Size and Returns: A Study of the Indian Stock Market

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Abstract

The Size effect is one of the prominent anomalies which have been observed in the stock markets around the world. The present study attempts to find out if the portfolio of small stocks yields higher returns vis-a-vis the portfolio of large stocks and whether the size effect is present in the Indian stock market or not. The sample consists of the monthly returns of the stocks included in the S&P CNX 500 index from April 1, 2001 to March 31, 2010. Equal weighted portfolios of thirty smallest and largest stocks were constructed for each year for the entire period of the study based on the criteria of total assets and market capitalization. Using correlation analysis, CNX Nifty Junior was finalized as the market proxy, and the market model was applied by using the variables of excess returns on the portfolio of the stocks and the returns on the market proxy. The results indicate that the returns on the portfolio of small stocks are not significantly different from the returns on the portfolio of large stocks. Therefore, based on the results, the study concludes that the size effect is not present in the Indian stock market.

Keywords **: size effect, market anomalies, small firm effect, market proxy, capital asset pricing model**
JEL Classification: G02, G14

The stock market functions as a combination of many factors, wherein risk-return has a significant role and large-cap, small-cap, and mid-cap stocks all perform differently and their sizes keep changing over a period of time. Traders and investors devise various trading strategies in order to outperform the market and earn superior returns. The investment strategies to design various portfolios are based on a number of variables such as Size, Leverage, Price-earnings ratio, Book to market ratios, which are inconsistent with the capital asset pricing model (CAPM) which was developed by Sharpe (1964) and Lintner (1965), and was an improvement over the portfolio theory of Markowitz (1952,1959). According to CAPM, the return on a security is linearly related to the non-diversifiable risk measured relative to the market portfolio. Thus, the market risk captured by (β) determines the stock prices and returns. However, factors other than the market risk have been identified, which help to explain the asset returns and these have come to be known as CAPM anomalies. A financial anomaly is a price and or return distortion which contradicts a well established financial theory. In financial markets, a number of anomalies have been observed like the month effect, size effect, value effect, and momentum effect. The size effect is an observation in stock markets that smaller firms have risk adjusted higher returns than larger firms on an average over long horizons. The presence of the size effect implies that CAPM is misspecified, and there are factors other than market risk, which determine the returns and the prices of stocks.

Scope of the Study

This study deals with the presence of size effect in the Indian stock market, and thereby, aims to identify the impact of size premium in the returns of a portfolio. The study examines the size effect by comparing the returns of the portfolios which have been constituted based on the criteria of total assets and total market capitalization with the market proxy, using the market model. A number of portfolios were created, and the largest and smallest of them were identified based on the criteria while the other portfolios were ignored in this study. The portfolios were constructed from the sample of 500 companies included in the S&P CNX 500 index, and the period covered is from April 2001 to March 31, 2010.

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Review of Literature

Most of the research on the size effect has been in the developed markets. Banz (1981) found that on an average, stocks of smaller companies had higher risk adjusted returns than those of larger companies during the period from 1936 to 1975. He concluded that size was misspecified, but failed to give an explanation on how size is a factor in stock returns. Reinganum (1981) identified the size effect and reconfirmed the findings of Banz (1981). Roll (1981) argued that small firms are riskier and ,therefore, holding the risk-return principle, their returns have to be higher than those of larger firms. Barry and Brown (1984) found the presence of the size effect in their study and identified that it was due to the difference in the information available for the two types of firms and the perception of investors about the riskiness of smaller firms. Arbel et al. (1983) cited that smaller firms are neglected, and that is why the size effect is present in the markets. Chan and Chen (1991) argued that small firms have lower production efficiency and higher financial leverage, and their reaction to economic news is different from the larger firms. Fama and French (1992) attributed the cross-section variation in returns to size and the ratio of book value to equity. In their subsequent work, Fama and French (1993, 1995, and, 1996) found the presence of the size effect. Rathinasamy and Mantripragda (1996) used risk adjusted Treynor and Sharpe portfolio performance measure to examine the size effect and concluded that for small firms, the returns increased in January, but it was not justified by the quantum of risk of small firms. Daniel et al. (1998) developed a theoretical model using the application of cognitive psychology and identified investors' over-confidence and self-attribution as the reasons for markets moving away from fundamentals.

