Review of Literature

Since the beginning of 1980’s, there has been a lot of research on capital market anomalies like the size effect, the turn-of-the-year effect, the weekend effect and the overreaction effect & the momentum effect which seems to contrast the EMH. While the efficiency of the stock market was once virtually taken for granted, it is now being seriously questioned again, primarily due to the cumulating evidence on the predictability of stock returns based on their prior return behavior. There is an extensive body of literature which documents this “Prior –return Effect”, i.e. the prior returns can explain the cross-sectional behavior of subsequent stock returns. Various studies have provided evidence of the existence of winner-loser patterns in security returns. The literature on prior-return effect basically documents two opposite phenomena, ‘the return continuation’ and ‘the return reversals’.

Several studies have tested the longer term performance of the stocks on the basis of their price behavior during the past few years (usually three to five years) and reported that stock returns are observed to reverse their direction in the subsequent holding period of three to five years such that the stocks that have experienced extremely negative returns during the past few years (losers) are found to perform better during the following years than those that previously had the extreme positive returns (winners). On the other hand, there are number of studies which reported that during the intermediate horizons of three to twelve months, stock returns are observed to follow a return continuation pattern, i.e. stock which were the best performers of past few months continue to earn positive returns in the subsequent holding period of three to twelve months and vice-versa.
There is another category of research studies which tested the subsequent return behavior of the stocks following large changes in their daily or weekly prices and have reported return reversals and return continuations in very short holding periods of days and weeks too. While most of the studies have attributed the return continuation and reversals to the ‘Momentum Effect’ and the ‘Overreaction Effect’ respectively, few others have advanced the alternative explanations behind it.

Present chapter provides a detailed review of literature documenting the return predictability on the basis of prior period return behavior. It is divided into three sections; Section 1 focus on studies investigating the predictability of stock returns over long interval of few years followed by Section 2 which describes the studies investigating the predictability of stock returns over intermediate horizon of few months. Finally Section 3 is made up of studies investigating the predictability of stock returns over very short intervals of few days based on their prior period return behaviour.

I. Studies investigating the predictability of stock returns over long interval of few years based on their prior period return behavior

De Bondt and Thaler (1985) for the first time formally presented evidence of economically important return reversals over long intervals of three-to-five years. This is perhaps, one of the most influential and controversial papers in this line of research. De Bondt and Thaler reported that on the basis of the past half century of data for the U.S. Stock market, large abnormal returns can be earned by contrarian investment strategy. In particular, stocks that experience poor performance over the past three–to–five years (losers) tend to substantially outperform prior-period winners during the subsequent three-to-five years. They studied the investment
performance of (35 stock, 50 stock, or decile) portfolios of most extreme long-term winners and losers; that is, exceptional performers over prior “formation periods” ranging between one to five years. Using the monthly return data for NYSE common stocks during the period January 1926 to December 1982 as compiled by Center for Research in Security Prices (CRSP) and taking an equally weighted arithmetic average rate of return on all CRSP listed securities as market-index, they formed portfolios of 35 most extreme winners and losers, on the basis of their market-adjusted excess returns, over the prior 3 years (the formation period) and followed these portfolios for the next 3 years (the test period). They estimated market-adjusted excess returns as

\[ u_j = R_j - R_m, \]

where \( R_j \) represent the return on security \( j \) at time period \( t \) and \( R_m \) represent the return on market index. They repeated this procedure 16 times starting in January 1930, January 1933, …, up to January 1975 and finally, computed the average test period performance in excess of the mean return on a market index. De Bondt and Thaler found the results consistent with the predictions of the overreaction hypothesis. Portfolios of prior losers are found to outperform prior winners. Thirty-six months after the portfolio formation, the losing stocks have earned about 25% more than the winners. Furthermore, they offered proof of asymmetric overreaction; it is much larger for losers than for winners as the loser portfolios outperformed the market by an average of 19.6% while the winner portfolios earned about only 5% less than the market.

They also observed pronounced seasonality in returns’ pattern as most of the excess returns are realized in the month of January; however their results indicated that the overreaction phenomenon is qualitatively different from the January effect and more generally from seasonality in stock prices. They reported that stock with more (or less) extreme return experiences (during the formation period) are followed by more (or less) pronounced
subsequent price reversals. Their results indicated the tendency for the most extreme initial winners and losers to exhibit the most extreme subsequent price reversal [which Brown and Harlow (1988) call “magnitude effect”]. To check for the effect of December as the “portfolio formation month” (if any), they also conducted some tests with May as the portfolios formation month and found the similar results.

De Bondt and Thaler (1985) interpret their evidence as a manifestation of irrational behavior by investors; they attributed their findings to the tendency of investors to over-emphasize recent information and under-emphasize earlier information in revising expectations of the future, and concluded that they have discovered a substantial weak form of market inefficiency.

This rather startling finding surprised the researcher community and inspired considerable additional research on stock market overreaction. Various researchers like Fama and French (1988) and Poterba and Summers (1988) re-examined the evidence on return-reversal phenomenon in stock prices and came up with the findings further supporting the overreaction hypothesis. They found large and economically important negative serial correlations by examining the stock returns over longer time periods.

Fama and French (1988) simply regressed the return on stock market index over some time period of length T, on returns over the prior period of equal length. Fama and French used monthly nominal return data from 1926-1985 for firms listed on the New York Stock Exchange and studied both equal-weighted and value-weighted indexes as well as the returns to portfolios formed on the basis of the size of the firms. They ranked all the NYSE firms that appear on the CRSP tape based on their market value, and formed the decile portfolios with the smallest 10 percent of the firms in the first portfolio and so on; and identified losers and winners with each decile portfolio. Their
results revealed considerable mean reversion. The slopes of the regressions are found to be generally negative for horizons from 18 months to 5 years, with 25 to 40 percent of the variation in long holding period returns predictable in terms of negative correlation with past returns. Both the $R^2$ and the slope increased with the length of the horizon, $T$, upto 5 years, and then decreased. They found more negative slopes for portfolios of smaller firms and for the equal-weighted index than for the large-firm portfolios or the value-weighted index. They also analyzed the results for 2 sub-periods: 1926-1940 and 1941-1985 and found that the mean reversion has declined over time, with the results for the sub-period 1941-1985 weaker than the earlier period.

Fama and French’s results have been replicated and extended by Poterba and Summers (1988) using variance ratio test. The authors first confirmed Fama and French’s results for both real returns, measured using the Consumer Price Index (CPI) Inflation Rate, and returns in excess of a Treasury bill yield by analyzing the monthly returns on both the value-weighted and equal-weighted NYSE indices for the period 1926-1985. They found substantial mean reversion over long intervals as the variance of eight year returns is about four times (rather than 8 times) the variance of annual returns.

Poterba and Summers also investigated whether mean reversion can be found on the stock exchanges of other countries. They used data for Canada since 1919, Britain since 1939, and fifteen other countries for shorter postwar period. The Canadian and British market displayed patterns similar to those found in United States, namely strong mean reversion over long time horizons. Most of the other countries also displayed negative serial correlation at long horizons, the only exceptions being Finland, South Africa and Spain. The average eight-year variance ratio for all non-U.S. countries is
From the international evidence, Poterba and Summers concluded that mean reversion is more pronounced in less broad-based and less sophisticated (foreign) equity markets.

Various authors, however, have offered an alternative interpretation of the observed return reversals. For example, Chan (1988) and Ball and Kothari (1989) have argued that these return reversals are due primarily to systematic changes in equilibrium required returns that are not captured by De Bondt and Thaler (1985).

Chan (1988) argued that both winner and loser portfolios experience large changes in market value during the rank period. The changes in capitalization are so large that although the median loser stock is bigger than the median winner at the beginning of most rank periods, it becomes smaller than the median winner at the end. Taking the market value as a good proxy for risk, as suggested by the size effect literature, the loser stocks are safer in the beginning, but become riskier than winners by the end of the formation period. Since the risk of the loser portfolio increases during the rank period, betas estimated in the rank period fails to model the changes in the risk and underestimates the test period beta. Thus, the estimation of abnormal returns may be sensitive to how the risks are estimated. Chan took 2 samples of winner and loser stocks for his study, one similar to that of De Bondt and Thaler (1985), that is, top 35 and bottom 35 stocks chosen on the basis of cumulative (market-adjusted) abnormal returns and the other sample identifying the winner and loser stocks as the top and bottom decile of stocks, using the monthly return data for the stocks listed on NYSE for the period 1930-1985. Both the samples yield similar results. He used both the market-adjusted abnormal returns as well as CAPM-adjusted abnormal returns estimated using test period betas. Chan found that after accounting for the changes in the betas of loser and winner portfolios from rank period to test
period, the contrarian strategy earns a very small abnormal return (ignoring transaction costs) which is economically insignificant. He also observed large changes in betas from the rank period to the test period, such that losers are riskier than winners after formation, a finding lending strong support to their argument. His conclusions follows that “On average, the investor realizes above –market returns but that excess return is likely to be a normal compensation for the risk in the investment strategy”.

