A Review of Momentum as an Investment Strategy

** Ranajee*
*** Rajesh Pathak*
**** Satish Kumar*

Abstract

Existing literature claims momentum as a profitable investment strategy. It is widely documented in finance literature that momentum profit has explanatory power, and it provides additional information for explaining the abnormal returns of the stocks. The paper was written with a purpose to report the findings of existing literature to identify decompose and define the dynamics of momentum as an investment strategy. The contribution of the study would broadly be four folded: (a) The outcome of the study fills the void in the existing stocks of literature on momentum investing strategies, (b) the presence of momentum profits may induce the investors to develop momentum investment strategies so as to minimize the vulnerability, and (c) understanding of the drivers of momentum profits in the up market and down market states of the market may help the market participants to devise their trading strategies under momentum investing, (d) the knowledge of volatility behaviour of winners, losers, and momentum profits and the volatility drivers of momentum would contribute to market participants in trading of volatility risk and returns.

Keywords: **momentum, price momentum, earning momentum, volatility, market state, information diffusion**

JEL Classification: G1, G2, G3

Paper Submission Date : April 5, 2015 ; Paper sent back for Revision : July 6, 2015 ; Paper Acceptance Date : July 27 , 2015

Debate on market efficiency goes back to the late 1970s when researchers started doubting the notion of complete and instantaneous dissemination of all available information in stock prices. The idea of market efficiency championed by Fama [1] suggests that at any given time, prices fully reflect all available information about a particular stock and/or market, and hence, no investor should be able to make systematic profits above transaction costs and risk premia, and therefore, returns should be unpredictable (Fama, 1970). Modern portfolio theory (MPT) suggests that one can't beat the market, and the market compensates the investors for taking systematic risk as all non-systematic risk can be diversified (Markowitz, 1952). Furthemore, the capital asset pricing model (CAPM) determines the risk-return relation wherein an investor should hold a market portfolio and should not be involved in active fund management (Sharpe, 1964) as the investor cannot make a systematic profit over and above the market portfolio returns. The original CAPM model has undergone many changes over the decades, where authors have added different new dimensions in understanding the asset pricing

* *Assistant Professor - E-008*, Department of Finance, IBS Hyderabad (A Constituent of IFHE, Deemed to be University), Dontanapally, Shankerpally Road, Hyderabad-501 203. E-mail: ranajee@ibsindia.org
** *Assistant Professor - E-005*, Department of Finance, IBS Hyderabad (A Constituent of IFHE, Deemed to be University) Dontanapally, Shankerpally Road, Hyderabad-501 203. E-mail: rpathak@ibsindia.org
*** *Assistant Professor - E-006*, Department of Finance, IBS Hyderabad (A Constituent of IFHE, Deemed to be University Dontanapally, Shankerpally Road, Hyderabad-501 203. E-mail: satishwar@ibsindia.org

[1] Fama (1965)

phenomenon [2]. Despite extensive theoretical and empirical evidence of the last 40 years, there is still no consensus, whether financial markets are efficient. If the above asset pricing theories hold true in the real world, it can be inferred that the role of fund managers, in particular, and security analysis, in general, are not useful for investment decision making. However, indications against market efficiency started to accumulate in the late 1970s.

Grossman and Stiglitz (1980) [3] argued that the goal of financial markets is to extend the social benefits ; else, there exists a conflict between efficiency with which markets spread information and the incentives to acquire information by the informed trader. Informed traders gather information by incurring a cost only when they are compensated by the subsequent price change in the market, which does not reflect all the information available. Shiller's (1981) [4] study also negated the proposition of the efficient market hypothesis as the author observed that the volatility exhibited by the stock prices was five to thirteen times higher than the changes in the new information about dividends. Gibbons and Hess (1981) [5] provided evidence of the day of the week effect in asset returns and reported a negative return for stocks and below average returns for treasury bills on Monday. DeBondt and Thaler (1985) affirmed that the long term past losers outperformed the long term past winners, which suggests a notion of overreaction of stock prices. French and Roll (1986) asserted that dissemination of public information affected prices, while private information was revealed through informed trading. Furthermore, they contended that the return volatility of normal trading days was higher when compared with volatility over exchange holidays, which was due to active trading by traders with access to private information during trading days. Roll (1988) asserted that after adjusting for public news announcements, idiosyncratic variance implied the existence of private information or occasional frenzy of investors. Jegadeesh (1990) rejected the random walk hypothesis of stock prices on the basis of serial correlation of stock prices, and reported return reversal in short term. Fama and French (1992) reported no relationship between stock returns and beta estimated by the CAPM model. Fama and French (1993) reported a three-factor model using size and value of firms with the existing beta to explain excess returns. However, recent finance literature has vehemently attached a predictability role of momentum in a security market.

Motivation for the Study

Momentum investing is prevalent everywhere, but has not been captured empirically. Hence, there is a need for conducting a systematic study to examine the nature and dynamics of momentum profits. Secondly, there is no

---

[2] In subsequent studies, different macroeconomic factors (arbitrage pricing theory), wealth and investment (intertemporal CAPM) and different investor's preferences (consumption CAPM) were used to modify the initial model of CAPM.

[3] Grossman and Stiglitz (1980) argued that if social benefits are not the motive of the financial markets, then there exists a conflict between efficiency with which markets spread information and the incentives to acquire information by the informed traders. The authors opined that in a competitive market, the price system has importance because of the cost involved in gathering the information. If there is no cost involved in gathering information or in a situation when every trader knew one and the same thing (homogeneous belief) about the firms traded in the market, then in the best case, one can have the possibility of a thinly traded market. Informed traders will gather the information by incurring a cost only when they are compensated by the subsequent price change in the market which does not reflect all the available information.

[4] Shiller (1981) opined that in a rational expectation model, the current stock price should reflect present value of all the future payouts by the firm, and volatility in the prices should be explained by new information about dividend change. The author found that volatility exhibited by the stocks was five to thirteen times higher than it should be on the basis of the changes in the new information about dividends.

