market, anomalies, small-firm effect, calendar effects, January effect, April effect, December effect*

## INTRODUCTION

Numerous researchers have reported a stock market anomaly known as the size effect where small capitalization stocks have generated higher risk-adjusted returns than large capitalization stocks. This so-called size effect, also known as the small firm effect in stock returns, is inconsistent with the concept of efficient market. Many researchers indicate that size premium (small firm stock returns minus large firm stock returns) is inconsistent across months in U.S. and many other international stock markets. Researchers have indicated previously that the size premium is largely prevalent in the month of January. In other words, size premium exist because of the January month. Researchers indicate this phenomenon exists because of possible tax-loss selling hypothesis, as the month of December is year-end for tax purposes in the U.S. stock market. However, researchers have later found that the size effect has either diminished or is nonexistent in some stock markets globally. Some researchers conversely note that the size effect has reversed in later years. In other words, these researchers have demonstrated that larger firms have generated relatively higher risk-adjusted stock returns than smaller firms.

We are interested in examining the size effect in the Indian stock market. The Indian economy has experienced tremendous growth in recent years. As of 2023, the Indian economy has become one of the top five largest economies in the world. Additionally, since 1990s, the Indian stock market has generated high positive returns after implementation of liberalization polices such as allowing foreign investments. We believe there is an increased appetite of investors around the globe to understand the performance and efficiency of the Indian stock market.

We compare performance of small capitalization stocks with that of large capitalization stocks in the Indian stock market. We initially investigate the size effect by comparing returns of small capitalization stocks with that of large capitalization stocks for the recent period, October 2005 to September 2023. We also investigate if size premiums are significantly different in the month of January from that of the mean

of other eleven months of the year. Additionally, we reviewed relevant literature of the Indian stock market and determined that some months other than January generated significantly unique returns in the Indian stock market. We acknowledge that the Indian stock market is uniquely different from the U.S. as well as other international stock markets. We therefore compare separately if size premiums significantly differ in some specific month(s) from other remaining months of the year. Our research therefore thoroughly examines possible existence of the size effect in the Indian stock market. Our analysis will indicate if there is a size effect, no size effect or a reverse size effect in the Indian stock market. Additionally, we also investigate if any particular month(s) separately exhibit a size or a reverse size effect. The next section summarizes some selected literature relevant to our study.

## LITERATURE REVIEW

Rogalski and Tinic (1986) state that it is widely documented in prior research that small capitalization stocks generate higher returns than large capitalization stocks. They report the excess returns of small firms over large firms are largely prevalent in the month of January. They add that most prior studies have assumed that the risk of small firms remains constant over the year. However, they find the risk of small firms increasing at the beginning of the year in January and therefore required rate of return should increase in January. They conclude high abnormal returns in the month of January are not necessarily abnormal because of higher risk associated with the month of January.

Leong and Zaima (1991) indicate small firm effect has remained unsolved over the years. They state previous studies have generally examined NYSE-AMEX stocks. The authors examined the small firm effect utilizing smallest firms of the OTC market. The small firm effect was prevalent in NYSE-AMEX stocks. However, the small firm effect was not prevalent in OTC stocks. They however found that there is a small firm effect in NYSE-AMEX stocks as well as OTC stocks in the month of January.

Cheung, Leung and Wong (1994) examine the small firm effect in the Korean Stock Exchange for the period 1982 to 1988. The authors found that small firms generated higher risk-adjusted returns than larger firms. The author also found that January's returns were two to three times higher than that of other months for both small and large firms. The authors indicate these anomalies are also prevalent in the Asia-Pacific stock markets as in the U.S. stock market.

Gharghori, Lee and Veeraraghavan (2009) examined several effects including the size effect in the Australian stock market. The period examined for their study was from January 1992 to December 2005. The authors identified a size effect in the Australian stock market. Haidi, Pyeman and Mahmood (2011) examined the existence of the small firm effect in the Malaysian Bourse, previously known as the Kuala Lumpur Stock Exchange (KLSE) from 1990 to 2003. The authors did not find a small firm effect in the emerging Malaysian Bourse (KLSE) market as that found in the developed stock markets. Alternately, the authors found a reverse small firm effect where larger firms generated higher returns than that of the smaller firms.