A similar line of argument has been offered by Ball and Kothari (1989) who reported that negative serial correlation in relative market – adjusted returns is due almost entirely to variation in security’s relative risks and therefore expected relative returns through time. They examined serial correlation in both relative market-adjusted returns using CAPM to estimate returns, and abnormal risk–adjusted returns, adapting Ibbotson’s (1975) technique to capture relative risk changes as a function of ex-post returns, on 20 portfolios over successive 5 year periods from 1930-1981. Twenty portfolios were formed every successive year by assigning all stocks on CRSP monthly tape in equal numbers to 20 portfolios on the basis of ranked total returns over the previous 5 calendar years, or firm size at the beginning of each calendar year, Portfolio 1 and 20 being extreme portfolios. The Spearman rank and Pearson Product-moment correlations are used to find correlations between 5 years portfolio returns in the ranking and post-ranking periods. Their results indicated significant return reversals and negative serial correlation on extreme portfolios and reported large beta changes from ranking period to post-ranking period. Betas of extreme losers exceed the betas of extreme winners by a full 0.76 following the ranking period. Ball and Kothari concluded that changes in relative risks are consistent with changing expected returns and thus could explain the negative serial correlation in relative returns.
Trying to explain overreaction, some researchers like Zarowin (1989), (1990) and others dismiss the overreaction phenomenon as manifestation of size effect which is reported in seminal work by Banz (1981).

Zarowin (1989) examined the subsequent 3 year stock return performances of firms that have experienced extreme earnings years in the prior 3 year period, and found that while the poorest earners outperform the best earners by a statistically significant amount over the subsequent 36 months, and that neither the differences in risk (beta) nor in January returns can account for this result; the poorest earners also are significantly smaller than the best earners at the time of portfolio formation. When the poorest earners are matched with the best earners of equal size, there is virtually no evidence of differential stock return performance.

Zarowin (1990) re-examined De Bondt and Thaler’s evidence on stock market overreaction controlling for size differences between winners and losers. He found that losers are usually smaller than winners and in periods when winners are smaller than losers, winners outperform losers. Zarowin performed 2 sets of tests to examine the role of firm size in the overreaction phenomenon. He used the monthly return data for NYSE common stocks as compiled by CRSP for the period between January 1927 and December 1985, and CRSP equally weighted index as the market index for the calculation of firm’s cumulative market–adjusted excess returns. Firstly, he matched the sub-groups of winners and losers of equal size. To control for size, he ranked all the firms in the sample at the beginning of each 3– year test period from one to five based on size as well as prior period return performance. Each firm is indexed by i, j where the i index refer to prior period return performance and the j index refer to size; i=1 refers to the losers, i=5 refers to the winners; likewise, j=1 refers to the smallest firms, j=5 to the largest firms.
Then he conducted the Jensen performance tests for Arbitrage portfolios (i.e., loser minus winner portfolio) on five groups of losers and winners that are matched by size; group 11 vs. group 51, 12 vs. 52, 13 vs. 53, 14 vs. 54 and 15 vs. 55. He observed that all return discrepancies, except those in January are eliminated, suggesting that an effect other than overreaction, such as the tax loss selling phenomenon may be at work. As a test of robustness of their results, he compared the effects of size and overreaction on returns using Jegadeesh’s (1987) cross sectional regression methodology. He performed this test by regressing, for each of the 17 periods, the test period’s cumulative excess returns of the 10 size and performance based portfolios against their mean rank period cumulative excess returns and (log) sizes at the date of portfolio formation, and found the results consistent with their original result using Jensen Performance tests. Secondly, he performed separate analysis on periods when losers are smaller than winners and on periods when winners are smaller than losers. His results indicated that when losers are smaller, they outperformed winners by a highly significant 26.7% over the 36-month test period, with 21.4% of the cumulative return difference coming in January, again highlighting a strong January effect. When winners are smaller they outperformed losers, which is consistent with size phenomenon but inconsistent with the overreaction phenomenon. Zarowin concluded that the winner vs. loser phenomenon appears to be another manifestation of size phenomenon in finance.

9 Jensen’s Performance Test for arbitrage portfolios is a regression test with the equation:

\[ R_{At} = \alpha_A + \beta_A (R_{mf} - R_{f,t}) + \varepsilon_{At} \]

where, \( R_{At} \) represents the return on an arbitrage portfolio for month \( t \), i.e., \( R_{At} = R_{Lt} - R_{Wt} \) and \( R_{mf} - R_{f,t} \) represents the market risk premium given by the return on the CRSP equally weighted index minus the risk free rate (1-month Treasury bill rate) at the beginning of month \( t \).

10 Jegadeesh’s (1987) cross sectional regression methodology assumes that returns are linear in the explanatory variables and uses the Fama McBeth (1973) methodology to compute t-statistics.
De Bondt and Thaler (1987), in an attempt to re-evaluate the overreaction hypothesis, extended their earlier results and provided additional evidence in support of overreaction effect as distinct from the size effect or the leverage option effect. Using CRSP monthly return data for the period from 1926-1982, they formed the portfolios of 50 most extreme winners and losers over the past 5 years which were then followed for the next 5 years, i.e. the test period. They repeated the same procedure 48 times by advancing the starting data one year each time and computed the average test period performance in excess of the mean return on NYSE index. They found the evidence further supporting the overreaction hypothesis. They examined the magnitude effect and the seasonal pattern exhibited by the stock returns using Spearman rank correlations and Ordinary Least Square (OLS) regression and found an evidence of significant ‘magnitude effect’ for losers, however no such evidence was detected for winners. They further reported that losers earn virtually all of their excess returns in January, with the last three months of the year offsetting any gains between February and September. Winner excess returns, though smaller in absolute terms than losers, also occurred pre-dominantly in January. January excess returns of both winners and losers showed significant short-term reversals. De Bondt and Thaler found this behavior for winners to be consistent with capital gains tax “lock-in” effect; and for losers, attributed this finding to the possibility of tax-loss selling pressure as reported by Branch (1977), Reinganum (1983) and Roll (1983).

They further investigated if return reversals to winner and loser portfolios could be explained by the variation in their relative risks during the test period as argued by Chan (1988) and Ball and Kothari (1989). They estimated the test period CAPM-beta for both winner and loser portfolios and reported that the test period betas were only slightly higher for losers than for winners (1.263 vs. 1.043), the difference being only .220, which is insufficient to explain the difference in the test period returns of the 2 portfolios which
was 9.2%. Thus, they concluded that winner–loser effect cannot be attributed to changes in risk as measured by CAPM-betas. They extended their analysis to estimate 2 types of betas for both portfolios: one for periods when the stock market is rising (bull market) and another for when it is falling (bear market). Their analysis revealed that in rising markets, the losers have a tendency to gain more than winners, while in falling markets, the winners tend to lose more than the losers, thus indicating that the arbitrage portfolio (loser minus winner portfolio) does well in both up and down markets, again supporting the contrarian investment strategy.

To test for any correspondence between overreaction effect and the size effect, they replicated their original winner-loser experiment using both NYSE and AMEX firms listed on COMPUSTAT for the period 1966-1983. They ranked all the firms in sample according to 4 ranking variables, i.e. cumulative excess returns over a four-year formation period; market value of equity at the end of the formation period; market value of equity divided by book value of equity (MV/BV) at the end of the formation period; and the company assets at the end of the formation period. They found that even in quintile portfolios ranked on the basis of cumulative excess return (which are less extreme than the deciles or the group of 50 stocks), the losers have positive excess returns and the winners have negative excess returns, with the losing firm quintile portfolio earring about 25% above the market over a four-year period after portfolio formation. Also, the average market value for the smallest quintile ranked by market value, i.e. $9 million, was about 30 times smaller than the average market value for the losers quintile which is $304 million; indicating that the loser firms are not unusually small. Thus, De Bondt and Thaler concluded that the winner-loser effect cannot be described as primarily a small firm phenomenon, not even it can be attributed to the variation in the relative risks of winner vs. loser portfolio.
Chopra, Lakonishok and Ritter (1992) also investigated the controversial issue of stock price overreaction and came up with the findings in support of overreaction hypothesis. They found an economically important overreaction effect even after adjusting for size and beta changes. They observed a strong January seasonal in the return pattern, but also presented evidence suggesting that overreaction effect is distinct from tax-loss selling effect. Also the overreaction effect is found to be substantially stronger for smaller firms than for larger firms. For comparability with prior studies, they used the CRSP monthly tape of NYSE issue from 1926 to 1986 and ranked the stocks on the basis of their five years buy-and-hold returns and assigned them to one of the 20 portfolios, i.e., one winner and one loser portfolios in each of 10 decile portfolios. They compared the average return on prior winners and losers with stocks in the same size decile that were in the middle 50% of returns during the portfolio formation period to control for size effect. As an adjustment for risk changes in winner and loser stocks, they used empirically determined price of beta risk and estimated the market model coefficients using Ibbotson’s (1975) technique (with Jensen’s (1969) measure of abnormal performance). Their results indicated economically significant overreaction effect present in stock market with losers outperforming winners by 5-10% per year during the subsequent 5 years. They even observed the returns for short windows around quarterly earnings announcements and found it consistent with overreaction hypothesis, and thus showed that the winner-loser effect cannot be attributed to the risk measurement problems. However, they observed a pronounced January seasonal in the returns pattern. To examine the same, they constructed portfolios based upon prior one year returns and measured their performance over the subsequent 5 years. They found much smaller differences in the returns between extreme portfolios than when portfolios were formed based upon 5 year returns, suggesting that winner-loser effect is distinct from tax-loss selling effect. Also, much of this
difference occurred in the first of the 5 post-ranking years as portfolios of winners and losers formed on the basis of 1 year returns displayed momentum rather than immediate return reversals, i.e., losers continue to lose and winners continue to win during the next year. Chopra et al. also presented evidence suggesting that the overreaction effect is substantially stronger for smaller firms than the larger firms. Amongst the small firms, which are held predominantly by individuals, extreme losers outperformed extreme winners by about 10% per year, while no such evidence of overreaction was observed amongst the decile of largest firms which are held by the institutional investors. They contended that overreaction by individuals is more prevalent than overreaction by institutions.