Hong et al. (2000) associated the size effect to the short-term momentum in stock returns. Timmermann and Quiros (2000), Holle et al. (2002), and Xu (2002) found the presence of the size effect in various stock markets. Fan and Liu (2005) attempted to estimate a simultaneous equation model in order to find the characteristic components of size and book-to-market anomalies. Zadeh (2010) studied the German stock market and documented that there is a conditional relationship between size and returns, and the past performance of the firm determines this relationship. Su et al. (2011) examined the A-shares listed on the Shanghai and Shenzhen stock markets of China. Equal weighted and value weighted portfolios were constructed to analyze monthly seasonality and size effect in the markets. The results showed that January effect is not present in the markets. However, it was found that the size effect was present for both types of portfolios.

In the Indian stock market, Mohanty (2001) studied the data for a period of ten years with market capitalization as a criteria to classify the largest and smallest companies and found the presence of size effect in the Indian stock markets. Sehgal (2002) used the survey method to record the responses of mutual fund managers and stock brokers about the returns from different classes of companies. He concluded that 60% of the respondents were of the opinion that returns are higher in case of smaller companies as compared to larger companies. Sehgal (2003) studied the market data over a period of ten years (1989-99) and constituted portfolios on the basis of enterprise value, total assets, and market capitalization, and found the presence of size and value effect in the market. Sehgal and Muneesh (2002) reported the presence of a strong size effect in the Indian stock market. In the context of the Indian stock market, detailed work on size effect has been done by Sehgal and Tripathi (2005), who found a strong size effect in the market during the period from 1990-2003, irrespective of the size measure used based on market or non-market available information. Sehgal and Tripathi (2006) found that small firms have risk characteristics reflected by the following five measures : Average daily trading volume, Institutional neglect, Book equity to market equity ratio, Debt- equity ratio and Operating profit ratio.

Recent studies have focused on examining the seasonal and calendar anomalies in the stock markets. Mehta and Ramesh (2010) examined the anomalies of the January effect along with the November and December effects in the context of BSE 100 and BSE 200 indices using t-statistic and Kruskal-Wallis H- test. The study found that unlike developed markets, there is no January effect in the Indian stock market. However, returns in December and November months were found to be significant. The April month had the lowest mean returns, negating the existence of tax-loss selling hypothesis. Kaur (2011) examined the month of the year effect and day of the week effect using closing values of BSE 500 and S&P CNX 500 indices from January 2002 to December 2009. The study found that there is no day of the week effect in the Indian stock market. However, month of the year effect was observed, and the markets were not fully efficient. Chandra (2011) used the sample of BSE Sensex companies for the period from April 1998 to March 2008 for examining the turn of the month effect and the time of the month effect. The turn of the month effect was present in the Sensex companies as the returns were higher in early days of a month as compared to the later

days of the month. Time of the month had a minor magnitude and was not much helpful in determining average returns. Kumar (2012) undertook a study to find out if there are excess returns post the Muhurat (Diwali) trading period, and whether the volatility increased in returns for that period. The study concluded that there is Diwali effect in the Indian market and the returns and the volatility increased subsequent to the Muhurat period. Sehgal et al. (2012) examined the presence of a number of anomalies, namely, Size, Value, Momentum, Liquidity accruals and Profitability.