[5] Gibbons and Hess (1981) argued that as the market does not work on Saturday and Sunday, so effectively, when the market closes on Monday, it closes after three days. So, the stock prices and its mean as well as variance should reflect the observable fact. The authors found the evidence of day of the week effect in asset returns and reported negative Monday returns for stocks and below average returns for treasury bills.

such unified study available that accounts the extent to which macroeconomic, market driven, and firm-specific factors drive momentum profits in general. Thirdly, literature on examination of time varying momentum profit remains limited. This study tries to unify the above concerns and tries to fill the gap by using a unified approach. The findings of the study would be useful for various participants in a different manner as discussed: for individual investors, the study would be helpful in determining the choice of stocks for their portfolio for a superior performance without incurring any cost on the investment advice as momentum strategy is based on publicly available data. The findings would be helpful in determining a profitable investment strategy and precautions to be taken while investing for portfolio managers as well as institutional investors.

Discussion

(1) Momentum as an Investment Strategy : Various studies have shown that momentum plays an important role in prediction of excess returns. The study bridges three strands of research in the domain of momentum strategies. The three important dimensions of momentum as an investment strategy are considered in the study. Firstly, the study aimed to review literature on momentum and its presence, highlighting its presence across different forms of markets and even over time and space. An attempt is also made to understand the evidence of price and earning momentum across markets. Secondly, it captures the literature that explains the sources of momentum profit; highlighting the role of macroeconomic factors, market driven factors, and firm specific factors in explaining momentum profits. Thirdly, emphasis is laid on literature that examines the role of time varying volatility risk in relation to momentum profits. The studies on aforesaid dimensions are sequentially organized and presented hereunder.

(2) Momentum and its Presence across Markets : Jegadeesh and Titman (1993) analyzed the extent of profitability of buying winners and selling losers in the U.S. stock market's context and challenged the outcome of DeBondt and Thaler's (1985) overreaction hypothesis [6] and outcome of the short term return reversal [7] proposed by Jegadeesh (1990) and Lehman (1990). Jegadeesh and Titman argued that the result of overreaction is debated as it can be explained with the help of systematic risk of contrarian portfolio and on the basis of size. Again, the authors cast doubt on the overreaction hypothesis as long-term losers outperformed long-term winners only in the month of January. Furthermore, the authors argued that short term return reversal based on 1 week to 1 month data is transaction intensive and based on short-term price movements. These stocks succeed due to the presence of short-term price pressure or lack of liquidity in markets rather than overreaction. The authors observed that academic literature is lopsided either towards very long-term strategy (3-5 years) or towards very short-term strategy in estimating asset returns.

However, practitioners follow a medium term investment strategy (3-12 months) while investing in assets. The discrepancy between practitioners' and academicians' approach is due to the difference between time horizons used in trading rules used in practice and those examined in recent academic papers. Analyzing the relative strength of trading strategies over 3 to 12-month horizons, the authors found that strategies of buying past winners and selling past losers earned significant abnormal returns of around 1% per month for a holding period of up to 12 months. Furthermore, tests suggested that part of the predictable price change that occurred during these 3 to 12 months holding periods may not be permanent. The stocks included in the relative strength portfolios experienced negative abnormal returns starting around 12 months after the formation date and continued up to 31 months. The authors reported a seasonal pattern outside January. August returns were quite low ; whereas, the returns were

[6] The overreaction hypothesis states that over 3 to 5 years holding period, stocks that performed poorly over the previous 3 to 5 years achieved higher returns than stocks that performed well over the same period.

[7] The short term return reversal indicates that stocks that return will change direction over a week or a month.

fairly high in April, November, and December. Furthermore, decomposition of momentum profit into different sources established that the profits were not due to systematic risk of trading strategies, but were consistently linked with delayed price reactions to firm-specific information. Further evidence suggested that the profits could not be attributed to a lead-lag effect resulting from delayed stock price reactions to information about a common factor. However, the authors were not very clear on whether return reversal was observed due to positive feedback trading on stock prices or were due to underreaction to short term prospects of a company and overreaction to long-term prospects of a company. The authors also indicated that there was a need for further study to identify the sources of relative strength (momentum) investment strategy.

Rouwenhorst (2002) analyzed international medium-term return continuation within markets and across the markets at the individual stock level using a sample of 2,190 stocks from 12 European countries during the period from 1978 to 1995. The study revealed that internationally diversified relative strength portfolio that invested in medium-term winners and sold past medium-term losers earned approximately 1% per month irrespective of the markets across Europe. It evidenced that return continuation was present in all countries, and held for both large and small firms, although it was stronger for small firms than for large firms. However, the outperformance lasted about a year, and Rouwenhorst (2002) contended that it cannot be attributed to conventional measures of risk. Controlling for market risk to a size factor increased the abnormal performance of relative strength strategies. Return continuation was present in all countries, and held for both large and small firms, although it was stronger for small firms than for large firms. The paper presented evidence of European momentum returns being remarkably similar to findings obtained by Jegadeesh and Titman (1993) for the United States, suggesting a common component of momentum strategies, which may drive the profitability of momentum strategies. Whether momentum returns arise due to a common priced momentum factor remains a topic which needs to be explained and tested in new situations and countries.

Chan, Jegadeesh, and Lakonishok (1999) analyzed profitability of price momentum strategies based on past returns and earning momentum strategies on the basis of standardized unexpected earnings and revisions of consensus forecasts. Authors like Latane and Jones (1979), Givoly and Lakonishok (1979), and Bernard and Thomas (1989) opined that earnings momentum strategies tended to earn significant abnormal returns. So, profits from price momentum strategies revealed fundamental changes captured by earnings momentum. This study used all the stocks listed on NASDAQ, AMEX, and NYSE as well as foreign stocks, closed-end funds, American depositary receipts, and real estate investment trusts. The stock price data of CRSP database, earnings data (from Compustat) were used, while the earnings forecast data of I/B/E/S were used. The first set of tests used data from January 1973 to December 1993 (as used by Chan, Jegadeesh, and Lakonishok, 1996). The out-of-sample performance of momentum strategies of 1994- 1998 was used. The price and earnings momentum variables were computed at the beginning of every month. Two measures of earnings momentum strategies were used: standardized unexpected earnings (SUE) and change in analysts' earnings forecasts. Price momentum and earnings momentum measures were found to be positively correlated with each other. Profitability of momentum strategies were considered on an individual basis by ranking stocks on the basis of price momentum or earnings momentum. The predictability based on analyst forecast revisions were also calculated.

