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A Study of Contrarian and Momentum Profits in Indian Stock Market

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Abstract

This paper studies the Indian stock market within the framework of momentum and contrarian strategies, using the monthly-adjusted prices of all the stocks listed on National Stock exchange (NSE) having complete data for the sample period January 1997 to March 2013. The findings of the study document the presence of statistically significant short-term momentum and long-term overreaction effect in India. Further, the paper also evaluates the predictions of various behavioural models that propose that momentum profits eventually reversed in long term. The evidence of the paper provides support for the behavioural explanation of momentum and overreaction effect in Indian stock market.

Keywords: Behavioural Finance, Momentum, Contrarian, Indian Stock Market

Introduction

Financial academicians are in the middle of a debate about paradigm shift; from a neoclassical-based traditional paradigm to one that is behavioural-based. In traditional finance models, investors are assumed to be rational and the main pillar of pricing is Efficient Market Hypothesis (EMH). EMH proposed that market is efficient where all the information is fully reflected in the stock prices at all the time (Latif *et al*., 2011). Conversely, over past some years several researchers reported the occurrence of empirical findings contradicting the validity of EMH (Soares and Serra, 2005). A number of papers have provided empirical evidences showing that it is possible to predict future returns on the basis of past returns. The emergence of such contradictory evidences, known as market anomalies, has in more recent times resulted in a critical re-examination of the EMH. Among these, there are two main directions that have been comprehensively taken up by academicians and researchers that present a sharp challenge to the traditional view of securities pricing. These are: the contrarian strategy (overreaction effect) and the momentum strategy (momentum effect) based on price continuation. DeBondt and Thaler (1985, 1987) and Jegadeesh and Titman (1993), respectively, for 'overreaction' and 'momentum' effects, were among the first few people to show that it is possible to develop a profitable investment strategies based on the observation of past returns.

De Bondt and Thaler (1985) documented a reversal phenomenon with the help of US data where long term past loser stocks outperformed the long term past winner stocks over a subsequent period of three to five years. The investment strategy based on such reversal that is to buy past loser stocks and to sell past winner stocks is known as contrarian strategy (Mun *et al*., 1999). Such contrarian strategies earned a subsequent excess return of about 8% per year in the US market (DeBondt and Thaler, 1985).

In contrast to long term reversals documented by DeBondt and Thaler (1985), Jegadeesh and Titman (1993) documented the profitability of short term momentum strategies using monthly data of US stock market. They found that over a short term period of 3 to 12 months, there exist considerable degrees of stock continuation wherein past winners continue to outperform past losers. Momentum strategies entail the purchase of winner stocks and sale of loser stocks- the exact opposite of what contrarians recommends.

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The success of both the contrarian and momentum strategies has attracted considerable attention among the academician's and researchers. There exists a vast majority of literature supporting momentum and contrarian profitability in the US and other developed markets. Much of these recent research efforts have been devoted to explaining why such anomalies in stock market exists. Although there exist many empirical and statistical significant evidences supporting the existence of momentum and contrarian profits in developed markets, very few are concentrated on less developed and emerging markets. Hence, there exists a huge gap in existing literature. Emerging markets by their nature tend to differ from developed markets owing to differences in their investor's behaviour and market structure. Thus, these EMH anomalies should be tested for a wide range of markets, especially in emerging markets to have a pervasive acceptance.

The current paper will re-examine the presence of momentum and overreaction phenomenon in Indian stock market which is one of the leading emerging market of the world by using several different testing methodologies to evaluate the robustness of the results that controls for size and value effect. The paper further examines the findings based on the predictions of various behavioural models that have been proposed to explain momentum and overreaction effect. The motivation for studying the Indian market is that the Indian economy is one of the fastest growing economies of the world. Improved market surveillance, trading mechanism and introduction of new financial instruments have attracted a lot of international investors. However, the market has not yet reached the level of sophistication and efficiency of developed markets. Secondly, the quality of information environment in emerging economies like India differs from that of developed markets. This may cause different return pattern in the Indian stock market that may promote arbitrage based trading strategies based on information about fundamentals. Hence, it would be interesting to explore up to what extent momentum and contrarian strategies can be exploited to earn abnormal profits in Indian stock market. Moreover, in Indian context there is dearth of empirical studies in this area. In addition, not many of the previous studies have examined the momentum and overreaction effect as an integrated phenomenon. This makes our study unique from the existing studies.

Literature Review

Overreaction and Momentum Effect: An Overview

The overreaction hypothesis was first documented in 1982 by Kahneman, Slovik and Tversky (1982) that was afterward used by DeBondt and Thaler (1985) in stock market. According to DeBondt and Thaler (1985) stock market investors overreacts to information on security prices over the longer time horizon. Investors overreact on both positive and negative information, pushing the prices of stocks away from their fundamental values. However, over the period of time the prices revert to their fundamental values. Hence, it is possible to earn abnormal profits in long term by buying undervalued stocks and selling overvalued stocks. They analysed monthly return data of NYSE stocks over the period 1926-1982 by emphasizing on stocks that have experienced extreme capital gains or losses over the last three to five years. They constructed two portfolios: Winner and Loser. Winner portfolio consists of 35 best performing stocks and loser portfolio was composed of 35 worst performing stocks. They reported that on an average the loser portfolio outperformed the winner portfolio by significant 24.6% over the next three year. The loser portfolio earned 19.6% above the market where as the winner portfolio underperformed the market by 5%. DeBondt and Thaler's (1985) study attracted a considerable amount of attention among the financial researchers as the results of the study suggested some predictability in the stock returns, thus violating the weak form of market efficiency. Following research by Keim and Stambaugh (1986) and Fama and French (1988) also reported results favouring the stock returns predictability supporting the findings of DeBondt and Thaler (1985).