It was found that asset pricing anomalies did exist in the Indian stock markets. Of all the anomalies, the size effect had the strongest presence with a mean difference of 4.4% per month. The momentum anomaly was also present, and the study concluded that CAPM was not able to explain the anomalies and there are other factors which play a role in the market. Thus, the research on size effect is scant in India, and there is a research gap for the sample period covered in this study. Size effect has been found to be a seasonal phenomenon depending on the business cycle. The integration of the global stock markets is such that any turbulence results in ripples across the markets. This has led the market players to design different investment strategies based on fundamental analysis, technical analysis, market anomalies and security attributes. Apart from fundamental and technical analysis, portfolios are also designed on the basis of market capitalization and financial position of the company. Research studies (Mohanty, 2001; Sehgal and Muneesh, 2002 ; Sehgal and Tripathi , 2005, 2006) have shown extra normal returns on risk adjusted basis using size and value based investment strategies. So, the findings will provide information on whether size based investment strategies can still be used in the market to earn returns on portfolios that exceed the returns of a passive benchmark.

Methodology

❖ **Sample Companies :** The sample for the study consisted of 500 companies included in the S&P CNX 500 index as on March 31, 2010. These 500 companies belong to the broad sectors of the economy and are reasonably representative of the aggregate performance of the market. The data consists of the month-end adjusted closing prices of the sample companies for a period of ten years beginning from April 2001 to March 2010. The sample also consists of the figure of market capitalization for all the 500 companies as on March 31 of every financial year for the sample period. The annual accounting figure of total assets was also taken for the sample companies. The data were obtained from Prowess Database of Centre for Monitoring Indian Economy. The monthly log returns of stock prices were calculated by using the following equation:

$$R_t = (P_t - P_{Pt-1} / P_{Pt-1}) * 100 \qquad (1)$$

Where,

R_t = Monthly return of the stock for the month period $_t$

P_{t-1} = Closing price of the stock for the month $_{t-1}$ and

P_t = Closing price of the stock for the month $_t$

The classification of the firms based on size can be done by using several criteria of accounting and non-accounting parameters like net fixed assets, total assets, net working capital, net annual sales, market capitalization and enterprise value. In this study, two measurement criteria have been used, market capitalization - which is market based, and total assets, which is a non-market based indicator. Market capitalization is the value arrived at by multiplying the market price per share multiplied by the number of shares outstanding. Total assets are the historical cost of the assets required to carry on the operations of the business. Using these two measures, securities were ranked and sorted with the largest 30 securities constituting the portfolio P_{LARGE} , and 30 smallest securities constituting the portfolio P_{SMALL}, thus creating four portfolios. This process of equally weighted portfolio re-constitution was repeated for every year, and the returns for the portfolio were calculated on a monthly basis.

❖ **Market Proxy :** The question of using the appropriate market proxy is pertinent when portfolios are designed using various criteria for determination of size. Most benchmark indexes focus on large firms and there was no small-firm index for the entire period (though the index figures were available for the later period). The mark proxy had to be finalized from CNX Nifty and CNX Nifty Junior. The other NSE indices were ignored due to non-availability of data for the entire period. The log returns for the index were calculated in the same manner as it was done for the share prices. The returns of the portfolios based on market capitalization and total assets were averaged for the largest and the smallest portfolios, and the correlation was calculated between these returns and the returns of the two indices. The

Table 1: Correlation of Portfolio and Indices Returns		
	PSMALL	PLARGE
P_{SMALL}	1.000	
P_{LARGE}	0.836	1.0000
S&P CNX Nifty	0.797	0.9165
S&P CNX Nifty Junior	0.865	0.9564
Source : Figures in all Tables are based on computations		

Table 1 shows the correlation matrix of the two portfolios to the indices. Both the large and the small firms were correlated to both the indices, but the correlation was comparatively higher in case of large firms. This difference in the correlation affects the estimation of the beta, which tends to be biased downwards in case of small firms. The difference in the correlation for the two portfolios with S&P CNX Nifty is 0.1201 and with S&P CNX Nifty Junior, it is 0.0915. As the difference in correlation is lower for the S&P CNX Nifty Junior, it was finally selected as the market proxy for this study.