Marquering, Nisser, and Valla (2006) examined the prevalence of several anomalies before and after its publication. The authors argue increased awareness of an anomaly will diminish its effectiveness. They further add that investors may not be able to take advantage of increased profits after that anomaly becomes popular and known to the investors. This is because more investors will trade as they become aware of an anomaly. The authors found several well-known anomalies such as the weekend effect, holiday effect, the time of the month effect and the January effect had disappeared after documentation in publications. However, the small firm effect continued to exist in the stock market.

Patel (2012) compared returns of small firms with that of large firms for developed and emerging stock markets. Patel concluded that these differences were not statistically significant in developed as well as emerging stock markets. Furthermore, small firm returns were not significantly different from that of large firm returns over varying market conditions. Patel also examined if small firms generated different reruns than that of large firms during the month of January. He found small firm returns were not significantly different from large firm returns over January month and non-January months. Patel concluded that there is no size effect or a reverse size effect in developed as well as emerging stock market returns.

Harshita, Singh and Yadav (2018-2019) examined the size effect in the Indian stock market from 1995 to 2015. The authors question if the size effect is an anomaly or is just a manifestation of data sets utilized for the examination. They therefore examined the size effect with two related datasets and with two different return calculations. They found size effect exists irrespective of the methodology employed in calculation of returns. However, their research did not find size effect consistent across different data sets. They indicate practitioners should be careful before implementing the size anomaly strategy in their investment decisions.

Raj and Kumari (2006) examined several seasonal effects in the Indian stock market. The authors did not find the January effect in the Indian stock market. The authors indicate the tax year ends in March in India. Therefore, December has no real significance and the January effect does not exist in India. The authors also examined the April effect to determine the extent of tax-loss selling hypothesis in the Indian stock market. The authors indicate returns of April were higher than that of nine out of eleven remaining months and therefore their results seem to support the tax-loss selling hypothesis to some extent. However, they found March returns were not among the lower returns as compared to other eleven months of the year. The authors indicate seasonality in the Indian stock market differs from that in other developed stock markets. These results indicate that the Indian stock market appears to provide diversification benefits to international investors.

In an earlier study, Patel (2003) examined the performance of the U.S. stock market and the Emerging markets of Asia. Patel concluded the Indian stock market provided diversification opportunities to U.S. investors. In another study, Patel (2008) investigated prevalence of any systematic patterns in monthly returns of the Indian stock market for the period, July 1999 to June 2007. The author found two distinct patterns in the Indian stock market. First, the November-December monthly returns generated significantly higher returns than the other ten months of the year. Second, March to May monthly returns generated significantly lower returns than the other nine months of the year.

Patel (2016) studied the existence of January effect in stock returns from 1997 to 2014. The author specifically examined prevalence of January effect in the U.S. stock market, developed stock market, three major regional stock markets and emerging stock market. Patel found January effect did not exist in international stock returns. The author notes researchers may want to examine if any other calendar month(s) such as April and/or December generates significantly higher returns than other months of the year. Patel found April month generated statistically significant positive returns in three of the six international stock indices and December month generated statistically significant positive returns in four of the six international stock indices examined in the study.

Accordingly, researchers have documented that small firms have generated significantly higher returns than large firms even after adjusting for risk. These researchers have investigated the size effect in developed as well as emerging stock markets. In recent years, however, some researchers have found that size effect has diminished or is no longer prevalent in stock markets. Some researchers have found that there is a reversal of size effect in stock markets. In other words, larger firms have generated significantly higher returns than that of smaller firms. We investigate the prevalence of possible size effect or alternately reverse size effect in the Indian stock market. Additionally, we investigate separately if there is a size effect or a reverse size effect in some particular month(s) of the year. We now describe data utilized in our study.