In 1993, Jegadeesh and Titman (1993) had ignited a new debate on the controversial work of DeBondt and Thaleer (1985) by providing evidence in favour of short-term continuation and long term reversals in stock returns. Jegadeesh and Titman (1993) reported one of the early evidence in favour of momentum effect by using the monthly data of AMEX and NYSE stocks for the period 1965 to 1989. The momentum strategy that buy stocks with high return over the past three to twelve months (Winners) and sell stocks with poor returns over the same time period (Losers), earns profits of around 1%

per month over the next one year in US stock market. Jegadeesh and Titman (1993) investigated 32 strategies based on formation-holding period of 3-12 months and reported positive momentum profits for all the strategies except one that was based on 3-month formation and holding period. They further concluded that the abnormal momentum profits obtained were not due to idiosyncratic risks or delayed reaction of stock prices to common factor. Similar results were obtained by Conrad and Kaul (1998) and Lee and Swaminathan (2000) for US stock market.

The profitability of both contrarian and momentum strategies are not restricted to US stock market, rather it was observed to work in other international markets too. Baytas and Cakici (1999) reported strong evidence in favour of overreaction effect for five developed markets that includes stock markets of Japan, France, Italy, Germany and UK. Similarly, Alonso and Rubio (1990) for Spanish stock market, Stock (1990) for German stock market, Campbell and Limmack (1997) for UK, Swallow and Fox (1998) for New Zealand Stock Exchange confirmed the presence of overreaction Effect. As far as Asian stock markets are concerned, Fung (1999) for Honk Kong Stock Exchange and Tripathi and Aggarwal (2009) for Indian Stock Market reported results in favour of Overreaction Effect.

Similarly, Rouwenhorst (1998, 1999) reported momentum patterns for European and Emerging stock markets and concluded that momentum profit was not limited to US stock market. Evidence of momentum profits on a global scale was first reported by Griffin *et al*. (1993) that investigated momentum profits on 40 countries. More specifically, Griffin *et al*. (1993) reported momentum profits for all the African and American countries with average monthly momentum profits of 1.63% and 0.78% respectively. Among Asian and European countries, only 10 out of 14 Asian countries and 14 out of 17 European countries exhibit momentum effect with average momentum return of 0.32% and 0.77% respectively. In addition, Liu et al (1999) for UK, Hurn and Pavlov (2003) for Australia, Mengoli (2004) for Italy and Cheng and Wu (2010) for Honk Kong stock market.

Rational Sources of Contrarian and Momentum Profits

The most interesting application associated with momentum and overreaction effect is the potential to earn abnormal profit. The significant momentum and contrarian profits in large number of countries have encouraged various researchers to find the sources of these effects (Dhankar and Maheshwari, 2013). Many researchers have argued that the profitability of momentum and contrarian strategy were due to compensation of risk (Chan, 1988; Conrad and Kaul, 1998). However, DeBondt and Thaler (1987) and Jegadeesh and Titman (1993) found no evidence for risk based explanation of overreaction and momentum effect respectively. This has motivated researchers to further analyse the trading behaviour of investors. Large number of other explanations were put forward based on size effect (Zarowin , 1989), Bid and Ask biases (Conrad and Kaul, 1993) , industry returns (Moskowitz and Grinblatt, 1999), volume (Lee and Swaminathan, 2000) and market states (Cooper *et al*., 2004) to explain the abnormal profitability of contrarian and momentum strategies. However, none of the above explanations have been completely successful in explaining the two effects. This has led to the search for new models and ideas that may be able to predict and explain various market anomalies and behaviour from various psychological biases (Maheshwari, 2013).

Behavioural Finance: A New Approach

Behavioural finance as a theoretical field is relatively a new phenomenon. However, in recent times it has become more prominent and is being acknowledged in the academics. Behavioural finance draws inputs from the field of psychology as well as finance in an attempt to understand and explain irrational stock market and investor behaviour (Maheshwari, 2013). This has motivated various researchers to propose behavioural-based models that may explain various market anomalies and behaviour from various psychological biases (Dhankar and Maheshwari, 2013). Research literature within behavioural finance explaining momentum and overreaction effect has different approaches. Some studies focussed on initial overreaction as the primary cause of continuation pattern in returns, others focussed on under-reaction for the same. Some of the researchers have unified the momentum due to under-reaction and overreaction into a combined theory.

Momentum is Generated by Initial Under-Reaction

Disposition effect was first reported by Shefrin and Statman (1985). According to disposition effect investors

sell winning stocks too early and keep on holding the losing stocks for too long. Based on disposition effect Grinblatt and Han (2002) suggested a behavioural model to explain momentum effect. The model is based on the interaction of two type of investors; rational and disposition investors. At the time of positive news, the disposition investors sell their stocks rapidly to capture the gains before any subsequent price decline. Similarly, when the stock price drops as an outcome of negative news the disposition investors holds on the losing stocks expecting the price to rise in future. Due to this conservative nature of disposition investors, prices never increase nor drop enough to match their true values causing under reaction in prices. To overcome this variance between the true stock value and its market price, the rational investors generate momentum in stock returns and push the prices towards their fundamental value. The model of Grinblatt and Han (2002) explains momentum in stock returns as an outcome of investor's under reaction that does not reverse in long term. Hence, according to Grinblatt and Han (2002) momentum and long term reversals are distinct phenomenon. Supporting the results of Grinblatt and Han (2002), George and Hwang (2004) also indicated that momentum profits could be explained solely due to under reaction and not by a combination of under reaction and a subsequent overreaction.