❖ **Risk-free Rate :** The risk-free rate was taken with reference to the rate applicable for the 91 days treasury bills. To maintain uniformity, rate of return was taken at 4.60% p.a., which was further converted into the monthly rate of return. It is to be noted that prior to the year 1993, the rate of return on 91-days Treasury bills was fixed, which was subsequently made flexible on account of various amendments.

❖ **Size Premium :** Size premium is the additional return over the risk premium earned on a smaller stock due to its higher cost of capital, and the risks associated with it. It is the excess of mean returns on small shares portfolio over the large shares portfolio. It has been detected in many of the countries, including India, wherein Sehgal and Tripathi (2002) found the monthly size premium of 3.99%. Risk premium is calculated as excess mean returns over the risk-free rate of return.

$$\text{Risk premium} = R_t - R_{ft} \qquad (2)$$

Where,

R_t = Monthly Returns of portfolio for the time period t and

R_{ft} = Monthly risk free return for the time period t

To calculate the excess returns from the portfolio over the market portfolio, the following market model has been used:

$$R_{pt} - R_{ft} = \alpha_t + \beta (R_{mt} - R_{ft}) + \varepsilon \qquad (3)$$

Where,

$R_{pt} - R_{ft}$ = Excess returns on portfolio at time t

α_t = Excess return of the portfolio

β = Slope coefficient measuring the sensitivity of portfolio to market return

$R_{mt} - R_{ft}$ = Excess return of Market proxy index over risk-free rate of return

ε = Random error term

❖ **Limitations of the Study :**

The study has the following limitations:

i) Only equal weighted portfolios were considered and value weighted portfolios were ignored.

ii) Only two criteria, one accounting and one market based, were used for the construction of the portfolio.

iii) Portfolios were reconstituted only once in a year.

iv) While selecting the market proxy, only two indices were considered due to non-availability of data on all indices.

Table 2: Descriptive Statistics for P_{LARGE} (on the basis of Total Assets)

Year	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Mean	0.056	0.086	0.402	0.075	0.084	-0.008	0.109	-0.212	0.314
Std.Deviation	0.143	0.170	0.144	0.175	0.108	0.113	0.087	0.141	0.182
Sample Var.	0.020	0.029	0.021	0.031	0.012	0.013	0.008	0.020	0.033
Kurtosis	-0.465	0.309	-0.786	1.018	-0.682	-0.868	-1.154	-0.372	1.154
Skewness	0.446	0.036	0.233	-0.164	-0.534	0.372	-0.031	-0.530	-1.042
Range	0.534	0.782	0.546	0.864	0.390	0.409	0.305	0.546	0.787
Minimum	-0.198	-0.315	0.126	-0.379	-0.127	-0.173	-0.045	-0.528	-0.152
Maximum	0.335	0.467	0.672	0.485	0.263	0.236	0.260	0.018	0.635

Source : Figures in all Tables are based on computations

Table 3: Descriptive Statistics for P_{SMALL} (on the basis of Total Assets)

Year	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Mean	0.138	-0.045	0.256	0.212	0.154	-0.081	-0.018	-0.332	0.402
Std. Deviation	0.280	0.277	0.210	0.303	0.287	0.274	0.281	0.203	0.217
Sample Var.	0.078	0.077	0.044	0.092	0.082	0.075	0.079	0.041	0.047
Kurtosis	0.809	3.611	2.000	4.744	1.731	1.697	2.678	-0.275	-0.328
Skewness	0.966	-1.346	-0.918	-1.838	-1.216	-1.137	-1.312	-0.355	-0.037
Range	1.250	1.391	0.954	1.486	1.248	1.157	1.326	0.843	0.937
Minimum	-0.360	-0.872	-0.408	-0.852	-0.685	-0.764	-0.919	-0.812	-0.067
Maximum	0.891	0.519	0.546	0.634	0.563	0.393	0.407	0.031	0.870

Source : Figures in all Tables are based on computations

Table 4: Descriptive Statistics for P_{LARGE} (on the basis of Market Capitalization)