The findings were consistent with the idea that the market does not incorporate news regarding past earnings promptly, but gradually. Predictability tests were also conducted by sorting the securities in the sample based on returns of past six-months and assigning them to portfolios. The portfolios formed on the basis of price momentum revealed that past winner portfolios outperformed past loser portfolios. Portfolios with high earnings momentum outperformed portfolios with low earnings momentum. Results of this study showed that profitability of momentum strategies was not statistical in nature. Strategies based on past returns had significant profits over a 6-12 month period. The evidence goes against the concept of market efficiency. Examining price and earnings momentum together is a good idea. Much of the work has not been done in this area; hence, such studies can be conducted with respect to the Indian equity market.

Jegadeesh and Titman (2001) reexamined the extended sample with additional number of years over the 1990

- 1998 period, including NASDAQ stocks [8], to validate their results documented in 1993. The results revealed that momentum profits continuing into the 1990s suggested that the original results were not a product of data mining. Momentum profits documented by the authors in the extended sample and time period were found to be similar to the earlier findings of their work in 1993. The results suggested that market participants had not altered their investment strategies in a way that would eliminate this source of return predictability. The paper reported that the performance of the momentum portfolio in the 13 to 60 months following the portfolio formation month was negative. Positive momentum returns are sometimes associated with post holding period reversals and sometimes not, suggesting that the behavioral models provide, at best, a partial explanation for the momentum anomaly. Though the study examined the different dimensions of the momentum profit and attributes thereof, but did not clearly point the direction about the behavioral dimensions of the momentum anomaly. Hence, there was a need for further examination of the determinants of momentum, including behavioral models.

Chen, Hong, and Stein (2002) argued that as raw auto- and cross-serial covariances were negative on an average, underreaction was not the basis of momentum. This study revealed that the industry, size, and book-to-market momentum was not affected by the overreaction hypothesis, while being consistent with the underreaction explanation. Jegadeesh and Titman's decomposition was used for the portfolios ; 20 time series (industry portfolios) were used to estimate the equations using the value-weighted market CRSP index as a proxy for the common factor. The estimates were used to calculate autocovariances for the residuals and average them to get an estimate of Ω (average idiosyncratic autocovariance). For both the cases, Q was greater than zero, and was responsible for the entire momentum profits. Simply stated, the overreaction model did not drive momentum profits, while in-sample serial correlation of market caused the observed negative cross-serial covariances. Momentum results due to price continuation was found to be coherent with the underreaction explanations. This study revealed the existence of momentum in firms of various size and book-to-market portfolios. The negative average auto- and cross-serial covariances among the portfolios were consistent with the underreaction explanations. The study revealed that these findings were caused by in-sample serial correlation of market factors and not through overreaction as advocated. The authors suggested that there was a need to develop stock price models that fit stock price predictability patterns (momentum) and generated new, testable predictions (as suggested by Barberis, Shleifer, & Vishny, 1998; Daniel, Hirshleifer, & Subrahmanyam, 1998; Hong & Stein, 1999). Although the findings are consistent with existing models, the authors suggested for identification of new predictable models. Sehgal and Balakrishnan (2002) reported continuation of trend in short term and significant high returns of momentum strategy in the Indian market from July 1989 to March 1999 for 364 companies.

Leippold and Lohre (2012), using a sample of 17 equity markets, including 16 European markets and the United States and covering the period from 1987 to 2007, examined the link between price and earning momentum and tested whether the earning momentum subsumed price moment. The authors reported the decoupling of price and earning momentum in the late 90s arising due to investors' overreaction. However, considering the entire sample period, the study suggested that price momentum was most likely determined by the earning momentum, but not in all markets. The correlation between price and earning momentum ranged between 0.8 and 0.95 in European markets for the entire sample period. In a sample of 17 counties, 15 countries showed significant price momentum in which it was subsumed by earning momentum in seven countries. In the remaining eight countries, five showed earning momentum; whereas, in two countries, there was no significant earning momentum, and Greece exhibited no earning momentum. The authors also established that momentum was not explained by

---

[8] The sample was constructed from all stocks traded on the New York Stock Exchange (NYSE), American Stock Exchange, and NASDAQ. All stocks priced below $5 at the beginning of the holding period and all stocks with market capitalizations that would place them in the smallest NYSE deciles were excluded in order to take care of small and illiquid stocks or bid-ask bounce. Following Jegadeesh and Titman (1993), at the end of each month, the stocks were ranked in the sample based on their past 6-month returns (Month -5 to Month 0) and then, the stocks were grouped into 10 equally weighted portfolios based on these ranks. Each portfolio was held for six months (Month 1 to Month 6) following the ranking month. To increase the power of tests, overlapping portfolios were constructed. Each monthly cohort was assigned an equal weight in this portfolio.

macroeconomic factors; rather, the authors argued that the behavioral factors better explained the momentum phenomenon irrespective of the market. They found that high information uncertainty, liquidity, and underreaction to fundamental news were the drivers of momentum profit. However, the patterns of momentum profit differed across the markets in the presence of liquidity; while momentum profits existed even for high liquid stocks in Europe, but were found to be prominent in illiquid stocks in United States. They reasoned out that the significant cost involved in arbitrage of mispricing gave rise to persistence of momentum. The authors suggested that after establishing a link between two anomalies (price and earnings), the reason for momentum needed to be investigated. Again, whether earning momentum explained the price momentum remained a problem.

Moskowitz, Ooi, and Pedersen (2012) documented important "time series momentum" in the context of currency, commodity, equity index, and bond futures. The study consisted of data for futures prices of 24 commodities, 12 cross-currency pairs, nine equity indexes, and 13 developed government bond futures for the period from January 1965 to December 2009. Data for speculators and hedgers position was collected from the Commodity Futures Trading Commission (CFTC). Each instrument's volatility was collected using exponentially weighted lagged squared daily returns. Due to the existing huge volatility differences, the returns were divided by volatility to make them scalable. A pooled panel regression was run after stacking the futures contracts and dates to predict the price for continuation and reversal. Next, a time series was predicted by focusing on past excess returns. The results showed strong return continuation during the first year and weaker reversals during the consecutive 4 years. Separate panel regression for each asset class gave the same results. The profitability of time series momentum trading strategies was also investigated. A single time series momentum strategy was used for in-depth analysis of time series momentum. The study focused on the properties of 12-month momentum strategies with a one-month holding period. The relationship between time series momentum and cross-sectional momentum was investigated using regression analysis. Results revealed within each asset class, an average pair-wise correlation of each instrument's 12-month time series momentum strategy returns, as well as passive long position in each instrument. Time series momentum study adopted a new approach and established momentum in currency, commodity, equity index, and bond futures markets. Using data from 66 countries for the time period from 2000 to 2013, Zaremba and Konieczka (2014) reported the characteristics of value, size, and momentum premiums.