The stock market overreaction hypothesis states that a stock price usually reverses itself after a stock experiences a sharp increase or decrease in its price such that profitable contrarian investment strategies which calls for buying the stocks that have performed poorly in the past and selling stocks that have performed well in the past can be constructed to take advantage of overreaction effect. Lakonishok, Shleifer and Vishny (1994) tested the profitability of these contrarian strategies from the angle of value strategies which also calls for buying the stocks which performed poorly in the past and produce superior returns. They investigated the two possible explanations behind success of value strategies; first that the value strategies might produce higher returns because they are contrarian to ‘naïve’ strategies followed by other investors who extrapolate past performance too far into the future and second, that these value strategies are fundamentally riskier, as argued by Fama and French (1992). Their findings revealed that investment strategies that involve buying out-of-favour (value) stocks have outperformed glamour stocks in the US market over April 1968 to April 1990 period. The authors reported that these value strategies yield higher returns because they exploit the suboptimal behaviour of the typical investor and not because these
strategies are fundamentally riskier. For the purpose of their study, the authors used the returns data from CRSP and accounting data from COMPUSTAT for the NYSE and AMEX stocks for the period April 1968 to April 1990. They formed equally weighted portfolio of stocks and computed raw as well as size-adjusted returns using an annual buy-and-hold strategy for years +1, +2, …… , +5 relative to the time of formation. In addition to returns for various portfolios, they also computed growth rates in earnings, cash flow and sales for each portfolio and for each year prior and post formation. They also computed several accounting ratios such as book-to-market ratio, cash flow-to-price ratio and the earnings-to-price ratio. They examined a variety of simple classification schemes for glamour and value stocks based on the book-to-market ratio, the cash flow-to-price ratio, the earnings-to-price ratio and the past growth in sales and showed that all of these simple value strategies produced superior returns. They then examined the performance of value strategies that are defined using both past growth and current multiples and reported that these two-dimensional value strategies outperform glamour strategies by approximately 10 to 11% per year. They documented that contrarian strategies work because they exploit expectational errors implicit in stock prices. Specifically, the differences in expected growth rates between glamour and value stocks implicit in their relative valuation multiples significantly overestimate actual future growth rate differences, i.e. market participants consistently overestimate future growth rates of glamour stocks relative to value stocks. They also examined the risk characteristics of value strategies and provided evidence that, over longer horizons, value strategies have outperformed glamour strategies quite consistently and have done particularly well in “bad” states of the world, thus rejecting the hypothesis that value strategies are fundamentally riskier. The authors conjectured that their results can best be explained by the preference
of both individual and institutional investors for glamour strategies and by their avoidance of value strategies.

**Ball, Kothari and Shanken (1995)** refuted the robustness of De Bondt and Thaler (1985) estimates of contrarian portfolio performance on the ground of various problems involved in the measurement of raw as well as 5-year contrarian portfolio returns. They demonstrated that the observed winner-loser effect is not a result of investor overreaction but an outcome of measurement problems. Ball et al. ranked all NYSE stocks for the period 1925-1988 and all AMEX stocks for the period 1962-1988 on CRSP monthly tape on the basis of their buy-and-hold returns over the preceding 5 year ranking period. They picked the top 50 stocks with highest returns as ‘winner’ portfolio and bottom 50 stocks with lowest returns as ‘loser’ portfolio, similar to that of De Bondt and Thaler (1985). They first documented the problem in the measurement of raw returns and reported that much of the reported profitability of a contrarian strategy is driven by low-priced loser stocks. They detected a greater upward bias in the returns of lower-priced stocks than those of higher prices. Loser stocks are found to be extremely low priced and exhibiting skewed return distribution. The skewness in rates of return is so pronounced that while winner and loser 5 year means differ by 91%, their medians differ only by 14%. Their 163% mean return is due largely to their lowest-price quartile position. Loser stock prices are observed to be very low such that their subsequent 5-year returns showed extreme sensitiveness to the micro-structure/liquidity induced effects. Even a $1/8 change in their prices reduced the mean by 25%. The authors, thus, suggested that the significant profitability of a zero-investment portfolio is largely due to an upward bias observed in the returns of low-priced loser stocks and not a result of any overreaction by the market.
Ball et al. also reported that long position in low-priced loser stocks occur disproportionately after bear markets and thus induce expected returns effect. They also considered the effect of changing the post-ranking period from December-end to June-end on the profitability of the contrarian strategy. Using the abnormal return, calculated using Jensen alpha measure of abnormal return, they found limited evidence of positive abnormal performance for December-end contrarian portfolio, but negative abnormal performance for the June-end portfolio even after ignoring the transaction costs. Also, change from December-end strategy to June-end strategy drastically reduced the raw as well as abnormal returns of the lower-priced ‘loser’ stocks, a finding consistent with the previously documented tendency for the prices of low-capitalization stocks to be recorded at the bid at the end of December [Roll (1983a), Lakonishok and Smidt (1984), Keim (1989), Bhardwaj and Brooks (1992)]. Based on their findings, Ball et al. raised some skepticism about the contrarian portfolio performance measures of De Bondt and Thaler (1985, 1987), Chan (1988), Ball and Kothari (1989) and Chopra et al. (1992).

Apart from the U.S. Stock market, long term return reversals and the overreaction hypothesis has been supported by international evidence as well. The overreaction effect, which has been largely documented for the stock markets of U.S., has also found its existence in the other developed as well as emerging stock markets worldwide.

MacDonald and Power (1991), using the methodology of De Bondt and Thaler, examined the incidence of winner-loser effect among UK stocks. Their analysis was based upon monthly share returns obtained from the London Share Price DataBase (LSPD) over the period 1959 to 1985. Excess returns were calculated using market-adjusted returns model, and cumulated over a three-year formation period; the top 5% of firms were allocated to the
winner portfolio and the bottom 5% to the loser portfolio. The cumulated excess returns of each set of portfolios were then calculated over a three-year test period following portfolio formation. It was found that there was a reversal in the performance of the winner and loser portfolios in the test period. The results of the study are thus supportive of De Bondt and Thaler’s U.S. findings.

Clare and Thomas (1995) also tested for over-reaction using UK data over the period 1955 to 1990. Using the LSPD, market-adjusted returns were obtained for a random sample of 1000 stocks over non-overlapping one, two and three-year periods. Portfolios were then formed by allocating the top quintiles of stocks to winner portfolios and the bottom quintiles to loser portfolios. They found that previous losers tend to outperform previous winners, when the average return is calculated over 2 and 3 years. However, when they calculated average returns over one year, they found that losers tend to continue to be losers, as also shown by Jegadeesh and Titman (1993) for U.S. data. To allow for a potential size effect, they compared the performance of large losers (winners) with small losers (winners). Their results showed that losers tend to be small; Clare and Thomas thus concluded that ‘any overreaction effect is caused as a result of losers being small’ (p. 967).