## **DATA**

The S&P Dow Jones Indices and the BSE Ltd. (formerly, Bombay Stock Exchange) announced collaboration to create S&P BSE indices in February 19, 2013. We collected index values of the S&P BSE Large Cap stock index and the S&P Small Cap stock index. The inception date of these two stock indices is September 15, 2005. We collected data values of the last trading day of the month from September 30, 2005. We have therefore monthly returns from October 2005 to September 2023 resulting in 216 monthly return observations (18 years) for each of the two stock indices. The S&P BSE Large Cap stock index represents the top 70 percent of the total market cap of the S&P BSE All Cap index. Therefore, the S&P BSE Large Cap index represents the large cap segment of the Indian stock market. The S&P BSE Small Cap stock index represents the bottom 15 percent of the total market cap of the S&P BSE All Cap index.

Therefore, the S&P BSE Small Cap index represents the small cap segment of the Indian stock market. We now report our empirical results in the next section.

## EMPIRICAL RESULTS

We report summary statistics of monthly returns of small cap and large cap stocks in Table 1. Monthly returns of small cap stock index (1.27 percent) are higher than that of large cap stock index (1.12 percent) for the period October 2005 to September 2023. Risk, as measured by standard deviation, is higher for the small cap stock index (8.83 percent) than that of the large cap stock index (6.23 percent). The risk and returns are as expected; small cap stock index generated higher monthly returns and risks than that of large cap stock index for the overall period of our study from October 2005 to September 2023.

**TABLE 1**  
**SUMMARY STATISTICS OF INDIAN STOCK INDICES, OCTOBER 2005 TO**  
**SEPTEMBER 2023**

Index	Mean	SD	Minimum	Maximum	N
Small Cap	1.27	8.83	-32.49	51.92	216
Large Cap	1.12	6.23	-25.18	29.11	216

We now utilize statistical significant tests to compare returns of small cap stocks with that of large cap stocks. Specifically, we utilized parametric as well as non-parametric statistical tests to compare small stock returns with that of large stock returns. We report results from these analyses in Table 2. We find small cap stock returns are not significantly different from large cap stock returns when we utilize parametric t-test statistics and non-parametric Wilcoxon Signed Ranks test statistics. We conclude that there is no size effect nor a reverse size effect in the Indian stock market.

**TABLE 2**  
**COMPARISON OF SMALL CAP VERSUS LARGE CAP INDEX, OCTOBER 2005 TO**  
**DECEMBER 2023**

Index	Mean	SD
Small Cap	1.27	8.83
Large Cap	1.12	6.23
<b>Significance Test Results</b>		
T-Statistics	0.467	
Significance	0.641	
Degree of freedom	215	
<b>Wilcoxon Signed Ranks Test</b>		
Significance	0.938	

The size effect or the reverse size effect likely exist in some month(s) of the year. We therefore examine the size effect separately by each month. We utilize the following OLS regression equation to analyze the existence of size premium by each month.

$$Size\ Premium_t = \beta_{1t}D_1 + \beta_{2t}D_2 + \beta_{3t}D_3 + \beta_{4t}D_4 + \beta_{5t}D_5 + \beta_{6t}D_6 + \beta_{7t}D_7 + \beta_{8t}D_8 + \beta_{9t}D_9 + \beta_{10t}D_{10} + \beta_{11t}D_{11} + \beta_{12t}D_{12} + \varepsilon_t \quad (1)$$

In the above equation (1), size premium is the dependent variable. In this equation, we utilize twelve dummy variables as independent variables for each of the twelve months of the calendar year. For example,  $D_1=1$  for size premium in the month of January and 0 for the other eleven months.  $D_2=1$  for size premium in the month of February and zero for the other eleven months. We create similarly dummy variables for each month of the year. We have suppressed the intercept (constant) in equation 1. In the above equation (1), the  $\beta_i$  are the estimated coefficients and are therefore mean of the size premium of each of the twelve calendar months. Subsequently, the estimated  $\beta_1$  coefficient is size premium for the month of January and the coefficient indicates if size premium is positive or negative and is statistically significant. Similarly, the estimated coefficient of  $\beta_2$  represents the month of February as do the other months of the year, respectively. If the estimated coefficient of a particular month is positive and statistically significant, then it implies the prevalence of size effect in that particular month. If the estimated coefficient is negative and statistically significant, it implies a reverse size effect in that particular month. We present the results utilizing this equation in Table 3.