Momentum is Generated by Initial Under-Reaction with Subsequent Reversal

Barberis *et al*. (1998) presented a behavioural model to simultaneously explain short run stock return continuation and long term reversal pattern using different behavioural biases and heuristics. They proposed a model that combines conservatism bias and representative heuristics. In the short term, due to conservatism bias investors, investors do not respond sufficiently to the new news, pushing the prices below their fundamental value. This leads to subsequent higher returns that generate momentum. As the firm publishes good earnings reports over the time period, due to representative bias investors mistakenly conclude that the past growth of the firm will continue in the future. Hence, they overestimate the value of the firms, pushing the prices too high. In the future the prices revers back leading to price reversals in long run.

Similar to Barberis *et al*. (1998), Hong and Stein (1999) also based their model on short term under reaction and subsequent overreaction to explain momentum and overreaction effect. They based their model on two types of investors: "news watchers" and "momentum traders" with different information sets. News watchers trades on new information whereas momentum traders based their trading activity solely on past price changes. As the news enters the market, the prices are initially driven by only news watchers leading to initial under reaction. The news gets gradually transmitted to the market prompting momentum traders to trade further leading to subsequent overreaction to news. In the long run, the prices revert back to their fundamental values. .

Momentum is Generated by Initial Overreaction With Subsequent Reversal

Daniel, Hirshleifer and Subrahmanyam (1998) proposed two patterns from psychology as an explanation for the momentum effect and long-term reversals: overconfidence and self-attribution bias. Due to overconfidence people overestimate their judgment – especially when they have to estimate quantities and probabilities. In contrast, due to their self-attribution bias they tend to attribute the success of their actions to their ability and the failure of their actions to sabotage or bad luck (Dhankar and Maheshwari, 2013). During the arrival of confirming news about the stock, investor increases the belief in their ability. This increases the investor's overconfidence as an effect of self-attribution bias that further promotes the prices of stocks above their fundamental value, thus generating momentum in stock returns. The overreaction in prices gets corrected in long horizon as investors realize their mistakes leading to long term price reversals.

Data and Methodology

The data used in the study consisted of the month-end closing adjusted prices of all the stocks traded on National Stock Exchange (NSE) over a period from January 1997 to March 2013. The data are collected from PROWESS which is a financial database offered by the Centre for Monitoring Indian Economy (CMIE) and is widely used in research studies in India (Tripathi and Aggarwal, 2009). The initial sample of stocks was further screened to meet the eligibility criterion of having the data for the complete sample period. The stocks not fulfilling this eligibility criterion were eliminated from the sample and a final sample of 328 stocks was formed. Share prices of all the selected stocks were further converted into returns

with the help of MS-Excel software using the formula:

$$R_{jt} = ln(P_{jt}/ P_{jt-1}) \quad (1)$$

where R_{jt} is monthly return, P_{jt} is the price on month t and P_{jt-1} is the price on month t-1.

The main advantage of using logarithmic returns is that it is not affected by the base effect problem. According to Strong (1992) the logarithmic returns are both theoretically and empirically preferable. In agreement with Tripathi and Aggarwal (2009) monthly return on S&P CNX Nifty Index was used as proxy for the market return.

To test the contrarian and momentum trading strategy for Indian market, we have followed the methodology used by Debondt and Thaler (1985, 1987) and Jegadeesh and Titman (1993) with few modifications. Only market adjusted excess returns method is used to calculate the residuals as DeBondt and Thaler (1985) has shown that results remained similar and the choice of the method does not affect the conclusion. The market-adjusted excess returns (u) for every stock was calculated using the formula:

$$u(t) = R(t) - R_m(t) \quad (2)$$

where R(t) refers to the return of stock at month t and $R_m(t)$ is the return on market index at month t.

Different combination of length of formation and holding period were designed to investigate the portfolio of momentum and contrarian profits in Indian stock market. Different horizon of formation period (F=3,6,9,12,18,24,36) and holding period (H=3,6,9,12,18,24,36) were chosen giving a total of 49 strategies.

The investments in the portfolios with *F*= 3, 6, 9 and 12 and *H*= 3, 6, 9 and 12 are short to medium-term strategy while the investments in the portfolios with *F*= 18, 24 and 36 and *H*= 18, 24 and 36 are the long-term strategy.

To reduce the bid-ask bias, price pressure and lagged reaction the trading strategies were constructed by skipping one month between the formation and holding periods (Jegadeesh and Titman (1993). Further the study also uses full rebalancing technique instead of overlapping portfolio technique. In full rebalancing technique, new portfolio is formed after the end of previous portfolio formation period. A pictorial representation of 3X3 strategy is shown in Table 2.

At the beginning of each month t, the securities were ranked in descending order on the basis of their cumulative return of the prior F months. Based on these rankings, the stocks were split into five quintiles. The topmost quintile portfolio is referred as the "Winners" and the bottom quintile is called the "Losers "portfolio (Ismail, 2012).

The cumulative abnormal return for both the portfolios over the next H month holding period was computed If the average cumulative abnormal returns on the winner-loser portfolios for the holding period are significantly positively (negative) different from that in the formation period, presence of the momentum (contrarian) effect can be accepted. T Test is used to determine if the momentum and contrarian profits in the holding periods are significantly different from that in the formation periods. The procedure is replicated for each one of the formation and holding period.