(3) Sources of Momentum Across Markets : Miller (1977) stated that stocks with short-sale constraints and high dispersion in opinion tended to be overvalued and created low subsequent returns. The author argued that short-sale constraints prohibited pessimistic traders from entering into the market, so it was only optimistic investors who kept trading the increase prices, leading to overvaluation. Overvaluation continued until the difference in opinion was narrowed and until investors realized the fact that the stock was overvalued and started selling their holdings. Miller's views on the impact of short-sale constraints and difference in opinion on stock valuation can be extended to scrutinize possible reasons to utilize momentum profits.

According to Hossan and Park (2013), studies in the context of emerging economies such as Bangladesh reported that overreaction of investors influenced momentum profits, while lead-lag pattern had no role in explaining the same. The study also found momentum to be an investment strategy in the context of Bangladesh.

Barberis et al. (1998) showed that investors faced a conservatism bias and underreacted to earnings and corporate news that lead to a positive short-run autocorrelation, while during trends of increasing prices, a positive signal lead to overreaction and subsequent long-run negative autocorrelation. Investors were conservative and underreacted to important information while adjusting their beliefs. The study had immense implications for explaining momentum returns with behavioral finance models.

Daniel, Hirshleifer, and Subrahmanyam (2001) introduced an alternative model based on overconfidence and self attribution and suggested that overreaction/overvaluation lead to momentum profits. The authors suggested that investors were overconfident about private information, and tended to overweigh private information while underreacting to public signals. Investors tend to overreact to prior information due to self-attribution. The

overreaction in prices is rectified in the long run when investors observe future news and realize their mistakes. So, increased overconfidence leads to momentum in the short run and to reversals in the long run. Research idea of the study is innovative and it should be tested with new data and in new context.

Hong, Lim, and Stein (2000) constructed a plausible model that delivered a unified account of asset-price continuations and reversals. Based on the processing time required for new information, authors divided the investors into two groups, that is, news watchers and momentum traders. By doing so, the authors stated that the momentum strategy, as put forward by Jegadeesh and Titman (1993), should be most profitable among those stocks for which information moves most slowly across the investing public. To examine the phenomenon, the authors incorporated two proxies such as firm size and a stock's residual analyst coverage after controlling for size and for the rate of information diffusion. In the model prescribed by the authors' momentum, traders were rational maximizers who made money on average and imposed a negative externality on others by trading in small stocks having less analyst coverage in which information diffused slowly. The authors concluded by reporting that the phenomenon of short-run continuation and long run reversals were more pronounced in stocks with small market capitalization and low-analyst-coverage, where information diffused more slowly. Long run overreaction to information that was initially private was observed than to public news announcements; and a relationship between momentum traders' horizons and the pattern of return autocorrelations needs to be further reexamined.

Lee and Swaminathan (2000) examined the role of past trading volume as a link between momentum and value strategies. The authors obtained data from three major sources, that is, price and trading volume data for all firms listed on the NYSE and AMEX from CRSP, book to market value and return on equity from Compustat database, and earnings forecasts and analysts coverage from I/B/E/S database. Their findings established several important regularities about the role of trading volume in predicting cross-sectional returns. The authors did not find significant price reversals through the third year following portfolio formation, which goes against the findings of Jegadeesh and Titman (1993). However, over years 3 through 5, they found that initial winner portfolios significantly underperformed initial loser portfolios. The common presumption of price momentum as a matter of underreaction gets refuted here, and the authors stressed upon the fact that at least a portion of the initial momentum gain was better characterized as an overreaction. Furthermore, the study revealed that firms with high (low) past turnover ratios exhibited many glamour (value) characteristics, earned lower (higher) future returns, and had consistently more negative (positive) earnings surprises over the next eight quarters. The authors claimed that the magnitude and persistence of price momentum was predicted by past trading volume as well. Specifically, price momentum effects reversed over the next 5 years, and high (low) volume winners (losers) experienced faster reversals. Collectively, their findings showed that past volume helped to reconcile intermediate-horizon"underreaction" and long-horizon "overreaction" effects.

Hong et al. (2000) extended the previous underreaction hypothesis of Hong-Stein (1999) which stated additional momentum in stocks with slower information diffusion with an extended assumption. Firm size, analyst coverage, and two proxies for transaction costs (share turnover and a dummy variable for the existence of listed options on a given stock) were used as variables in the study to examine the additional momentum in stocks. The data for the study came from three primary sources, that is, the stock returns from CRSP monthly stocks combined file, the analyst coverage monthly data from the I/B/E/S historical summary file, and the options-listing data from the Options Clearing Corporation. The authors established three key results that (a) apart from the very smallest stocks, the profitability of momentum strategies declined sharply with firm size, (b) holding size fixed momentum strategies work better among stocks with low analyst coverage, and (c) the effect of analyst coverage was greater for stocks that were past losers than for past winners. The reported results should be applied to earning momentum profits also as analyst coverage is used as a measure of earning momentum by scholars.

Chen et al. (2002) proposed that changes in ownership were intrinsically connected to momentum profits. The only issue that arose was that under any circumstance of disagreement, all stocks would be purchased by optimistic investors only. Miller's hypothesis holds true only when the number of pessimistic investors exceeds the number of optimistic investors. Alternatively, higher number of investors as compared to that of pessimistic

investors leads to lower disagreement, which signifies that large number of optimistic investors will purchase and increase the prices. Ownership structure was concluded to be a country dependent variable that is a significant determinant of the existence, growth, and profitability of firms.