**TABLE 3**  
**SIZE PREMIUMS BY MONTHS, OCTOBER 2005 TO SEPTEMBER 2023**

Month	Coefficient	T-Statistic	Significance
January	-0.96	-0.907	0.366
February	-1.68	-1.598	0.112
March	-1.76	-1.671	0.096
April	3.36**	3.184	0.002
May	0.60	0.570	0.570
June	-0.20	-0.187	0.852
July	-0.38	-0.360	0.719
August	1.24	1.181	0.239
September	-0.01	-0.010	0.992
October	-1.09	-1.034	0.302
November	0.25	0.237	0.813
December	2.38*	2.263	0.025

Note: \*\* Significant at the 0.01 level, \* Significant at the 0.05 level.

Many researchers have previously documented that the size effect in stock returns exists because of the January month. They note January effect is largely prevalent in small cap firms rather than large cap firms. If this is true, the size premium in January should be positive and statistically significant. Subsequently, some researchers have documented that January effect does not exist anymore in the stock market. Our analyses indicate that January size premium is -0.96 percent, which indicates January returns of larger firms were higher than that of the smaller firms. However, January size premium is not statistically significant. We conclude there is no January size effect or a reverse size effect in the Indian stock market.

There is some documentation in literature that monthly returns of November and December were significantly higher than the mean returns of the other ten months of the year in the Indian stock market. Additionally, March to May mean returns were significantly lower than that of the mean returns of the other nine months of the year in the Indian stock market. Researchers have previously noted that April and December months have generated higher positive stock returns than other months of the year. Our results in Table 3 also reveal that April and December months generate high positive size premiums in the Indian stock market. We are interested in pursuing these analyses in further detail. Specifically, we investigate if size premium in April and/or December are higher than that of other months of the year. We compare first size premium in the month of April with that of the mean of other eleven months. We report these results in Table 4. Size premium is on average 3.36 percent in the month of April compared to a mean of -0.15 in the remaining eleven (non-April) months. Statistical tests reveal size premium is significantly higher in the

month of April compared to the average size premiums of the other eleven (non-April) months. We conclude there is an April size effect in the Indian stock market.

**TABLE 4**  
**SIZE PREMIUM OF APRIL VERSUS NON-APRIL MONTHS, OCTOBER 2005 TO SEPTEMBER 2023**

<b>Month</b>	<b>Size Premium</b>
April	3.36
Non-April Months	-0.15
<b>Statistical Tests</b>	
T-Statistics	3.150
Significance	0.002
Degree of freedom	214
<b>Mann-Whitney U Test</b>	
Significance	0.001

Note: April month has 18 observations and Non-April months have 198 observations.

We now compare size premium of December month with that of the mean of the other eleven (non-December) months. We report these results in Table 5. Size premium is on average 2.38 percent in December month versus a mean of -0.06 percent in the other eleven (non-December) months. Statistical tests indicate size premium is significantly different in December month over non-December months. We conclude size effect exists in the month of December in the Indian stock market.

**TABLE 5**  
**SIZE PREMIUM OF DECEMBER VERSUS NON-DECEMBER MONTHS, OCTOBER 2005 TO DECEMBER 2023**

<b>Month</b>	<b>Size Premium</b>
December	2.38
Non-December	-0.06
<b>Statistical Tests</b>	
T-Statistics	2.172
Significance	0.031
Degree of freedom	214
<b>Mann-Whitney U Test</b>	
Significance	0.050

Note: December month has 18 observations and Non-December months have 198 observations.