Dissanaike (1997) conducted a comprehensive study investigating the overreaction effect among U.K. stock returns and found evidence consistent with stock price reversals, even after controlling for time-varying risk and addressing concerns about size effect and bid-ask biases. Period of his study extended from January 1975 to January 1991 and his sample consisted of FT 500 companies in U.K.. Using the Share Price Data from LSPD Monthly Returns File, he computed the rank period returns (RPR’s) for all the stocks in the sample for 48 month ranking period prior to the date of portfolio formation by using FT 500 equal weighted return index as the market index.
and ranked all the securities on the basis of their rank period returns. He then assigned the top 10% securities with highest RPR’s to ‘winner’ portfolio and bottom 10% to ‘loser’ portfolio and also formed 8 intermediate decile portfolios and tracked the performance of all these decile portfolios over the subsequent 48 month test period. His results based on market-adjusted returns appeared largely consistent with the overreaction hypothesis. He found the return differentials between the winner and loser portfolios statistically significant as well as economically larger than those documented in the U.S. studies. On average, the loser portfolio outperformed the winner portfolio by nearly 100%, 4 years after portfolio formation. His results revealed apparent return reversals in the intermediate portfolios also; portfolios with relatively poor past returns had relatively high future returns. He also found an evidence of asymmetric overreaction, as the test-period return on the loser portfolio exceeded the negative return on the winner portfolio (in absolute terms), a finding also documented by De Bondt and Thaler (1985).

Dissanaike noticed a strong seasonal pattern in the return behavior around turn of the year, especially around January. However he also mentioned that such a seasonal pattern cannot be attributed to a possible explanation of tax-loss selling around January as suggested in the U.S. studies because the tax year in U.K. ends in April. Since their sample consisted of the stock constituting the FT 500 Index which comprises the largest 500 industrial companies in the U.K., accounting for over 70% of the market capitalization of LSE, he dismissed the possibility that the winner-loser effect could be ‘subsumed’ by the size effect [as argued by Zarowin (1990)]. By restricting his sample to larger and better known firms and using the monthly data and focusing on a buy-and-hold method of computing returns, Dissanaike even showed that bid-ask biases and infrequent trading are unlikely explanations
to the overreaction phenomena\textsuperscript{11}. To test whether time-varying risk can explain the winner-loser anomaly for the U.K. dataset also, he applied the methods used by Chan (1988). He computed the risk adjusted return by measuring the risk relative to the log version of the CAPM and run the time series regression (OLS) for the 2 extreme portfolios and for the arbitrage portfolio (L-W). He found an evidence contrary to the finding of Chan (1988) and Ball and Kothari (1989); in his analysis, loser portfolio appeared to be less risky than the winner portfolio as the beta of the contrarian portfolio was (on average) found to be negative. He also investigated the winner-loser anomaly by adopting an approach similar to that used by Ball and Kothari (1989), computed the CAPM-adjusted returns for each of the 4 event years in the test period, and came up with the findings consistent with his earlier results. He thus concluded that differential risk did not seem to be a possible explanation to the overreaction hypothesis and that the overreaction hypothesis holds for the share price behaviour in U.K.’s capital market.

\textbf{Dissanaike (2002)} extended his earlier study [Dissanaike (1997)] to further investigate if the winner-loser effect could be subsumed by the size effect within his sample of large FT 500 companies. For this purpose, he constructed the dataset in the same way as that in Dissanaike (1997). By restricting his study to around 1000 larger and better known U.K. companies and using the LSPD to extract the returns and market capitalization data, he formed the size-sorted decile portfolios by ranking all the companies by their market values on the portfolio formation date. His results indicated the presence of size effect within the FT 500 sample as the small firm portfolio outperformed the large firm portfolio by nearly 60\%. However, on comparing

\textsuperscript{11} These biases are known to be particularly acute in the case of smaller companies: Dimson (1979) found that infrequent trading is negatively correlated with companies’ size. Also, bid-ask biases are said to occur because the bid-ask spread tends to form a larger proportion of the price of low-priced stocks, relative to high priced ones. Small firms are said to be more likely to have low stock prices (see Blume and Stambaugh, 1983)
the performance of size based portfolios with return based winner-loser portfolio, he found that the winner-loser effect was much higher than the size effect as the loser portfolio outperformed the winner portfolio by 98.9%. He also observed that the two effects appear to be related as size effect tended to be higher (lower) in those periods where the loser-winner effect was higher (lower). Thus, he concluded that although the size and winner-loser effects appeared to be related to each other, there is no evidence to suggest that the size effect subsumes the winner-loser effect.

**Bacmann and Francois (1998)** studied the profits of a contrarian strategy on French Stock market and reported that a standard contrarian strategy, in all states of nature, lead to smaller but still significant profits in France. For their study, they used a sample consisting of all the shares of French firms listed on the French stock market for the period ranging from January 1, 1977 to December 31, 1997. They divided all the shares in the sample into size quintile where size is measured as the market value on the first trading day of the year and formed five equally weighted portfolios which were rebalanced at the beginning of the year. Their analysis revealed significant profits from a contrarian strategy applied in French stock market and also that the profits computed for the long position are stronger and are more likely to occur when the market is strongly bullish. They also examined the lead-lag relation between a large size firms’ portfolio and small size firms’ portfolio and do not found any evidence of an asymmetric reaction to bad and good news. Finally, they decomposed the profits into various sources and showed that overreaction to firm specific information is the primary source of contrarian profits.

**Sehgal and Balakrishnan (2002)** used the Indian stock return data to test the presence of long-term reversal effect in the Indian stock market. Their results came in conformity with those for the developed markets like U.S. &
long term return-reversals are found to exist in the Indian market as well. Their data comprised of month-end share prices taken from Capital Market Line Software and adjusted for capitalization changes such as bonus, rights and stock splits for 364 companies forming part of the CRISIL – 500 Index for the period July 1989 to March 1999. The BSE National Index and the implicit yields on the 91-days treasury bills have been used as a proxy for economic wealth and risk-free rate respectively. To test long term return reversals, they ranked the sample securities in June of each year \( t \) on the basis of their average returns for the past 36 months and formed 5 equal portfolios with \( P1 \) containing bottom 20% securities and representing loser portfolio and \( P5 \) containing top 20% securities and representing winner portfolio. They also taken into account the possibility of short-term momentum effect offsetting the reversal pattern in the long term returns by skipping one year between portfolio formation period and portfolio holding period and estimated the equally weighted returns for the five portfolios for one year holding period starting in July of year \( t+1 \) to June of year \( t+2 \). Their empirical findings revealed that long term returns in India display a reversal pattern once the short-term momentum effect has been controlled. To examine the profitability of contrarian strategy based on long-term past returns, they estimated the extra normal returns for the five portfolios using the market model equation and found that a contrarian strategy provides moderately positive returns in the Indian Stock Market. Their findings as a whole implied the existence of return reversal phenomena in the Indian stock market with moderately positive payoffs to the contrarian strategy based on long-term past returns.

Chiao and Hueng (2005) observed a presence of a significant overreaction effect in Japanese stock market. They documented that firm size (SZ) and book-to-market ratio (BM) cannot fully explain stock returns on prior-return-based portfolios in Japan and that the overreaction effect after controlling for \( SZ \) and \( BM \) effects is significant and plays an important role in
explaining the zero-investment returns on the loser-to-winner strategy. For their analysis they took the monthly price data of common stocks listed on the Tokyo Stock Exchange (TSE) for the period from January 1975 to December 1999. They formed the portfolios at the beginning of each October from 1980 to 1994, by first sorting all TSE stocks in their sample into five equal groups based on their SZ and then sorting them into five equal groups based on their BM. They then constructed twenty-five (5 x 5) SZ/BM double-sorted portfolios from the intersections of the five SZ and five BM groups and denoted the portfolio with the highest BM and the smallest SZ as the “growth” portfolio, and the portfolio with the lowest BM and the biggest SZ as the “value” portfolio. The average monthly return is calculated over the period from October in year \( t \) to September in year \( t+1 \). Next, they constructed their prior-return-based portfolios, i.e., the winner portfolio and the loser portfolio, by sorting all the stocks according to their prior five-year cumulative returns that are composed of the same numbers of stocks as those in the growth and the value portfolios, respectively. By comparing the prior-return-based and the characteristics-based portfolios, they found evidence in the Japanese stock market that validates the existence of overreaction effect in it. They observed that even though the characteristics of comparable winner/loser portfolios are not as extreme as those of the growth/value portfolios, the matching loser significantly outperformed the matching winner in each year within the five-year holding periods. Their returns are not dominated by those of the growth/value portfolios. In addition, the zero-investment return on the loser-to-winner strategy is higher than that on the value-to-growth strategy. Finally, in an attempt to isolate the characteristics effect from the prior-return-based portfolios, they constructed the “SZ/BM-adjusted return” using a methodology similar to that in Lakonishok, Shleifer, and Vishny (1994) and La Porta, Lakonishok, Shleifer, and Vishny (1997), for each stock in the prior-return-based portfolios by subtracting the return of the
corresponding characteristics-based portfolio from each stock’s return. Interestingly, they found that the zero-investment returns on the SZ/BM-adjusted loser-to-winner portfolios are all positive and most of them are statistically significant, which again indicates clear and persistent overreaction effects in Japanese stock market over time.