Griffin, Ji, and Martin (2003) studied data of 40 countries to examine the relationship between momentum returns and macroeconomic risk and to investigate the sources (risk-based, behavior-based) of these momentum returns. Using monthly return data of all NYSE and AMEX stocks in United States and data for other 39 countries on the basis of correlations of momentum returns, the authors examined interregional and intraregional relation between macroeconomic risk and momentum profit. It was observed that momentum profits are large and have weak co-movement among countries. Furthermore, using the macroeconomic risk proxies like unexpected inflation, changes in expected inflation, term spread, and changes in industrial production, it was affirmed that momentum profits cannot be explained by macroeconomic factors. However, borrowing risk based factors from Chordia and Shivakumar's (2002) study, such as dividend yield on the market, term spread, yield on the three-month T-bill and default spread, the authors concluded that momentum profit and market movement had no correlation and the extent of momentum profit was slightly higher during high growth in GDP ; whereas, it remained large and positive in all other states. By measuring the performance of stocks in 60 months after the investment period, the authors found that momentum profits reversed soon after the investment period and became negative. Over long horizons, reversal patterns were more compatible with behavioral explanations. The authors contended that macro factors did not explain the momentum factor, but behavioral factors explained the return reversal; so, if the two factors of risk based and behavioral based were combined, and the individual and interaction effects were seen, then it should explain the entire phenomenon of return continuation and reversal.

Cooper, Gutierrez, and Hameed (2004) used NYSE and AMEX stocks listed on the CRSP monthly file from January 1926 to December 1995 to test whether overreaction was the source of price momentum and to test whether the state of the market played a role in determining the profitability of momentum strategy. Two states were defined in the study based on past 3 years market return, where the market state was up when the lagged 3-year market return was non-negative and the market state was down when the 3-year lagged market return was negative. The authors observed that the state of the market had a clear and dramatic impact on the profits to momentum strategies [9]. Short-run momentum profits exclusively followed UP states and there was a significant long-run reversal following DOWN states as the market eventually corrected the mispricing. A 6-month momentum portfolio was profitable only following periods of market gains (UP market states), and momentum profits increased as the lagged market returns increased. Significant long-run reversal was observed in the down states without any initial momentum, which indicated that long-run reversal was not solely due to the corrections of prior momentum. The study asserted that momentum profits are reversed in the long-run, as predicted by the overreaction theories. Thus, lagged return of the market state was the type of conditioning information relevant for predicting the profitability of the momentum strategies. The way in which the market state is defined in the study can be criticized on the basis of the practice followed by investors in the market. The rationale behind choosing the time period to decide the state of the market may be examined in line with the portfolio formation period used in the momentum strategy.

Zhang (2006) used proxies like firm size and age, leverage, cash flow volatility, analysts forecasted dispersion and return volatility to capture information uncertainty variables. The study showed that higher levels of information uncertainty caused relatively low future stock returns after bad news and higher returns after good

---

[9] Estimating the raw and CAPM profits for the six-month strategy during the first six months of the holding period (termed the "6/6 strategy") were 0.93% and 1.12% per month, respectively. However, the raw and CAPM profits for the six-month strategy during the first 12 months of the holding period (termed the "6/12 strategy") were 0.72% and 0.87% per month, and these were also statistically significant. The performance of the six-month momentum strategy was, however, dramatically different following Down states. The mean raw and CAPM-adjusted profits for the six-month strategy ranged from -0.50% to 0.01% and were not statistically different from zero in any of the cases.

news, revealing that uncertainty reduced the incorporation of information in stock prices. Information uncertainty and segregation of news into good and bad news is a tricky issue in case of momentum strategy as it is a long-short strategy (long on winners and short on losers).

Sarwar and Muradoglu (2013) investigated the existence of momentum returns while pricing for risk factors. The study used Fama and French's factors for analyzing cross sectional variations and the macroeconomic risk factors stated by Chordia and Shivakumar (2002) to carry out the time series variations. The sample consisted of all the stocks listed on AMEX, NYSE, and NASDAQ during the period from 1926 -2005. Finally, the sample comprised of 22,277 stocks over 960 months. Initially, empirical investigation was conducted on the total sample period and was then narrowed down to 10 year sub-periods (to examine variations in momentum returns through the different sub-periods). Raw momentum returns were measured using Jegadeesh and Titman's (1993) method. Stocks were selected on the basis of returns of the past four quarters (i.e. 3rd, 6th, 9th, and 12th month). The stock returns of individual stocks were divided into risk premiums and an idiosyncratic component unexplained by risk factors. Alternative momentum strategies were formed by estimating parameters of each individual stock using a 60 -month window and 24 observations. Regression revealed positive, significant momentum returns for the entire period, that is, from 1963-1989. A high momentum return was evidenced during the period from 1946 - 1995, while it was found to be low during the pre-1950s and post 1995s. The returns were high when there was a rise in the U.S. stock markets and low during falling markets (as established in previous studies - Avramov & Chordia, 2006 ; Cooper et al. 2004).

Park and Kim (2013) used monthly return data of 14 countries to identify the sources of momentum profits. The results supported the risk-based explanation for momentum profit. All the risk based as well as macroeconomic factors and their individual and collective impact needed to be identified. The interaction of risk based and macroeconomic variables with market states is another interesting area to be identified and analyzed in the Indian market's context.

Geczy and Samonov (2013) used the data of security prices starting from 1801 and found a negative correlation between momentum beta and new market direction at the start of a new market state. The authors observed a relationship between the riskiness of momentum portfolio, excess return provided by momentum investing, and the duration of a market state (Up/Down) or unidirectional market. There was a positive correlation between the riskiness of momentum investing and duration of a market state which contributes positively unless the market changes its direction and this high beta exposure results in adverse returns once the market changes its direction. The authors suggested using dynamic hedging by momentum investors in each market state. The way in which a market state is defined and used in the study is debatable as when an investor invests in a market, he is interested in the percentage return for his holding period rather than the direction of the market (Stoll, 1978). If the aggregate holding period return is positive, then the investor gets the utility maximization of his investment, irrespective of the direction of the market.

Pyo and Shin (2013) analyzed the relationship between momentum returns and idiosyncratic volatility in the Korean stock market and found that systematic factors did not explain momentum profits. Momentum returns were higher for high idiosyncratic volatility stocks, prominently among high idiosyncratic volatility winner stocks.

Naik and Padhi (2015) used daily data from January 2002 to July 2012 to find the effect of investment flow of two institutional investors (i.e. foreign institutional investors (FIIs) and domestic institutional investors (DIIs)) on stock returns. Market returns were reported to be influenced by DIIs flow ; whereas, FIIs flow had no significant impact. Both groups of investors used different trading strategies to invest in the market based on their past investments and market performance. Collectively, net investment of both the groups was found to impact the returns with a feedback relation between investment flow and return from the market.