Hence if during test period

ACARW,t – ACARL,t> 0 : It shows the presence of Momentum Effect

Table 1: Representation of Different Short and Long term Strategies

Formation Period (F)	*Holding Period (H)*						
	3	*6*	*9*	*12*	*18*	*24*	*36*
3	3 X 3	3 X 6	3X 9	3 X 12	3X18	3 X 24	3 X 36
6	6 X 3	6 X 6	6 X 9	6 X 12	6X18	6 X 24	6 X 36
9	9 X 3	9 X 6	9 X 9	9 X 12	9X18	9 X 24	9 X 36
12	12 X 3	12 X 6	12 X 9	12 X 12	12X18	12 X 24	12 X 36
18	18X3	18X6	18X9	18X12	18X18	18X24	18X36
24	24 X 3	24 X 6	24 X 9	24 X 12	24X18	24 X 24	24 X 36
36	36X3	36X6	36X9	36X12	36X18	36X24	36X36

Table 2: Pictorial Representation of Formation and Holding Period of 3X3 strategy

Portfolios	*1st Month*	*2nd Month*	*3rd Month*	*4th Month*	*5th Month*	*6th Month*	*7th Month*	*8th Month*	*9th Month*	*10th Month*	*11th Month*	*12th Month*	*13th Month*
1	FP			Skip	HP								
2				FP			Skip	HP					
3							FP			Skip	HP		

ACARL,t - ACARW,t> 0 : It shows the presence of Overreaction Effect

To test whether the ACAR of the zero investment portfolio, that is calculated as the difference between ACAR of Winners and Losers, is significantly different from zero, we employ t-test as prescribed by Forner and Marhuenda (2000):

Empirical Results

Existence of Momentum and Overreaction Effect in Indian Stock Market

This section provides the result of portfolio strategies (momentum and contrarian) as described in previous section over the period January 1997- March 2013 using monthly returns of NSE listed stocks. The average cumulative abnormal returns (ACAR) of different Winner and Loser portfolios as well as the arbitrage portfolio (Winner-Loser or Loser-Winner) are reported in Table 3. As discussed above, if the difference between the winner and loser portfolio is significantly larger than zero, then momentum profits do exist. In contrast, if the difference between the winner and loser portfolio is significantly smaller than zero, then it confirms the presence of Overreaction effect in Indian stock market. The results of the study document the presence of strong momentum effect for short formation-holding period and strong overreaction effect for long formation-holding period.

This table reports the average cumulative returns for the FXH strategies where F stands for the formation period months and H denotes length of holding period. The asterisk * indicates significance at 5% value.

The ACAR of winner and loser portfolio indicates a continuation pattern for short formation and holding period up to twelve months. These results are in accordance with the findings of Jegadeesh and Titman (1993) for US market. However, statistically significant momentum profits can be earned only for seven strategies (3X6, 3X9, 3X12, 6X3, 6X6, 6X9, 12X3) in Indian stock market. All the significant momentum strategies indicate that momentum effect in Indian stock market is clearly due to the outperformance of winner portfolio over the loser portfolio. Consistent with the findings of earlier studies, the momentum profits were observed to be highest for the formation period of six months. The most profitable strategy was detected to be the one with a formation period equal to six months and holding period equal to nine months (6X9) with an abnormal return of 7.7% above the market return in Indian stock market as compared to (12X3) strategy as documented by Jegadeesh and Titman (1993) for US market. However, as we increase the holding period from 12 to 36 months, the strength of the momentum effect starts decreasing. Similarly, the profitability of momentum strategies diminishes with the increase in formation period after six months. This appears to suggest that momentum effect is a short lived phenomenon. The evidence of the momentum effect in Indian stock market is in conformity with the previous studies by Sehgal and Balakrishnan (2002) and Ansari and Khan (2012). In contrast, the study by Michello and Chowdhary(2010) reported insignificant momentum profits for Indian stock market. However, it may be noted that a direct comparison of the results of this study with that of previous studies results is not possible as the period of the study, sample selection and momentum strategies employed were different. Table 4 presents the differences observed between the various studies of momentum effect in Indian Stock market.

The ACAR of winner and loser portfolio over longer formation and holding period indicates reversal pattern. This is in agreement with the findings of DeBondt and Thaler (1985) for US market who reported reversals in long term returns. The results of the study are in consistent with the overreaction hypothesis that the loser portfolio outperformed the winner portfolio, thirty six months after portfolio formation. The difference in the cumulative average residual between the extreme portfolios over 36

Table 3: Average Monthly Returns of Momentum and Contrarian Strategy for Different Formation (F) and Holding (H) Periods.