Tripathi and Aggarwal (2009) also documented the presence of overreaction effect in Indian Stock Market. They employed the methodology of De Bondt and Thaler (1985) and Chan (1988) on the monthly closing adjusted prices of 500 stocks comprising S&P CNX 500 Equity Index over the period from March 1996 to March 2007 and used both market-adjusted and risk-adjusted returns for testing purposes. They found a presence of statistically significant but asymmetric overreaction effect in the Indian Stock Market. They observed significant reversal in the direction of losers’ returns but found no evidence of such a reversal in winners’ returns and attributed this finding to the pessimistic nature of Indian investors who tend to overreact strongly to bad news but do not exhibit overreaction to good news. They reported that abnormally positive returns to contrarian investment strategy are largely driven by extremely positive returns to loser stocks during the test period.

Abdel and Ismail (2012) studied the Egyptian stock market as a distinct market within the framework of contrarian and momentum strategies and provided an evidence of the existence of contrarian / momentum profits in the cross-section of Egyptian stocks. For the purpose of their study, they examined the monthly data on common stocks listed on the Egyptian Stock Exchange from January 2000 to December 2010, across various formation and holding horizons ranging from one month to thirty-six months. For analysing the profitability of contrarian and momentum strategies, they constructed several winner and loser portfolios ranging from very short term (1 month) to
longer term (36 months) and for this purpose they primarily employed the approach adopted by Jegadeesh and Titman (1993) to identify the winner and loser portfolios according to their past monthly returns. To test the significance of contrarian and momentum profits, they used paired T-test to determine if the momentum and contrarian profits in the holding periods are significantly different from that in the formation periods. Specifically, in the context of overreaction hypothesis, their findings suggested that the contrarian strategies are profitable across all horizons, from a very short horizon of one month to a very long horizon of thirty-six months. The authors also examined whether the risk-based explanations can account for the proportion of this profitability and used the OLS estimator of the slope coefficient in the market model to estimate the contrarian portfolio betas based on the CAPM framework. Based on their findings, the authors documented that the excess returns of the contrarian portfolios are not a compensation for carrying extreme market risk and hence market risk does not explain results for contrarian strategies. They also explored whether the contrarian profitability is a market-state related phenomenon. To this effect, they grouped the returns on different portfolios into up market (when the holding period market return is positive) and down market (when the holding period market return is negative). Their findings partially support the relationship between contrarian profits and market states; their results indicate that the contrarian strategies perform better in the down market than in the up market across all horizons. In the conclusion the authors contended that their results present a clear violation of the concept of market efficiency.
II. Studies investigating the predictability of stock returns over intermediate horizon of few months based on their prior period return behavior

Jegadeesh and Titman (1993) reported for the first time, that over short horizons, equity returns exhibit short term price continuation. Using a U.S. sample of NYSE-AMEX stocks over the period 1965-1989, they demonstrated that a momentum strategy of sorting firms by their previous returns over the past 6-9 months and holding those with best prior performance and short selling those with worst prior performance generates an excess return of about 1% per month over the subsequent 6 months for U.S. stocks. They also provided for a decomposition of these profits into different sources and developed tests to evaluate their relative importance. Their findings indicated that these profits are neither due to the systematic risk of the trading strategies nor to a lead-lag effect resulting from delayed stock price reactions to information about a common factor. They further examined the performance of their winner minus loser portfolio in each of the 36 months following the portfolio formation date. Further tests suggested that part of the predictable price changes that occurred during these 3-12 month holding periods may not be permanent. Specifically, the longer term performances of the past winners and losers reveled that half of their excess returns in the year following the portfolio formation date dissipates within the following 2 years, thus, possibly suggesting the existence of overreaction over longer horizon.

Chan, Jegadeesh and Lakonishok (1996) attempted to trace the source of the predictability of future returns from the past returns and for this purpose, they examined whether the evidence on momentum in stock prices is related to the evidence on the market’s underreaction to earnings related information. The authors confirmed that the larger drifts in future returns over the next six and twelve months are predictable from a stock's prior return and from prior news about earnings and that each momentum variable
has separate explanatory power for future returns, so one strategy does not subsume the other. Considering all domestic, primary stocks listed on the New York (NYSE), American (AMEX), and Nasdaq stock markets, they ranked the sample stocks on the basis of either past returns or a measure of earnings news at the beginning of every month from January 1977 to January 1993 and assigned them to one of ten equally weighted decile portfolios. For their price momentum strategy they used a stock’s past six months compound return as ranking variable and for their earnings momentum strategies they used three different measures of earnings news namely standardized unexpected earnings (SUE) variable, the cumulative abnormal stock return around the most recent announcement date of earnings up to month t and changes in analysts' forecasts of earnings. For each of the momentum strategies, they reported buy-and-hold returns in the periods subsequent to portfolio formation. The authors found that sorting stocks on the basis of past returns yields large differences in subsequent returns. Sorting on past earnings surprise also gives rise to large spreads in future returns. The spreads in returns associated with the earnings momentum strategies, however, tend to be smaller and persist for a shorter period of time when compared to the results of the price momentum strategy. They documented that their evidence is consistent with the idea that the market does not incorporate the news in past prices or earnings promptly. Instead, the adjustment is gradual, so that there are drifts in subsequent returns. To examine whether the continuation in past price movements and the underreaction to earnings news are the same phenomenon, they formed double sorted portfolios based on their past returns and past earnings surprises together and reported that the continuation in stock price movements over the intermediate term includes a component unrelated to the news in near term earnings. They found a little sign of subsequent reversals in returns of stocks with high price and earnings momentum, suggesting that
positive feedback trading cannot account for the profitability of momentum strategies. They also investigated whether the behaviour of returns analysed for different momentum portfolios can be explained by factors related to size and book-to-market effects and observed that market risk, size and book-to-market effects do not explain the drifts. Further the authors observed that security analysts' forecasts of earnings are slow to incorporate past earnings news, especially for firms with the worst past earnings performance. They attributed delayed reaction of stock prices to the information in past returns and in past earnings to be the primary source of momentum profits.

**Rouwenhorst (1998)** presented evidence of medium-term return continuation for international equity markets. Using a sample of monthly total returns for 2,190 stocks from 12 European countries from 1978 through 1995, they found a presence of momentum in the stock returns of all the 12 markets in the sample. Following Jegadeesh and Titman (1993), they ranked all the sample stocks into deciles based on their past J-month return (J equals 3, 6, 9, or 12) and assigned them to one of the ten equally weighted relative strength portfolios which were held for K subsequent months (K equals 3, 6, 9, or 12 months). Based on their findings they reported that an internationally diversified related strength portfolio that invests in past medium-term Winners and sells past medium-term losers earns approximately 1% per month. They found that the outperformance lasts for about one year, and cannot be attributed to conventional measures of risk such as size and the market. In fact, they observed that controlling for market risk or exposure to a size factor increases the abnormal performance of relative strength strategies. They further reported that return continuation holds for both large and small firms, although it is stronger for small firms. He, however, presented some evidence that European and U.S. momentum strategies have a common component, which suggests that exposure to a common factor may drive the profitability of momentum strategies.
Conrad and Kaul (1998) analysed the momentum strategies implemented for eight different horizons and during several different time periods within the 1926-1989 period, using the entire sample of available NYSE/AMEX securities. They reported that most, and perhaps all of the observed momentum profits are explained by cross-sectional differences in expected returns of individual securities comprising the portfolios rather than any “time-series patterns in the stock returns.”

Jegadeesh and Titman (2002) provided evidence contradicting the findings of Conrad and Kaul (1998). They argued that Conrad and Kaul’s (1998) results can entirely be attributed to small sample bias. Using the sample of all the stocks listed on the NYSE/AMEX over the period of 1965-1997, they conducted a variation of Conrad and Kaul’s bootstrap experiment which they analytically showed to be unbiased and found that in their unbiased bootstrap experiment, momentum profits are virtually zero. They thus concluded that differences in unconditional expected returns explain very little, if any, of the momentum profits.

Lewellen (2002) studied momentum in stock returns by focusing on the role of industry, size and book-to-market (B/M) factors. Using the price data on all NYSE, AMEX and Nasdaq common stocks for the period 1941-1999, he found a presence of strong momentum in both individual stocks and portfolios for 7-9 months after formation. He observed that size and B/M portfolios also exhibit momentum as strong as that in individual stocks and industries, suggesting that momentum is a pervasive feature of returns and documented that macro-economic factors and not the firm-or-industry specific returns explain the momentum in stock returns.

Sehgal and Balakrishnan (2002) tested the presence of short-term momentum effect in the Indian stock market during the period July 1989 to March 1999. Their findings suggested a presence of strong momentum effect
in short-term returns for the Indian market with significantly positive payoffs of 1.27% per month to the momentum strategy. They formed portfolios based on short-term past returns of one year and tracked their performance for the following one year holding period. Their results suggested that there is continuation in short-term returns in the Indian market and a momentum strategy based on it provides significantly positive payoffs.