Researchers have previously documented that January was a driving force in prevalence of the size premium in many stock markets globally. We aim to determine if the size premium in January is significantly different from the mean of the other eleven months of the year in the Indian stock market. We report size premium of January month and non-January months separately in Table 6. Size premium is on average -0.96 percent in January month versus 0.25 percent in the other eleven (non-January) months. Statistical tests reveal size premium is not significantly different in January month over non-January months

utilizing parametric t-test statistics and non-parametric Mann-Whitney U test statistics. We conclude size effect or reverse size effect does not exist in January month in the Indian stock market.

**TABLE 6**  
**SIZE PREMIUM OF JANUARY VERSUS NON-JANUARY MONTHS, OCTOBER 2005 TO DECEMBER 2023**

<b>Month</b>	<b>Size Premium</b>
January	-0.96
Non-January	0.25
<b>Statistical Tests</b>	
T-Statistics	-1.060
Significance	0.290
Degree of freedom	214
Mann-Whitney U Test	-0.961
Significance	0.336

Note: January month has 18 observations and Non-January months have 198 observations

We now analyze size premium of November-December months and compare them with that of the remaining ten (non-November-December) months. We report these results in Table 7. Size premium was on average 1.32 percent in November-December months and was -0.09 percent in non-November-December months. Statistical tests reveal size premium is not significantly different in November-December months from that of non-November-December months. Therefore, we conclude size effect does not exist in November-December months in the Indian stock market.

**TABLE 7**  
**SIZE PREMIUM OF NOVEMBER-DECEMBER VERSUS NON-NOVEMBER DECEMBER MONTHS, OCTOBER 2005 TO SEPTEMBER 2023**

<b>Month</b>	<b>Size Premium</b>
November-December	1.32
Non-November-December	-0.09
<b>Statistical Tests</b>	
T-Statistics	1.678
Significance	0.095
Degree of freedom	214
Mann-Whitney U Test	-1.519
Significance	0.129

Note: Nov-Dec months have 36 observations and Non-Nov-Dec months have 180 observations.

We now compare size premium of March to May months and non-March to May months. We report these results in Table 8. Size premium is on average 0.73 percent in March to May, whereas the mean of the other nine (non-March to May) months is -0.05 percent. Statistical tests reveal size premium is not significantly different in March to May months over non-March to May months. We conclude size effect does not exist in March to May months in the Indian stock market.

**TABLE 8**  
**SIZE PREMIUM OF MARCH-TO-MAY VERSUS NON-MARCH-TO-MAY MONTHS,**  
**OCTOBER 2005 TO SEPTEMBER 2023**

<b>Month</b>	<b>Size Premium</b>
March-to-May	0.73
Non-March-to-May	-0.05
<b>Significance Tests</b>	
T-Statistics	1.078
Significance	0.282
Degree of freedom	214
<b>Mann-Whitney U Test</b>	
Significance	0.518

Note: March-to-May have 54 observations and non-March-to-May months have 162 observations.

### **SUMMARY AND CONCLUSIONS**

We were interested in investigating the prevalence of size effect in the Indian stock market. We found small firm returns were not statistically different from that of large firms in the Indian stock market from October 2005 to December 2023. We conclude that there is no size or reverse size effect in the Indian stock market. Additionally, we were interested in analyzing if small firms generated significantly higher returns than that of large firms during any particular month. In particular, we investigated if any particular month(s) exhibited size effect that may be remarkably different from that of other months of the year.

We found some interesting results when we analyzed size effect for specific months. We found April and December months exhibited size effect in the Indian stock market. In other words, smaller firms generated significantly higher returns than that larger firms during April and December. We believe these results can be beneficial to investors. Size premium was not significantly different in January month from the mean of other eleven months of the year. Therefore, we conclude that January size effect does not exist in the Indian stock market.

Similarly, size premium of November-December months were not significantly different from that of the average of other ten months of the year. Size premium of March-to-May months were not significantly different from that of the average of other nine months of the year. Therefore, we conclude size effect is not prevalent in November-December months and/or March-to-May months in the Indian stock market.



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