Formation Period in Months	*Portfolio*	*HOLDING PERIOD RETURN IN MONTH (H)*						
		H=3	*H=6*	*H=9*	*H=12*	*H=18*	*H=24*	*H=36*
F=3	Winner	-0.0028	0.00493	0.00057	0.00161	-0.0070	-0.0164	-0.0251
	Loser	-0.0127	-0.0390	-0.0424	-0.0518	-0.0560	-0.0539	-0.0431
	Winner-Loser	0.00989	0.04398	0.04302	0.05343	0.04898	0.03750	0.01805
	t-values	0.817	2.402*	1.823	1.988*	1.574	1.097	0.447
F=6	Winner	0.00958	0.01428	0.01485	0.00395	-0.0189	-0.0252	-0.0255
	Loser	-0.0398	-0.0434	-0.0627	-0.0570	-0.0665	-0.0568	-0.0527
	Winner-Loser	0.04946*	0.05771*	0.07762*	0.06101	0.04760	0.03160	0.02717
	t-values	2.626*	1.935*	2.091*	1.523	1.081	0.661	0.497
F=9	Winner	-0.0005	-0.0082	0.00274	0.0116	-0.0221	-0.0362	-0.0600
	Loser	0.12994	0.00855	-0.0105	-0.0019	-0.0078	0.01377	0.01410
	Winner-Loser	-0.0135	-0.0167	0.0133	0.0136	-0.0142	-0.0499	-0.0741
	t-value	-0.537	-0.486	0.305	0.18	-0.269	-0.954	-1.183
F=12	Winner	0.01076	0.01430	0.01979	-0.0034	-0.0320	-0.0477	-0.0954
	Loser	-0.0437	-0.0326	-0.0373	-0.0414	-0.0189	-0.0427	-0.0186
	Winner-Loser	0.05449	0.04696	0.05716	0.03803	-0.0130	-0.0049	-0.0767
	t-values	1.99*	0.974	1.022	0.55	-0.17	-0.74	-1.021
F=18	Winner	-0.0004	-0.0206	-0.0013	-0.0246	-0.1132	-0.0740	-0.1367
	Loser	-0.0187	0.03287	0.04894	0.09106	0.05920	0.02842	0.03008
	Loser-Winner	-0.0182	0.05348	0.05030	0.11575	0.17244	0.10244	0.16678
	t-values	-0.458	0.993	0.67	1.458	1.78	1.242	1.499
F=24	Winner	-0.0059	0.02095	0.03030	0.04093	-0.0185	-0.0907	-0.0505
	Loser	-0.0422	0.00813	0.00173	0.02403	0.01766	-0.0258	0.01882
	Loser-Winner	-0.0362	-0.0128	-0.0285	-0.0169	0.03626	0.06482	0.06935
	t-value	-0.93	-0.259	-0.365	-0.24	0.456	0.752	0.792
F=36	Winner	-0.0345	-0.0669	-0.0592	-0.0942	-0.2075	-0.14841	-0.2771
	Loser	-0.0842	-0.0475	-0.0765	-0.0336	-0.0185	0.04167	0.08010
	Loser-Winner	-0.0497	0.01947	-0.0172	0.06059	0.18898	0.19008	0.35724
	t-values	-0.793	0.39	-0.217	0.597	1.61	2.454*	2.699*

formations and holding period (36X36) was observed to be 35.7% (statistically significant). In agreement with Benjamin Graham's (1959) claim that " the interval required for a substantial undervaluation to correct itself averages approximately 1 ½ to 2 ½ years" , the reversal takes place after eighteen months of formation and holding period in Indian stock market. However, statistically significant abnormal contrarian profits can only be earned for (36X24) and (36X36) strategies. Further, for formation and holding period as short as one year, no reversal was observed in Indian stock market. The evidence of overreaction effect in Indian stock market is also reported by Sehgal and Balakrishnan (2002), Locke and Gupta (2009) and Tripathi and Aggarwal (2009). However, due to different sample size and sample period a direct comparison among the various studies is not possible.

The profitability of both momentum and contrarian strategies can be explained by formation (rows) and holding period (columns). For formation and holding period of equal or more than 18 months, all strategies yield contrarian profits. Similarly, for formation and holding period of less than 18 months (except for F=9 months) all strategies yield momentum profits. This suggests that a momentum strategy is profitable in short to medium term

Table 4 : Summary of the Differences Observed between the Various Studies of Momentum Effect on Indian Stock Market

Differences	*Sehgal and Balakrishnan (2002)*	*Ansari and Khan (2012)*	*Michello and Chowdhary (2010)*	*This Study*
Sample period	July 1989-March 1999	January 1994-December 2006	January 1991-December 2006	January 1997-March 2013
Data Restrictions	Companies that form a part of CRISIL-500	BSE-500 companies having availability of previous 12 month data	Stocks having data throughout the sample period	NSE stocks having data throughout the sample period
Sample Size	364 stocks	285-466 stocks	254 stocks	328 stocks
First formation month	July 1989	January 1994	January 1991	January 1997
Formation period residual return	Raw returns	Raw returns	Raw returns	Market adjusted returns
Maximum significant momentum profit observed	16.12% for 12X12 strategy	25.23% for 3X3 strategy	No significant momentum profits	7.7% for 6X9 strategy

Table 5 : Summary of Differences Observed between the Various Studies on Overreaction Effect in Indian Stock Market

Differences	*Sehgal and Balakrishnan (2002)*	*Locke and Gupta (2009)*	*Tripathi and Aggarwal (2009)*	*This study*
Sample period	July 1989- march 1999	1991-2004	March 1996-March 2007	January 1997-March 2013
Data restrictions	Companies that form a part of CRISIL-500	Stocks listed on BSE-500	Stocks forming part of NSE-500 index	NSE stocks having data throughout the sample period
Sample Size	364 stocks	202-311	328	328
First Formation Month	July 1989	December	March 1996	January 1997
Maximum Contrarian profits	Moderately positive returns	74.4% for 36X36 strategy	46.73% for 36X36 strategy	35.72% for 36X36 strategy

horizon whereas contrarian strategies are more profitable over long horizons due to reversal in stock returns.

Robustness Test

The above tests for momentum and contrarian strategy were conducted on the complete sample of stocks. However, it will be further interesting to investigate momentum and contrarian profits among different type of stocks. Hence in this section we examine the role of size and value of the stock over momentum and contrarian strategy.

Size-based Sub-samples

It has been well documented that inverse relationship exists between the company size and the observed returns (Brailsford, 1992). Early empirical studies by Banz (1981) and Reinganum (1983) documented that the stocks issued by small companies earned higher rates of returns, on an average, as compared to the stocks of larger companies, referred to as 'size effect' in academic literature. This raises an important question whether the momentum and overreaction effect are different from the size effect. Many researchers such as Zarowin (1989) had challenged the profitability of overreaction and momentum effect and had proposed that it is the differential size that drives the winner-loser effect. The researchers argue that market inefficiencies such as momentum and overreaction effect are more likely to be observed in small capitalisation stocks as compared to large capitalisation stocks, as small capitalisation stocks are less covered by analysts and media in general.