Nijmana, Swinkelsb and Verbeekd (2004) investigated whether individual stock momentum in Europe is subsumed by country or industry momentum. They applied a portfolio-based regression approach on their sample consisting of 1581 stocks listed on the stock exchanges of 14 European countries for the period 1990 to 2000 and found that the positive expected excess returns of momentum strategies in European stock markets are primarily driven by individual stock effects, while industry momentum plays a less important role and country momentum is even weaker.

Hvidkjaer (2006) documented that momentum could partly be driven by the behavior of small traders. Using the transactions data for all NYSE/AMEX stocks for the period 1983–2002, they showed that among small trades, there is an extremely sluggish reaction to the past returns and the small-trade imbalances during the formation period significantly affect momentum returns, suggesting that underreaction among small traders contribute to the momentum effect.

Abdel and Ismail (2012) also found the evidence of the existence of momentum profits in the cross-section of Egyptian stocks. In their study, they examined the monthly data on common stocks listed on the Egyptian Stock Exchange from January 2000 to December 2010, across various formation and holding horizons and documented that the profitability of momentum strategies is compatible with the evidence from U.S. and European markets. To construct their winner and loser portfolios based on past monthly returns,
they primarily adopted the approach followed by Jegadeesh and Titman (1993). Their findings revealed that momentum strategies are profitable in short and medium term and that short-term momentum and long-term reversals are not likely to be components of the same phenomenon. They suggested that separate theories of short and long term predictability in prices may be more accurate than a theory that views both phenomena as integrated components of the market’s response to news. Using CAPM to explain their momentum results and to investigate whether a time varying beta explains the profitability of the momentum strategies, their study finds that momentum profits cannot be explained by a simple beta-risk effect; two offsetting positions, one long (winner) with higher beta and lower abnormal return and one short (loser) with lower beta and higher abnormal return, build up a profitable momentum with negative abnormal return. They documented that strength of momentum strategies is not built on differences in risk. The authors further examined whether the state of market is important to the profitability of momentum strategies. They used paired T-test to determine if the momentum profits in the different holding periods are significantly different across up and down markets and found a partial support for the relationship between momentum profits and market states as documented by Cooper, et al. (2004) for the U.S. market. Their findings reveal that momentum strategies generate significantly positive profits following up states and insignificantly negative profits following down states. The authors finally concluded that their results present a clear violation of the concept of market efficiency.
III. Studies investigating the predictability of stock returns over very short interval of few days based on their prior period return behavior

In the first study of short-term overreaction, Arbel and Jaggi (1982) did not find any evidence of daily overreaction on New York Stock Exchange. For the purpose of their study, the authors selected the top five stocks in terms of upward percentage daily price movement on each of the thirty six randomly selected trading days during the year 1977, from the Wall Street Journal’s daily price leaders’ list and assessed the market reaction in terms of price relative and residual return behavior in the eleven days preceding and ten days following the observed price movement on any given day. Their results based on 180 stocks and 3960 closing prices indicated that information that causes extreme price changes is assimilated by the market instantaneously in a single day and no significant pattern of price movement is evident either before or after this day.

Howe (1986) presented evidence consistent with the short-term and long-term company specific instances of overreaction to either favourable or unfavourable events. They examined the behaviour of the stocks that have experienced a rise or fall of more than 50% in prices within one week. Using the daily stock returns data of NYSE and AMEX companies from CRSP tape for the period 1963-1981, and converting it into the weekly data; they calculated the cumulative market-adjusted residual for the 2 samples. They reported evidence strongly consistent with the overreaction hypothesis. Specifically, stocks that experienced large positive returns perform poorly throughout the 50 week period following that event, with returns averaging about 30% below the market and negative returns more prominent during the later weeks. Stocks that experienced a large price decline were followed by a period of above average returns with most of the rebound occurring in the 5
weeks following the event. During the next ten weeks following the event, losers outperformed winners by an average of 27%, thus evidencing the overreaction phenomena over short horizons too.

French and Roll (1986) also documented the short-term overreaction phenomena which is more prominent amongst the smaller securities as compared to larger securities. They applied variance ratio test to the daily return data of NYSE and AMEX stocks for the period 1963-1982 and reported significant negative serial correlation among the smaller securities thus suggesting the presence of overreaction phenomenon particularly for smaller securities.

Atkins and Dyl (1990) presented evidence suggesting that stock prices do overreact in the short run, however, such an effect becomes insignificant after taking into account the transaction cost. They examined the behaviour of common stock prices after a large change in price occurred during a single trading day and found evidence favouring stock market overreaction in the short run. Using the daily returns for all the NYSE listed stocks for the period starting from January 1975 through December 1984, they measured the abnormal performance of the common stocks using three different approaches namely, mean-adjusted returns method as described by Brown and Warner (1980, 1985) and the 2 versions of the market-adjusted and risk-adjusted procedures. They selected 6 common stocks, 3 with largest price one-day loss and 3 with largest price one day gain on 300 randomly selected trading days. Their results revealed that the stock prices over-react in the short run, especially in the case of price declines; however the magnitude of the overreaction, while statistically significant, is small compared to the bid-ask spreads observed for the individual stocks in the sample, i.e. traders could not profit from the price reversals after the transaction costs are considered.
There are certain studies available that question the validity of overreaction effect behind the apparent profitability of short-term contrarian strategy and provided alternative explanations behind it. Most importantly, Lo and Mackinlay (1990) presented evidence against overreaction as the only source of contrarian profits. They contended that contrarian profits are not due to return reversal but due to lead-lag structures among stocks. Their argument follows that ‘if returns on some stocks systematically lead or lag those of others, a portfolio strategy that sells “winners” and buys “losers” can produce positive expected returns, even if no stock’s returns are negatively auto correlated as virtually all models of overreaction imply’. Using a particular contrarian strategy they showed that, despite negative autocorrelation in individual stock return, weekly portfolio returns are strongly positively auto correlated and are the result of important cross-autocorrelations. They constructed weekly equal-weighted and value-weighted returns indexes from the CRSP daily returns files for the sample period from July 6, 1962 to December 31, 1987, considering all the stocks with at least 52 non-missing weekly returns during the sample period. Their contrarian investment strategy involved buying stocks that were prior losers and selling stocks that were prior winners, where winning and losing was determined with respect to the equal-weighted return on the market. They found weekly negatively autocorrelated individual stock returns, however, equal-weighted returns are found to be strongly positively autocorrelated throughout the sample thus implying significant positive autocorrelation across securities. Also, the magnitude of the negative individual autocorrelation is found to be much smaller compared to the positive autocorrelation of the equal-weighted index. They documented that positive cross autocorrelation in stock returns reconciles the negative serial dependence in individual security returns with the positive autocorrelation in market indexes, thus implying that stock market overreaction need not be the
sole explanation for the profitability of contrarian portfolio strategies. Their results showed that less than 50% of the expected profits from a contrarian investment rule may be attributed to overreaction; the majority of such profits are due to the cross effects among the securities. They also reported that cross effect have a very specific pattern for size-sorted portfolios, they display a lead-lag relation, with the returns of larger stocks generally leading those of smaller ones, thus resulting into the profitability of a contrarian investment strategy without any overreaction.

Focusing on extreme price movements, Bremer and Sweeney (1991) examined the returns following one-day price declines of 10% or more for Fortune 500 firms that are in the CRSP data files over the period 1962-1986. They measured the abnormal returns as residuals to the stock’s average return over the entire sample period excluding the extreme observations. They find evidence of significant reversals after large stock price declines with significantly positive 3-day abnormal returns and note that this 3-day recovery is inconsistent with stock prices fully and quickly reflecting relevant information. They also suggest that their findings may partially be explained by market illiquidity.

Cox and Peterson (1994) documented that the bid-ask bounce and the degree of market liquidity accounts for substantial part of short-term price reversals. Their sample consists of NYSE, AMEX and NMS stocks with one-day price declines of 10% or more over the period January 1963 through June 1991. Considering the stocks that have prices of at least $10 per share, they measured the abnormal returns as security’s return minus an average of the pre-event and post-event beta times the return on market and examined the individual days 1, 2 and 3 following the event day 0 as well as cumulative results for days 4 through 20. They also segregated their total study period into six sub-periods. They found a presence of significantly positive average
cumulative abnormal returns for days 1 through 3 in initial sub-periods but observed that the degree of reversals tend to decline through time with no reversal seen in later sub-periods. They attributed this finding to the hypothesis that increased market liquidity through time reduces the degree of reversals. For days 4 through 20, they observed that the 3-day positive abnormal returns are more than reversed. They also tested the role of bid-ask bounce in explaining the observed reversals by comparing the results based on closing transaction prices and those based on the average of closing bid and ask quotations of NMS securities. Their findings proved that bid-ask bounce is an important component of NMS reversals as significantly positive average abnormal transaction returns turned significantly negative with average of bid-ask quotations used. They also run the regression analysis to test for the differences in reversals due to firm size or exchange listing and for the existence of an overreaction magnitude effect. They found significant negative coefficient on size index variables and lend this finding to the argument that small stocks have wider bid-ask spreads and are less liquid than larger stocks and thus experience greater reversals. They found no consistent relationship between exchange and degree of reversal. They do not even found evidence of overreaction magnitude effect. They also reported that subsequent to 3 days after the large price drop, securities tend to enter a prolonged period of relatively poor performance where post drop recovery was itself reversed. They thus contended that their findings donot lend any support to overreaction hypothesis.