Year	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Mean	0.081	-0.040	0.368	0.019	0.170	-0.067	0.068	-0.238	0.226
Std. Deviation	0.160	0.137	0.180	0.140	0.303	0.227	0.210	0.352	0.224
Sample Var.	0.026	0.019	0.032	0.020	0.092	0.052	0.044	0.124	0.050
Kurtosis	-0.734	-0.498	0.803	1.254	7.471	4.532	2.084	14.384	0.366
Skewness	0.181	0.008	0.322	-0.785	-2.605	-1.712	-1.276	-3.354	-0.636
Range	0.611	0.581	0.806	0.633	1.373	1.125	0.983	2.011	0.976
Minimum	-0.227	-0.315	0.017	-0.340	-0.851	-0.857	-0.579	-1.823	-0.301
Maximum	0.384	0.266	0.823	0.293	0.523	0.267	0.403	0.188	0.674

Source : Figures in all Tables are based on computations

Table 5: Descriptive Statistics for P_{SMALL} (on the basis of Market Capitalization)

Year	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Mean	-0.016	0.028	0.242	0.195	0.038	-0.098	-0.117	-0.367	0.370
Std. Deviation	0.209	0.190	0.139	0.176	0.270	0.160	0.264	0.210	0.166
Sample Var.	0.044	0.036	0.019	0.031	0.073	0.026	0.070	0.044	0.028
Kurtosis	7.924	1.439	-0.639	1.399	-0.196	1.420	3.378	-0.522	-0.269
Skewness	2.043	0.974	0.624	0.998	-0.338	-0.123	-1.881	-0.579	0.473
Range	1.173	0.840	0.491	0.822	1.083	0.808	1.111	0.753	0.693
Minimum	-0.360	-0.321	0.039	-0.127	-0.536	-0.534	-0.919	-0.826	0.065
Maximum	0.813	0.519	0.530	0.695	0.546	0.274	0.193	-0.074	0.758

Source : Figures in all Tables are based on computations

Table 6: Mean Excess Returns of Portfolios		
Portfolio	**Total Assets**	**Market Capital**
P_{SMALL}	0.580	0.205
P_{LARGE}	0.783	0.487
Source : Figures in all Tables are based on computations		

Table 7: Results of Market Model for Portfolios Based on Total Assets						
	Alpha	**t-value**	**Beta**	**t-value**	**R-Square**	**F-value**
P_{SMALL}	-0.080	-0.339	0.902	17.481	0.742	305.600
P_{LARGE}	0.111	0.685	0.920	25.802	0.863	665.734
Source : Figures in all Tables are based on computations						

Table 8: Results of Market Model for Portfolios Based on Market Capitalization						
	Alpha	**t-value**	**Beta**	**t-value**	**R-Square**	**F-value**
P_{SMALL}	-0.512	-1.755	0.981	15.311	0.689	234.430
P_{LARGE}	-0.108	-0.702	0.814	24.150	0.846	583.210
Source : Figures in all Tables are based on computations						

Results and Discussion

The Tables 2 and 3 present few descriptive statistics for the two portfolios constituted on the basis of total assets. For the large portfolio, the mean returns were the highest (0.402) in the year 2003-04, with a standard deviation of 0.144. The lowest returns were in the year 2008-09 (-0.212), with a standard deviation of 0.141. The highest and lowest returns were in the year 2009-10 (0.402) and 2008-09 (-0.332) respectively for the small portfolio. The standard deviation of the returns on an average is higher for the small portfolio as compared to the large portfolio, indicating the riskiness associated with returns of smaller companies.

The Tables 4 and 5 present the descriptive statistics for portfolios based on market capitalization. The large portfolio had the highest return in the year 2003-04 (0.368), with standard deviation of 0.180, and lowest return in 2008-09 (-0.238) with standard deviation of 0.352. As far as the small portfolio is concerned, year 2009-10 (0.370) had the highest return, and year 2008-09 (-0.367) had the lowest return, with standard deviation of 0.210. Thus, the lowest and highest returns were earned in the same years based on the two criteria - it is because most of the companies which had high market capitalization also had high asset base and are included in both the portfolios.