Table 6 : Momentum and Contrarian Profits for Size Neutral Subsamples

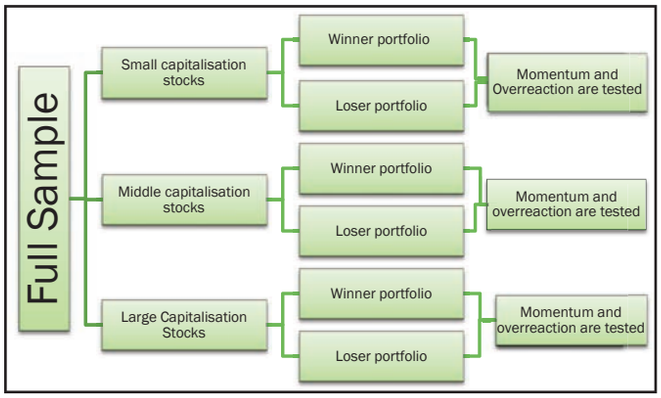
PANEL A								
	Formation Period in Months	SIZE	PORTFOLIO	HOLDING PERIOD RETURNS IN MONTH (H)				
				H = 1	H = 3	H = 6	H = 9	H = 12
Size Neutral Portfolios For Momentum Strategy		Small	Winner	0.00795	0.00607	0.02550	0.02833	0.04134
			Loser	0.01052	-0.0087	-0.0278	-0.0176	-0.0198
			Winner-Loser	-0.0025	0.01486	0.05339	0.04594	0.06116
			t-value	-0.19	1.066	2.593*	1.996*	2.394*
	F = 3	Medium	Winner	0.00822	-0.0003	0.00774	0.00844	0.01181
			Loser	0.00473	-0.0146	-0.0419	-0.046	-0.0571
			Winner-Loser	0.00349	0.0143	0.04973	0.05464	0.06900
			t-value	0.431	1.01	2.45*	2.079*	2.301*
		Large	Winner	0.00712	-5.1E-05	0.00074	-0.0018	-0.0092
			Loser	0.00064	-0.0154	-0.0452	-0.073	-0.0837
			Winner-Loser	0.00648	0.01541	0.04597	0.07111	0.07450
			t-value	0.764	1.14	2.201*	2.566*	2.179*
	F=6	Small	Winner	0.00837	0.00653	0.02270	0.02454	0.04245
			Loser	0.00473	-0.0271	-0.0144	-0.0192	-0.0188
			Winner-Loser	0.00364	0.03371	0.03719	0.04377	0.06126
			t-value	0.356	1.995*	1.261	1.364	1.729
		Medium	Winner	0.00443	0.00679	0.00048	0.01623	0.01076
			Loser	-0.0088	-0.0373	-0.0480	-0.0679	-0.0665
			Winner-Loser	0.01332	0.04410	0.04853	0.08419	0.0773
			t-value	1.53	1.994*	1.42	1.903*	1.583
		Large	Winner	0.01328	0.02120	0.01887	0.02334	0.00100
			Loser	-0.0149	-0.0396	-0.0516	-0.0744	-0.0774
			Winner-Loser	0.02821	0.06085	0.07053	0.097819	0.078433
			t-value	2.74*	2.695*	1.899	2.1	1.578

PANEL B								
	Formation period	SIZE	HOLDING PERIOD RETURNS IN MONTH (H)					
			Portfolio	H=18	H=24	H=36		
Size Neutral Portfolios For Contrarian Strategy		Small	Winner	-0.0779	0.00049	-0.3156		
			Loser	-0.0650	0.07530	0.1047		
			Loser-Winner	0.01290	0.07481	0.1363		
			t-value	0.148	0.592	0.681		
	F=36	Medium	Winner	-0.1086	-0.0601	-0.1722		
			Loser	0.02381	0.07676	0.14398		
			Loser- winner	0.13249	0.13686	0.31620		
			t-value	0.733	1.017	1.436		
		Large	Winner	-0.2256	-0.1823	-0.3465		
			Loser	0.03515	0.04852	0.08741		
			Loser-Winner	0.260792	0.230826	0.433939		
			t-value	1.145	1.125	1.782		

This table reports the average cumulative returns for the three subsamples (Small, Medium and Large) for FXH strategies.
* indicates significance at 5% level.t

To test whether momentum effect and overreaction effect are robust regardless of firm size, stocks were sort in three subsamples namely small, medium and large, based on their average monthly market capitalisation (stock price multiplied by number of shares outstanding) during the formation period. Finally on the basis of cumulative formation period returns, the momentum and overreaction effect were calculated for each of the three size groups: small, medium and large capitalisation stocks using the same methodology as discussed in previous section. Using this methodology of dividing stocks in three groups, both winner and loser portfolio will end up having same number of stocks in each of the size group.

Figure 1 : Pictorial Representation of Strategy to Form Size Neutral Portfolios



Results are reported for momentum strategies (3X6, 3X9, 3X12, 6X3, 6X6, 6X9) and contrarian strategy (36X24 and 36X36) only, in Table 6.

Table 6 shows that momentum returns are positive and statistically significant for the strategies (3X6, 3X9, 3X12, 6X3 and 6X9), for all the three (small, medium and large) subsamples. The momentum returns of large sized subsample higher as compared to that of small sized subsample. These results thus suggest that momentum profits are not size dependent. Jegadeesh and titman (1993, 2001), Chui *et al.* (2000) and others have also documented the similar results confirming that momentum effect is not limited to small stocks. The best momentum strategy turns out to be (6X9) for large capitalisation stocks increasing the momentum returns upto 9.7% in Indian stock market.

However, results for contrarian strategy are not as strong as momentum strategies. All the long term contrarian strategy shows positive contrarian profits in all the three subsample (small, medium and large), however, none of them were found to be statistically significant. Moreover, the results reported in table IV shows that overreaction is stronger among large stocks as compared to small capitalisation stocks in the Indian stock market. This indicates that the overreaction findings of the study were not influenced by the size effect. However, due to non-statistical significance, no strong conclusion can be drawn out for the long term contrarian strategies.