Akhigbe, Gosnell, and Harikumar (1998) also use the bid-ask spread to examine the overreaction phenomenon. They examined the overreaction issue by using a sample of NYSE stocks that gains or loses the most in a single trading day in 1992. In contrast to the findings by Cox and Peterson (1994), their empirical results show significant reversals during the immediate post-announcement period. Their results also indicate that the abnormal returns
during the reversal period are, on average, less than the bid-ask spread during the same time. Using major losers, they find the price reversals are large enough to be profitable net of the bid-ask spread, which they interpret as evidence consistent with the overreaction hypothesis. After considering the cost of trading, however, they assert that their findings still support weak-form market efficiency.

**Pritamani and Singal (2001)** examined the predictable price patterns following large changes in the daily stock prices accompanied by large volume increases and public announcements and offered a proof of investor underreaction following positive as well as negative price shocks. Their sample consisted of all common stocks listed on NYSE or American Stock Exchange for the period between 1990-1992. They calculated their post-event abnormal returns as buy and hold returns for an equally weighted portfolio of sample firms less the average return to a control portfolio formed by bootstrapping and reported these abnormal returns upto 20 days following an event. Beginning with a sample of abnormally large price changes, the authors found that unconditional post-event abnormal returns are economically insignificant, though sometimes statistically significant. However conditioning the sample on other criteria related to the quality of information like volume and public announcements, the abnormal returns became larger; depending upon volume increases, large price change events with accompanying public announcements revealed stronger evidence of price continuation with 20-day abnormal return of about 2% for positive events and -1.68% for negative event sample. On further analysis of price patterns based on type of news, the authors found that if the news relates to earnings or analysts’ recommendations, then the 20-day abnormal returns became much larger. The authors confirmed their results by testing an out-of-sample trading strategy of buying (selling) positive (negative) event firms accompanying increased volume and selected news which generated
significant abnormal annualized returns of the order of 12-18% after transaction costs.

Contradictory evidence has been shown by Larson and Madura (2003) who find that instead of overreacting, the market in general was overoptimistic. They found winners as well as losers both earn significantly negative abnormal returns during the period from 1988-1995. They identified losers and winners by selecting daily stock price returns of common stocks listed on NYSE in excess of 10% on either side and determined whether these samples over or under-react. They also investigated whether the degree of over-or underreaction is conditioned on the presence of public information. For this purpose, they divided their sample into informed events which corresponds to the announcements in the WallStreet Journal (WSJ) and uninformed events which are not explained in WSJ. They estimated abnormal returns using market model parameters for both pre-event and post-event periods and used various event windows to pinpoint timing of any over- or underreaction. In general, their findings reveal overreaction for winners and underreaction for losers as both the simples experienced significantly negative abnormal returns following extreme stock price changes. Their separate analysis of informed and uninformed events suggests that the release of public information reduces uncertainty as for winners they found overreaction in response to uninformed events but no overreaction on average to informed events. They also run a cross-sectional regression analysis to reassess whether the degree of over- or underreaction is related to the presence of public information while controlling for initial price change, pre-event leakage, firm size, January effect or the Monday effect. For winners they observed that uniformed events are associated with overreaction whereas informed events are not. For losers they donot find statistical difference between uninformed and informed events even after controlling for potentially confounding factors. They contended that the degree of
overreaction to the new information depends on whether the cause of extreme stock price change is publicly released.

Ma et al. (2005) empirically investigated the issue of market overreaction effect of the stocks with the largest daily percentage increases or decreases in price reported in The Wall Street Journal on any trading day between January 1996 and December 1997. They selected 852 stocks for the NYSE and Nasdaq samples of gainers and losers and computed abnormal returns using market model approach. They observed a strong evidence of stock price overreaction effects for both the Nasdaq gainers and losers samples but no such evidence for either the NYSE samples. The authors reported that the reversal of stock returns occurs in a very brief time period; it lasts only about two days after the event. Further, they noticed an asymmetry between the samples of gainers and losers as the sample of losers exhibit a stronger reversal effect over the two-day period after the event day. Their regression analysis shows that the magnitude of stock price reversal is inversely related to the price gains or losses controlling for the size of Nasdaq firms. They highlighted that given the insignificance of abnormal returns for NYSE stocks, their findings are suggestive of the fact that the recent market developments in the rapid dissemination of information may help alleviate the overreaction effect.

Return predictability over very short intervals of few days has also been tested and detected using stock price data from international stock markets worldwide including developed as well as emerging stock markets namely U.K., Japan, Brazil, Germany, and Turkey etc.

MacDonald and Power (1992) tested for the short term overreaction using the U.K. data. In their study of the short-term winner-loser effect, they applied the market model in analyzing weekly returns over the period from January 1982 to June 1990 for a sample of 100 firms listed on the UK stock
exchange. Stocks were allocated to winner and loser portfolios according to their abnormal returns: the top decile was designated as winners, while the bottom decile was categorized as losers. The authors found no evidence of reversals in the abnormal returns of the winner and loser portfolios over the following 12 weeks. Rather, they found that the winner portfolios earned a CAR of 0.44% over the 12 week period after portfolio formation, while loser portfolios earned a CAR of -0.21% over the same period. This rejection of a short-term winner-loser effect was reinforced by the results obtained from the trading strategy which the authors tested to exploit any possible mean reversion in stock returns. This strategy, which involved buying losers and short-selling winners, had been found to be profitable in a number of US studies. MacDonald and Power, however, found that such a strategy did not outperform the market; in the week following the formation of the two portfolios the strategy was found to underperform the market by a statistically significant -0.48%.

**Bremer, Hiraki and Sweeney (1997)** reported the evidence of predictable patterns of stock returns on days following large (positive or negative) changes in the stock prices on Tokyo Stock Exchange (TSE). For the purpose of their study, they considered all daily rates of return for stocks included in the Nikkei 300 that were less (greater) than -10 (+10)% over the period from January 1981 to December 1991 and define these rates of return as large price change events and measured abnormal returns as residuals to market model. Using standard methodologies, they found that stock returns of firms included in the Nikkei 300 tend to be significantly positive after large price decreases. This is similar to the pattern observed for American stocks in other research. The pattern remained when they adjusted the returns for market movements, and existed independently of the October 1987 market break. They found little evidence of significant patterns following large stock price increases. They also found little evidence that non-transaction prices
explain the persistent, significant returns observed following large price decreases on the Tokyo Stock Exchange. The authors conjectured that broker/dealers and TSE member firms respond to large price decreases not by trading for their own profit, but rather by selectively supplying liquidity to their preferred retail customers. They concluded that ordinary investors probably cannot earn economic profits from these statistically significant patterns on Japanese stock market.

Medeiros and Ribeiro (2005) tested the reaction of Brazilian Stock Market to positive and negative shocks and noticed strong signs of overreaction as well as underreaction. The authors tested for the efficiency of stock market over sixty days after the occurrence of an unexpected disruption in the Brazilian Stock Index (Ibovespa) relative to the Dow Jones Stock Index, used as a proxy for World Stock Index. Their study period spans from April, 1994 to November, 2005. They regressed the rate of return of Brazilian Stock Market on Dow Jones Index’s rate of return, and identified residuals greater than or equal to +2.5% in deviation as positive events and lesser than or equal to -2.5% in deviation as negative events. Their findings revealed that the arrival of unexpected information translates into increased volatilities on the Brazilian Stock Market, with post-positive shock variance significantly greater than post-negative shock variance. They observed that on occurrence of favourable events, stock prices jumps to a higher level and oscillate around this new level upto day +30 and then start falling until the end of post-event window to reach their pre-event or even lower levels, a finding in support of overreaction hypothesis in favourable scenario. For unfavourable events they observed an immediate fall in stock prices which keep on falling during the post-event window of 60 days, implying that the initial adjustment was insufficient, lending support to underreaction hypothesis for negative events. They concluded that Brazilian Stock Market overreacts to positive shocks and
underreacts to negative shocks which suggest the prevalence of institutional inefficiency.

**Vardar and Okan (2008)** examined the short-term overreaction effect in the Istanbul Stock Exchange. Using daily stock price data of 190 stocks traded in one of the major Turkish equity indices (ISE) for the 4-year period between January 1999 to December 2003, they found evidence of short-term overreaction effect in the Istanbul Stock Exchange prior and post financial crisis. They divided their study period into two sub-periods covering pre and post- Turkish financial crisis period. They demonstrated that stocks that display a large price increase show an evidence of overreaction in the short run, however stocks that display a large price decline indicate no significant evidence. They also find that the price reversal for winners in pre-crisis period is more pronounced than in post-crisis period. The authors postulated that their results indicate a diminished degree of overreaction after the crisis period which may be attributable to the behaviour of traders.