Prasad and Verma (2013) used monthly return data of constituent stocks of S&P CNX 500 for a period starting from April 2001 to March 2010 in the Indian context to test whether the size effect was present in the stock market or not. Using CNX Nifty Junior as market proxy, the authors could not find the presence of the size effect.

Parikh and Baruah (2013), using monthly return data of constituent stocks of Nifty 50 for a period from January 2004 to December 2010, reported the overreaction hypothesis with the phenomenon of short term momentum and long term reversal in the Indian context.

(4) Momentum and Time Varying Volatility Dynamics : Lesmond, Schill, and Zhou (2004) examined the profitability of relative strength trading strategies by testing the predictions of a friction-based explanation [10]. The study provided a [11] model of price friction and then used this model to infer trading costs from investors' behavior perspective. Trading costs provided binding constraints to relative strength strategy profits. [12] Relative strength returns were localized among low-price, poor performer stocks, and caused an increase in investors' transaction costs. Relative strength traders liquidated their positions in each period on the basis of the holding period used in the strategy. The returns associated with relative strength investing strategies could be explained by transaction costs or friction effects. The magnitude of the trading costs associated with these momentum strategies was much larger than previously appreciated, since the composition of standard relative strength portfolios was heavily weighted toward trading of particularly high transaction cost stocks. Large cross- sectional variation in relative strength returns lead to an increase in trading - cost proxies, suggesting that trading costs were binding to arbitrage. Relative strength returns were stronger for small and poorly covered stocks, and the authors attributed the findings to slower information diffusion among small stocks, which supported the findings of Hong and Stein (1999). The variables used to proxy for information diffusion speed were also highly correlated with trading costs. Transaction cost controls also largely eliminated the analyst coverage effect. Extending the previous slow information diffusion model (behavioral model) reported mainly by Hong and Stein, the authors suggested that momentum patterns were largely an effect of the slow price updating of high transaction cost stocks. However, the authors did not make any attempt to examine the behavior of relative strength strategies across firm size in the presence of friction and liquidity.

Korajczyk and Sadka (2004) tested the extent of profitability of momentum strategies after the impact of market friction and estimated the cost involved in trading with direct and indirect measures. The authors opined that components of trading costs differed dramatically in size and ease of measurement. Cost of commissions and bid/ask spreads are the components that can be measured easily, but for trading an institutional-size portfolio, non proportional cost such as price impact and cost involved in adverse price movement after trade should also be taken care of. Due to the potential asymmetry of trading costs between engaging in a long position and short-selling, the authors used winners only in the study. The estimated excess returns of some momentum strategies disappeared only after $4.5 to over $5.0 billion (relative to market capitalization in December 1999) were engaged in such strategies. Accounting for the price impact of trading lead to a large decline in the apparent profitability of some previously studied momentum-based strategies, particularly equally weighted strategies. Transaction costs, in the form of spreads and price impacts of trades, did not fully explain the return persistence of past winner stocks exhibited in the data. This anomaly remains an important puzzle. However, the authors estimated the effect of direct and indirect transaction costs on momentum returns using the winner's portfolio only. Thus, it was worthwhile to examine the effect of market friction on momentum returns, including both winners and losers

---

[10] In markets with trading friction, the incorporation of information into market prices can be substantially delayed through a weakening of the arbitrage process.

[11] A Model of Price Friction: In a frictionless market, the arbitrageur's model of expected trading returns is given as $\bar{r}(i,t) = \bar{r}^*(i,t) + \varepsilon(i,t)$ where, r is the expected return for asset i at time t based on the appropriate asset pricing model, and e, i, t is a mean zero term that captures the information not yet revealed in the liquidity trader pricing sequence. The e, i, t may also be interpreted as the expected gains from arbitrage.

[12] Relative Strength Portfolio Returns for each portfolio k are calculated as :

$$Pk = \frac{1}{T} \sum_t r_k(t) = \frac{1}{T} \sum_t \left[\frac{1}{Nk(t)} \sum_{i \in k} r(i,t) \right]$$

portfolio in a restricted market like India, where short selling is prohibited for institutional participants.

Arena, Haggard, and Yan (2008) used a sample of common stocks traded on the NYSE, AMEX, or NASDAQ during 1965 - 2002 to examine the relationship between price momentum and idiosyncratic volatility. The authors argued that well-known anomalies, such as the small-firm effect and the value effect, were not observed after the sample periods examined by the studies that initially identified these anomalies. The momentum anomaly was an exception. Momentum profits not only persisted, but also increased after the period examined by Jegadeesh and Titman (1993). Idiosyncratic volatility represented a proxy for firm-specific information and posed important limits to arbitrage as stocks with less idiosyncratic risk could be easily arbitraged ; whereas, high idiosyncratic volatility posed limits to arbitrage. The results of the study established a positive and statistically significant relation between momentum returns and idiosyncratic volatility.

Momentum returns and their statistical significance increased across idiosyncratic volatility portfolios, rising from 0.55% to 1.43% from the lowest to the highest idiosyncratic volatility portfolio, with *t*-values increasing from 3.45 to 6.12. The authors established that stocks with higher idiosyncratic volatility displayed greater momentum than did the stocks with lower idiosyncratic volatility, and the relation was primarily driven by high idiosyncratic volatility losers. The study also suggested that addition of information asymmetry to a rational theory explained momentum profits more clearly as stocks with higher information asymmetry were observed to have greater momentum and reversal. The asymmetric-information model was also supported by the study. The authors established the importance of idiosyncratic risk in asset pricing in incomplete markets where investors cannot perfectly diversify their risks. Hence, idiosyncratic volatility is as an important reason of momentum profits persistence and even its increase over time. The authors concluded that the effect of idiosyncratic volatility on momentum was not subsumed by size, price, turnover, beta, price delay, or financial distress risk. Hence, the relation of financial distress and momentum profit should be tested further.