Value-based Subsamples

The value effect or Book to Market effect is one of the oldest effects that was investigated in financial literature and can be traced at least to the times of Benjamin Graham. However, the value effect gained attention following Fama and French (1992, 1993) papers. They showed that the value stocks outperformed the growth stocks using US data for 1963-1990. Value stocks refer to the stocks with higher Book value to Market value (B/M) ratio whereas growth stocks denote stock with lower ratio of Book value to Market value (B/M) stocks (Fama and French, 2007).

To test whether momentum and overreaction effects are strong enough even after controlling the value effect, stocks were ranked on the basis of their average B/M ratio during the formation period. Similar to sized subsamples, stocks were divided into three equally sized subsamples (High, Medium and Low) based on their B/M ratios. Finally, the momentum and overreaction effects were calculated for each of the B/M subsamples; Low, Medium and High B/M stocks.

Book to Market ratio is calculated as follows:

Book to Market Ratio = Book Value of a Firm / Market value of a firm (6)

However, using Tripathi's (2009) operational definition of Book to Market ratio, it is calculated as an inverse of Price to Book (P/B) ratio. The P/B ratio is collected from PROWESS database.

Panel A of Table 7 shows that momentum profits are positive for all the subsamples, indicating that momentum profits are not confined to particular type of stocks. However, the significance of the momentum strategies are monotonically increases with the stocks Book to Market value. For High B/M subsample four strategies were observed to be significant, in comparison to three

Table 7: Momentum and Contrarian Profits for B/M Neutral Subsamples

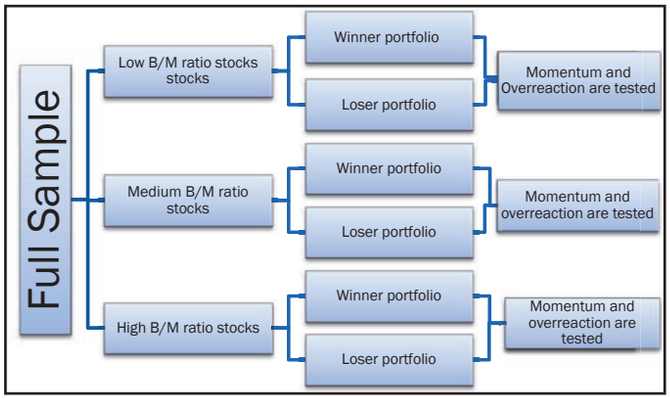
PANEL A							
	Formation Period in Months	*B/M RATIO*	*PORTFOLIO*	*HOLDING PERIOD RETURNS IN MONTH (H)*			
				H=3	*H=6*	*H=9*	*H=12*
B/M neutral portfolios for Momentum strategy	**F=3**	**Low**	**Winner**	-0.00243	0.00290	-0.00213	-0.01573
			Loser	-0.0178	-0.04631	-0.04623	-0.05611
			Winner-Loser	0.01537	0.04920	0.04409	0.04038
			t-value	0.882	2.022*	1.359	1.094
		Medium	**Winner**	-0.00651	-0.00227	-0.00857	-0.00731
			Loser	-0.00663	-0.03924	-0.04662	-0.05502
			Winner-Loser	0.00011	0.03697	0.03804	0.04771
			t-value	0.01	2.021*	1.616	1.782
		High	**Winner**	0.00625	0.02109	0.03136	0.05286
			Loser	-0.00338	-0.01604	-0.01014	-0.00909
			Winner-Loser	0.009628	0.037128	0.041507	0.06195
			t-value	0.797	2.107*	1.982	2.733*
	F=6	**Low**	**Winner**	0.01511	0.00338	0.00466	-0.00602
			Loser	-0.04395	-0.03758	-0.07005	-0.0485
			Winner-Loser	0.05905	0.04097	0.07471	0.04248
			t-value	2.132*	0.988	1.395	0.746
		Medium	**Winner**	0.00631	0.01099	0.01883	-0.00013
			Loser	-0.02273	-0.03852	-0.04285	-0.04928
			Winner-Loser	0.02904	0.04951	0.06168	0.04914
			t-value	1.502	1.768	2.055*	1.221
		High	**Winner**	-0.00529	0.01750	0.02349	0.03629
			Loser	-0.02478	-0.02169	-0.03085	-0.03338
			Winner-Loser	0.01948	0.03919	0.05434	0.069669
			t-value	1.156	1.385	1.764	2.145*

PANEL B						
	Formation period	*B/M RATIO*	*HOLDING PERIOD RETURNS IN MONTH (H)*			
			Portfolio	*H=18*	*H=24*	*H=36*
B/M neutral portfolios for contrarian strategy	**F=36**	**Low**	**Winner**	-0.19411	-0.17465	-0.31729
			Loser	-0.13406	-0.04764	-0.08445
			Loser-Winner	0.06004	0.12701	0.23283
			t-value	0.286	0.7056	0.918
		Medium	**Winner**	-0.18717	-0.1531	-0.30836
			Loser	0.09722	0.14059	0.15880
			Loser-winner	0.28439	0.29370	0.46716
			t-value	1.503	2.303*	3.368*
		High	**Winner**	-0.12167	-0.03945	-0.08702
			Loser	-0.05727	0.05315	0.12463
			Loser-winner	0.06440	0.09261	0.21165
			t-value	0.558	0.601	1.998*

This table reports the average cumulative returns for the three subsamples based on B/M ratio (Low, Medium and High) for FXH strategies. * indicates significance at 5% level.

and two significant momentum strategies for medium and low B/M subsamples respectively. This shows that some of the momentum profits are affected by value effect.