Based on the evidence of the return reversals over very short holding periods and the consequent profitability of contrarian strategies, **Wang, Peng and Hueng (2009)** examined the intra-day performance of contrarian strategies using the transaction price data for 438 stocks listed on the Taiwan Stock Exchange during the year 2004 and found that contrarian strategies yield significantly positive abnormal returns on intra-day basis. They examined a total of 36 contrarian strategies with formation and holding periods ranging from five minutes to sixty minutes in the trading day. To implement the contrarian strategies, they sorted the sample firms in an ascending order into quintiles on the basis of market-adjusted abnormal returns in the formation period and selected the quintile with the highest abnormal return as winner portfolio and the quintile with the lowest abnormal return as loser portfolio. Then they estimated the average abnormal
returns earned by contrarian strategy by subtracting the average abnormal return on winner portfolio from the average abnormal return on the loser portfolio for the given holding period. Their findings indicate significantly positive abnormal returns for all of the 36 contrarian strategies; for the whole trading day, the contrarian strategies earned an average abnormal return of at least 0.18% for all strategies, and above 0.3% in 24 out of the 36 contrarian strategies prior to transaction costs. Moreover, they observed that the contrarian profit increased from a formation period of five minutes to 10 minutes, and then declined toward a longer formation period of 60 minutes. The authors contended that this observed pattern suggests that price reversals occur around 10 minutes into the formation period. Their intraday analysis also indicated that the abnormal returns earned by the contrarian strategies are higher in the opening and the closing intervals than in the middle of the trading day. Finally, their results indicate that price reversals occur for both prior losers and prior winners, with prior winners experiencing larger price reversals than prior losers when the holding period becomes longer. However, the authors also noted that their results of profitable abnormal returns are based on gross returns before transaction costs were deducted. When they considered reasonable explicit trading costs, they found that none of the 36 contrarian strategies yield profitable net returns. The authors thus concluded that economically, the Taiwan stock market is efficient as none of the 36 contrarian strategies produce any “free lunches” for investors.

Lobe and Reiks (2011) found evidence of subsequent short term return reversals on German Stock market. Their sample consisted of the stocks that experienced a price change of 10% or more in a day in either direction on German stock market during the period from 1988-2007. To avoid the biases caused by bid-ask spreads and illiquidity, they considered only the stocks belonging to the four major German stock indices traded on Frankfurt stock exchange and excluded the stocks with a price of less than €10. They
calculated the market-adjusted abnormal returns for each event stock for the first day after an event and buy-and-hold returns for days one through five following an event. In agreement with earlier findings of U.S. and other international stock markets, they also found an asymmetric reaction to price shocks with larger positive abnormal returns after price decreases compared to negative abnormal returns after price increases. They further reported that significant abnormal returns after price shocks do not become weaker over time and thus ruled out lack of liquidity or existence of bid-ask spreads as possible explanations behind observed overreaction. They also ruled out short-term overreaction as another manifestation of size phenomenon. To investigate the influence of some well documented anomalies like the value-effect, the magnitude effect etc. and other stock characteristics like volatility on the direction and extent of markets abnormal reaction to price shocks, they run multivariate regressions and regressed the abnormal event return itself, log of company size in terms of market capitalization, log of book-to-market ratio, the average daily return during last 60 trading days, the log of price-earnings ratio and the estimated stock return volatility on post event abnormal returns. Their evidence suggested that reversal effects and volatility do exhibit explanatory power, however when controlling for size, only reversal effect can pervasively explain the abnormal one-day stock market reaction to price shocks.

Maher and Parikh (2011) examined the short-term price behaviour of three size-conditioned Indian stock market indices in response to informational shocks and found evidence of underreaction to negative events in the medium and small capitalisation indices. They based their analysis on the data of daily closing prices on three Indian equity indices namely, BSE 30 (Sensex), BSE Midcap and BSE Smallcap for the period April 2003-June 2010, which is inclusive of the time of the impact of the global financial crisis on India. They defined an extreme event day as the day in which the index
return is beyond two standard deviations the average daily index return, computed over the interval of \([-60,-11]\) days before any given day, in absolute values. In order to compute the abnormal return on the day of the shock as well as the cumulative abnormal returns upto 10 days after the shock, they employed to different approaches, namely a CAR analysis based on a mean-adjusted returns model and a GJR-Garch model. Conditioning their investigation on several factors such as market capitalisation, crisis vs. non-crisis periods and magnitude of shocks, they found evidence of post-event underreaction to negative events, detected mainly in the medium and small capitalisation stocks, in all periods except post-crisis. During post-crisis period, they observed overreaction to bad news. On the other hand, they found that the market apparently reacts more efficiently to positive events, overall. To test for the possible information leaks or anticipation ahead of an event, they also computed and tested the cumulative abnormal returns for three days prior to each event day and found that pre-event CARs tend to be negative and statistically significant, regardless of the sign of the shock and thus ruled out the possibility of information leaks. They also detected an abnormal volatility pattern increasing monotonically a few days before the event day and then suddenly decreasing in magnitude on event day upto ten days following the event. They also document a statistically significant and abnormally high trading volume in a large proportion of pre-event days, suggesting an increased traders’ appetite for selling. They suggested uncertainty avoidance as a potential explanation of their observations for Indian stock market.

**Mazouz et al. (2012)** examined the relationship between systematic liquidity risk and stock price reaction to large 1-day price changes (or shocks) and reported strong evidence of the role of the systematic liquidity risk in explaining the price reaction to shocks. They based their analysis on a yearly updated constituents list of the FTSE All share index covering the period from
the 1st of January 2001 to the 31st of December 2008, dataset of each stock consisting of the daily observations of the closing price, market capitalisation and trading volume. Given the ability of Liu’s (2006) Liquidity Augmented Capital Asset Pricing Model (LCAPM) to measure the liquidity risk better than the existing models and its explanatory power on the cross-sectional stock returns, the authors also used LCAPM to test the role of systematic liquidity in explaining the short-term price anomalies. For this purpose, they constructed a mimicking liquidity factor, LIQ, as the return difference between a low-liquidity portfolio containing stocks with low LM12 and a high-liquidity portfolio containing stocks with high LM12. In line with Liu (2006), they defined LM12 as the standardized turnover-adjusted number of days with zero trading volume over the period of 12 months. They then sorted stocks according to their historical liquidity betas generated using the coefficient on LIQ in the LCAPM and assigned these stocks to decile portfolios ranging from the most liquid to the least liquid. They used standard CAPM to estimate the post-shock abnormal returns for each of the ten portfolios. The authors defined price shocks as a daily price change in excess of 5 per cent, 10 per cent and 20 per cent in absolute values. Their analysis revealed evidence in favour of the price continuation hypothesis; they observed that positive (negative) shocks are followed by significantly positive (negative) abnormal returns for a number of days after a shock. However, their further analysis indicates that stocks with low systematic liquidity risk react efficiently to both positive and negative shocks, whereas stocks with high systematic liquidity risk underreact to both positive and negative shocks. Further they found that their results are valid irrespective of various robustness tests such as size of the shock, size of the firm, month-of-the-year and day-of-the-week effects. They conclude that trading on price patterns following shocks may not be profitable, as it involves taking substantial liquidity exposure.
In summary, the literature on winner-loser patterns in stock return appears to point out mainly the following conclusions. Firstly, the overreaction phenomenon has been observed over the long-horizons of 3-5 years in most of the stock markets examined so far, although the effect is not always symmetrical. Secondly, the mixed evidence has been found for the return predictability over shorter horizons of days and weeks. Few studies like those of Howe (1986), Atkins and Dyl (1990), Bremer and Sweeney (1991) and others have reported short-term return reversals, while others like MacDonald and Power (1992), Pritamani and Singal (2001) and Larson and Madura (2003) etc. have documented short-term price continuation. Thirdly, over intermediate horizons of few months, studies have consistently documented the existence of momentum effect. Fourthly, while there is now a clear consensus that stock prices do exhibit predictable patterns over very short, intermediate as well as long intervals, there is widespread disagreement about the reasons for its existence: it may be due to investor over-reaction or underreaction or it may be driven by methodological biases, including size or systematic risk differences, or by market micro-structure issues or due to cross-sectional differences in expected returns of individual securities or due to lead-lag effects among securities.

The extensive literature on the overreaction and the momentum effect presented so far warrants the increasing popularity, recognition and conviction of these well documented stock market phenomenon. But, surprisingly, very few studies have been published on the existence of these phenomenons in Indian stock market. To our knowledge, there exists no published study on the investigation of prior return effect in Indian Stock market using high frequency data. Thus, the main objective of this study is to contribute to the short-term overreaction literature by using daily as well as intra-day stock price data of Indian stock exchange.