Li, Miffre, and Brooks (2008) used the monthly UK stock prices adjusted for dividends from the London Share Price Database from February 28, 1975 to December 31, 2001 to affirm for the first time that the time-varying unsystematic volatility of winners differed from losers. Volatility of losers was more sensitive to distant news and was more persistent than winners. Both the asymmetric response of losers to good and bad news and the sluggish response of losers to bad news and the conditional risk premium embedded in the GARCH (1,1) M model explained the profitability of the relative-strength portfolios. In other words, to the statement by Hong et al. (2000) that "bad news travels slowly," the authors added their own: good news travels fast. Relative to the volatility of the winners, the volatility of the losers clearly showed an asymmetric response to good and bad news. The considerable reduction in relative price strength returns after allowing for time-varying risk seemed to stem from an increase in the performance of the loser portfolios ; underperformance of losers was in part due to their sluggish and asymmetric reaction to bad news. It is the asymmetric response of the losers to good and bad news and the conditional risk premium embedded in the GJR-GARCH (1, 1) M models that explained the profitability of the momentum strategies. Neither the leverage effect nor the conditional risk premium in isolation could explain the abnormal performance of the momentum strategies. It was the interaction between the two that drove the momentum returns. While the profitability of the relative-strength portfolios was not disputed, there was still a lot of controversy as to why these abnormal returns occurred.

Implications

Momentum provided a useful tool for stock selection in conjunction with other stock valuation analysis. The findings of this study also have a wide array of potential implications for investors, fund managers, and academicians. The findings also have profound implications for investors who are investing in the equity market. Investors could receive a higher level of abnormal profit targeting smaller stocks with short to medium term high momentum and high book to market ratios and with a proportionately more investment bias towards winners' stocks portfolios. If only long position was taken based on winner's portfolio returns, the risk of the portfolio

would be reduced by a greater extent. So, retail investors should invest in past winners only and not losers to increase their portfolio returns without increasing their portfolio risk substantially. While investing for a longer period, investors should take the macroeconomic factors into account. The findings of this study also extend directions to fund managers that momentum as an investment strategy needs to be integrated with unsystematic factors. There are three significant implications for academic practitioners and researchers - that it would be valuable to reexamine the findings of this review using a larger sample over an extended period. The presence of momentum profit examination may be carried out in other asset market contexts including commodity, currency, mutual funds, and so forth. Over and above, the examination of momentum persistence and momentum crashes across different phases of a business cycle may be good food for thought for scholars.

Limitations of the Study and Scope for Further Research

Despite sincere efforts, the study has certain inherent limitations. This study provides a theoretical backdrop to the concept of momentum, its sources, momentum as an investment strategy, and time varying volatility dynamics of momentum returns. There is ,therefore, dire need to empirically validate the relationships using longer periods of data for the momentum investment strategies discussed in the review.

The presence and extent of momentum profit determination in the context of different countries has been pursued by researchers. Previous studies revealed that in most of the studies, price and earning momentum are studied separately and not jointly. Price and earning momentum can be studied together in future studies. Again, momentum profit can be decomposed into price and earning momentum and whether earning momentum subsumes price momentum should be tested in future studies. There is woeful shortage of potential explanation of momentum. Different scholars have tried to explain momentum with the help of business cycles, market states, industry and macroeconomic variables. However, there is no consensus on the possible sources of momentum. A handful of studies have examined the time-varying volatility behavior of winners and losers and momentum portfolio returns, and to the best of our knowledge, it has never been attempted in the Indian market. In a nutshell, there is a dearth of literature in emerging markets on momentum profits that can be used as a trigger to examine diversified attributes of momentum profits, especially in the Indian market context. Ascertaining momentum in emerging markets, especially the Indian stock market and its role in abnormal return generation is an interesting extension of the phenomena reported in the developed market.

References

Arena, M. P., Haggard, K. S., & Yan, X. S. (2008). Price momentum and idiosyncratic volatility. *Financial Review, 43* (2), 159-190. DOI: 10.1111/j.1540-6288.2008.00190.x

Avramov, D., & Chordia, T. (2006). Asset pricing models and financial market anomalies. *Review of Financial Studies, 19* (3), 1001-1040. doi: 10.1093/rfs/hhj025

Barberis, N., Shleifer, A., & Vishny, R. (1998). A model of investor sentiment. *Journal of Financial Economics, 49* (3), 307-343.

Bernard, V. L., & Thomas, J. K. (1989). Post-earnings-announcement drift: Delayed price response or risk premium? *Journal of Accounting Research, 27 : Current Studies on The Information Content of Accounting Earnings*, 1-36.

Chordia, T., & Shivakumar, L. (2002). Momentum, business cycle, and time-varying expected returns. *The Journal of Finance, 57* (2), 985-1019.

De Bondt, W.F. M., & Thaler, R. (1985) Does the stock market overreact? *The Journal of Finance, 40* (3), 793-805. DOI: 10.2307/2327804

Chan, L. K. C., Jegadeesh, N., & Lakonishok, J. (1996). Momentum strategies. *The Journal of Finance, 51* (5), 1681-1713. DOI: 10.1111/j.1540-6261.1996.tb05222.x

Chan, L.K.C., Jegadeesh, N. & Lakonishok, J. (1999). The profitability of momentum strategies. *Financial Analysts Journal, 55* (6), 80-90. DOI: http://dx.doi.org/10.2469/faj.v55.n6.2315

Chen, J., Hong, H., & Stein, J. C. (2002). Breadth of ownership and stock returns. *Journal of Financial Economics, 66* (2), 171-205.

Cooper, M. J., Gutierrez, R. C., & Hameed, A. (2004). Market states and momentum. *The Journal of Finance, 59* (3), 1345-1365. DOI: 10.1111/j.1540-6261.2004.00665.x

Daniel, K. D., Hirshleifer, D., & Subrahmanyam, A. (1998). Investor psychology and security market under- and overreactions. *The Journal of Finance, 53* (6), 1839-1886.

Daniel, K. D., Hirshleifer, D., & Subrahmanyam, A. (2001). Overconfidence, arbitrage, and equilibrium asset pricing. *The Journal of Finance, 56* (3), 921-965. DOI: 10.1111/0022-1082.00350

Fama, E. F. (1965). The behavior of stock market prices. *The Journal of Business, 38* (1), 34 - 105.

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance, 25* (2), 383-417.

Fama, E. F., & French, K. R. (1992) The cross - section of expected stock returns. *The Journal of Finance, 47* (2), 427-465. DOI: 10.2307/2329112

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics, 33* (1), 3-56.

French, K. R., & Roll, R. (1986). Stock return variances: The arrival of information and the reaction of traders. *Journal of Financial Economics, 17* (1), 5-26.