The Table 6 shows the mean excess returns of the portfolios, wherein based on total assets, the mean excess returns on P_{LARGE} are 2.03% more vis-à-vis P_{SMALL}. In case of portfolios based on the market capitalization, the excess monthly returns are 2.82% more for P_{LARGE} as compared to P_{SMALL}. Thus, the size premium is not lying with the small firm portfolio.

The market model results for the portfolios based on total assets are presented in the Table 7. The beta of large portfolio as well as the small portfolio is close to one, which indicates that both the large firms as well as the small firms were being priced efficiently in the market , and the investors were paying the premium only for the systematic risk. The closeness of beta to one for P_{SMALL} shows that may be, the downward bias effect due to the selection of market proxy has not affected the risk premium calculation of these firms. The intercept also called as Jensen's alpha, represents the abnormal returns earned over the market index returns. The null hypothesis of equality of returns on P_{SMALL} and P_{LARGE} presupposes the alpha value being equal to zero. If the value of alpha is greater than zero for P_{SMALL}, it shows abnormal positive returns for the portfolio. The alpha value of both the portfolios is less than zero and the alpha value of P_{SMALL} is negative and statistically insignificant. Therefore, P_{SMALL} is not generating returns which are more than P_{LARGE} and, therefore, the size effect is not present in the Indian stock market.

The market model results for portfolios based on market capitalization are presented in the Table 8. The beta value

for P_{SMALL} is 0.981as compared to the beta vale of 0.814 for P_{LARGE}. The Jensen's alpha is negative for P_{LARGE} and the alpha value for P_{SMALL} is less than zero and statistically insignificant. Therefore, it can be concluded that there is no abnormal returns for the P_{SMALL} and size effect is neither present in case of portfolios constituted on market measure, nor in case of portfolios constituted on non-market based measure.

The findings are inconsistent with a similar study conducted by Marisetty and Vedpuriswar (2002) for the period from January 1991 to January 2002, which confirmed the presence of the size effect in the Indian stock markets. The other Indian studies referred to in review of literature have also found the presence of the size effect. One possible reason is that on account of use of technology and widespread electronic and print media, information flow and dissemination has been changing, and the small stocks are as much within the possible investment radars of participants as the large stocks. Secondly, the data for this study is for the latest period as compared to other studies which have used data for earlier periods. In fact, Berk (1996) found that size effect in the U.S. market is disappearing over a period of time. However, it may be pointed out that the results have to be interpreted cautiously as the methodology for studying the size effect is not as robust as the existing methods in the asset pricing literature.

Conclusion

Using the sample of 500 companies included in CNX Nifty 500 covering the period from April 2001 to March 2010, portfolios of 30 largest and smallest stocks based on market capitalization and total assets were created. Using CNX Nifty Junior as the market proxy, the market model was applied to explore the possibility of having abnormal positive returns for the portfolio of small stocks vis-a-vis the portfolio of large stocks. The results of the market model have indicated that size effect is not present in the Indian stock market. The markets of emerging countries like India are maturing, and the investors are giving equal attention to the analysis of the large and small stocks. The findings of this study indicate that the phenomenon of underreaction to the information on small stocks and overreaction to information on large stocks seems to be disappearing. It is difficult to have an absolutely efficient market and often, anomalies creep up in the market due to distortions and irrational behavior of investors. The presence of a number of anomalies distorts the market and provides undue advantage to some market participants to earn abnormal profits. Policymakers and regulating bodies, while not interfering in the market, should make efforts to ensure that markets provide a level playing field to the different category of investors.

Implications for Further Research

The findings indicate the absence of size effect; however, results need to be validated in the context of the value weighted portfolios. Further research can be undertaken on examining the size effect on the portfolios which are constructed based on a number of various other accounting and non-accounting measures. The application of other models and also examination of size effect for the portfolios along with seasonal anomaly will throw interesting light on the working of the stock markets of an emerging market like India.

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