Figure 2: Pictorial Representation of Strategy to form B/M Ratio Neutral Portfolios



However, significance of value effect was found to be more prominent for long term strategies. The Panel B of Table 7 shows that overreaction effect was significantly positive only for medium and high B/M subsamples. This suggests that some of the contrarian profits may be observed due to value effect in Indian stock market.

Evaluation of Behavioural Explanation for Momentum and Overreaction Effect

This is the fact that lot of research has been done to understand the mechanism that drives momentum and overreaction effect. Even Jegadeesh and Titman (2001) reported that there exists large number of hypothesis in academic literature to explain momentum effect. However, the existence and the causes of the momentum effect are still open to debate (Jegadeesh and Titman, 2001; Dhankar and Maheshwari, 2013). In addition, there exist various behavioural models and explanation as discussed in section that provides most valid explanations for the same.

Jegadeesh and Titman (2001) provide their support in favour of the behavioural models by evaluating the post holding returns for 13 to 60 months of momentum portfolio. They proposed three outcomes based on the returns of winner and loser portfolio over 60 months, following formation period. A brief summary of these outcomes are given in Table 8.

Table 8: Post Holding Return Options and their Interpretation

IF POST HOLDING RETURNS	Continues to be profitable	Risk Based explanations are accepted
	Turns out to be Zero	models based on under reaction with no subsequent reversals are accepted
	Turns out to be negative	explanation based on initial overreaction/under reaction that leads to long term reversals are accepted

Following Jegadeesh and Titman (2001), we also tested the evidence of behavioural explanations of momentum and overreaction effects by examining the momentum returns of 6 month formation period strategy and extended the holding returns of winner and loser portfolio upto 60 months.

In accordance with Jegadeesh and Titman (2001) study, Table 9 shows that momentum portfolio yield significant positive returns for the first 12 months following the formation date. However, momentum profits turns out to be negative for 13 to 60 post holding months in Indian stock market. Hence, these results depict a reversal of returns in second to fifth year in Indian stock market. This is consistent with the behavioural based explanations that predict that short term momentum effect will eventually reversed in long term. These findings suggested that momentum and overreaction effect are component of same phenomenon in Indian stock market.

These empirical findings of the study put a question on the validity of theoretical approaches of Grinblatt and Han (2002) and George and Hwang (2004) that predict momentum and overreaction effects as distinct

Table 9 : Longer Horizon Momentum Profits for Different Post Holding Periods

	Month 1-9	*Months 1-12*	*Months 13-24*	*Months 25-36*	*Months 13-60*
Winner	0.01485	0.00395	-0.0304	-0.00494	-0.04676
Loser	-0.0627	-0.0570	-0.01413	-0.02302	0.106714
Winner-Loser	0.07762	0.0610	-0.01627	0.018033	-0.15347
T-values	2.091*	1.523	-0.483	0.754	-2.962*

phenomena. In contrast, the results of the study provide support to the behavioural models of Daniel (1998), Barberis *et al.* (1998) and Hong and Stein (1999) that propose momentum and long term reversals as the component of same phenomenon.

Conclusion

This study investigated the profitability of contrarian and momentum strategy in one of the leading emerging market of the world. The study presented an analysis of both momentum and contrarian strategies to check the robustness of the US findings to data snooping bias by using the monthly return data of Indian stocks. The empirical results of the study suggested strong short term momentum effect and long term overreaction effect in Indian stock market. For the short term formation-holding period of 3 to 12 months, returns showed a continuation pattern. The investment strategy based on such momentum effect provides significantly high abnormal profits of 7.7% in Indian stock market. In addition, there also exists strong reversal in the Indian stock market where the contrarian strategy produces abnormal returns of 35.7% for long term formation-holding period of 36 months. In general, the contrarian strategies were observed to outperform the pure momentum strategies. The overall results of the study verifies that by focussing purely on the past price information, Indian investors can earn abnormal returns in the Indian stock market. The findings of the study provide strong support to those of DeBondt and Thaler (1985) and Jegadeesh and Titman (1993).

In addition, both momentum and overreaction effects were shown to exist independently of the small- firm effect, though the results were significant only for momentum strategies. Interestingly, in contrast to previous studies, the momentum and contrarian effect were found to be stronger amongst the larger companies. These results indicate that it is more profitable for Indian investors to invest in momentum strategy on larger market capitalisation stocks. However, these results are only preliminary and suggestive. Further, analysis and regression analysis in the context of Indian stock market could be beneficial.

Further, to understand the validity of various behavioural models, the 60 month post holding returns of the momentum portfolios were examined. The evidence of the study indicated negative performance of the momentum portfolio in post holding period. These results provides evidence in favour of behavioural theory of Daniel, Hirshleifer and Subrahmanyam(1998), Barberis *et al*. (1998) and Hong and Stein (1999) that explain both momentum and contrarian effect as the component of same phenomenon. However, all the three models are derived from different assumptions about the irrational behaviour and behavioural biases of investors. Hence, it would be further interesting to empirically test these models and to develop a single model that can explain both momentum and overreaction effect in Indian stock market.

The findings of our study provide useful evidences, impacting the various trading strategies on Indian stock market. These findings provide strong suggestion for investment companies, mutual fund managers and even for small investors who could improve their investment strategies by using momentum strategies in short period and contrarian strategies in long term. However, practical execution of these strategies may require focus on managing trading cost. Many researchers have proposed that much of the potential momentum and contrarian profits may get eliminated after adjusting for transaction cost. Therefore, a further research is necessary to validate the practical implementation of these strategies in Indian stock market. In short, it is concluded that the research on these strategies still has momentum.

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