Geczy, C., & Samonov, M. (2013). *212 years of price momentum (The world's longest backtest : 1801 - 2012)*. Retrieved from http://www.cmgwealth.com/wp-content/uploads/2013/07/212-Yrs-of-Price-Momentum-Geczy.pdf

Gibbons, M. R., & Hess, P. (1981) Day of the week effects and asset returns. *Journal of Business, 54* (4), 579-596.

Givoly, D., & Lakonishok, J. (1979). The information content of financial analysts' forecasts of earnings: Some evidence on semi-strong inefficiency. *Journal of Accounting and Economics, 1* (3), 165-185. doi:10.1016/0165-4101(79)90006-5

Griffin, J. M., Ji, X., & Martin, J. S. (2003). Momentum investing and business cycle risk: Evidence from pole to pole. *The Journal of Finance, 58* (6), 2515-2547. DOI: 10.1046/j.1540-6261.2003.00614.x

Grossman, S. J., & Stiglitz, J. E. (1980). On the impossibility of informationally efficient markets. *The American Economic Review, 70* (3), 393-408.

Hong, H., & Stein, J. C. (1999). A unified theory of underreaction, momentum trading, and overreaction in asset markets. *The Journal of Finance, 54* (6), 2143-2184. DOI: 10.1111/0022-1082.00184

Hong, H., Lim, T., & Stein, J. C. (2000). Bad news travels slowly: Size, analyst coverage, and the profitability of momentum strategies. *The Journal of Finance, 55* (1), 265-295.

Hossan, M. A., & Park, S. - B. (2013). Sources of momentum profits in emerging stock markets: The case of Dhaka Stock Exchange. *Indian Journal of Finance, 7* (11), 16-27.

Jegadeesh, N. (1990). Evidence of predictable behavior of security returns. *The Journal of Finance, 45* (3), 881-898. DOI: 10.1111/j.1540-6261.1990.tb05110.x

Jegadeesh, N., & Titman, S. (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. *The Journal of Finance, 48* (1), 65-91.

Jegadeesh, N., & Titman, S. (2001). Profitability of momentum strategies: An evaluation of alternative explanations. *The Journal of Finance, 56* (2), 699-720.

Korajczyk, R. A., & Sadka, R. (2004). Are momentum profits robust to trading costs ? *The Journal of Finance, 59* (3), 1039-1082. DOI: 10.1111/j.1540-6261.2004.00656.x

Latane, H. A., & Jones, C.P. (1979). Standardized unexpected earnings -1971-77. *The Journal of Finance, 34* (3), 717-772.

Lee, C. M. C., & Swaminathan, B. (2000). Price momentum and trading volume. *The Journal of Finance, 55* (5), 2017-2069. DOI: 10.1111/0022-1082.00280

Lehmann, B. (1990). Fads, martingales, and market efficiency. *Quarterly Journal of Economics, 105,* 1 - 28.

Leippold, M., & Lohre, H. (2012). International price and earnings momentum. *The European Journal of Finance, 18* (6), 535-573. DOI:10.1080/1351847X.2011.628683

Lesmond, D. A., Schill, M. J., & Zhou, C. (2004). The illusory nature of momentum profits. *Journal of Financial Economics, 71* (2), 349-380.

Li, X., Miffre, J., Brooks, C., & O'Sullivan, N. (2008). Momentum profits and time-varying unsystematic risk. *Journal of Banking & Finance, 32* (4), 541-558.

Markowitz, H. (1952). Portfolio selection. *The Journal of Finance, 7* (1), 77-91. DOI: 10.1111/j.1540-6261.1952.tb01525.x

Miller, E. M. (1977). Risk, uncertainty, and divergence of opinion. *The Journal of Finance, 32* (4), 1151-1168.

Moskowitz, T. J., Ooi, Y. H., & Pedersen, L. H. (2012). Time series momentum. *Journal of Financial Economics, 104* (2), 228-250. doi:10.1016/j.jfineco.2011.11.003

Naik, P. K., & Padhi, P. (2015). An empirical evidence of dynamic interaction between institutional fund flows and stock market returns. *Indian Journal of Finance, 9* (4), 21-32.

Parikh, A., & Baruah, M. (2013). Exploring overreaction hypothesis for large cap stocks in the Indian stock market : An empirical evidence of superior returns in Nifty 50. *Indian Journal of Finance, 7* (5), 32-40.

Park, K. I., & Kim, D. (2013). Sources of momentum profits in international stock markets. *Accounting & Finance, 54* (2), 567-589.

Prasad, S. S., & Verma, A. (2013). Size and returns: A study of the Indian stock market. *Indian Journal of Finance, 7* (5), 5-13.

Pyo, U. H., & Shin, Y. J. (2013). Momentum profits and idiosyncratic volatility: The Korean evidence. *Review of Accounting and Finance, 12* (2), 180-200. DOI : http://dx.doi.org/10.1108/14757701311327722

Roll, R. (1988). The stochastic dependence of security price changes and transaction volumes: Implications for the mixture-of-distributions hypothesis. *The Journal of Finance, 43* (3), 541-566. DOI: http://dx.doi.org/10.1111/j.1540-6261.1988.tb04591.x

Rouwenhorst, K. G. (2002). International momentum strategies. *The Journal of Finance, 53* (1), 267-284. DOI: 10.1111/0022-1082.95722

Sarwar, S. M., & Muradoglu, G. (2013). Macroeconomic risks, idiosyncratic risks and momentum profits. *Borsa Istanbul Review, 13* (4), 99-114. DOI : http://dx.doi.org/10.1016/j.bir.2013.10.001

Sehgal, S., & Balakrishnan, I. (2002). Contrarian and momentum strategies in the Indian capital market. *Vikalpa, 27* (1), 13-19.

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance, 19* (3), 425- 442. DOI: 10.2307/2977928

Shiller, R. J. (1981). Do stock prices move too much to be justified by subsequent changes in dividends? *The American Economic Review, 71* (3), 421-436.

Stoll, H. R. (1978). The supply of dealer services in securities markets. *The Journal of Finance, 33*(4), 1133-1151.

Zaremba, A., & Konieczka, P. (2014). Value, size and momentum across countries. *Indian Journal of Finance, 8* (9), 7-31.

Zhang, X. F. (2006). Information uncertainty and stock returns. *The Journal of Finance, 61*(1), 105-137. DOI: 10.1111/j.1540-6261.2006.00831.x