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CAN SMALL INVESTORS GAIN FROM MOMENTUM TRADING IN INDIA: AN EMPIRICAL INVESTIGATION

Navdeep Aggarwal*, Mohit Gupta**

Abstract *Momentum strategy proposed by Jegadeesh and Titman (1993) and later improvised by Lee and Swaminathan (2000) through volume augmentation, has long been explored and tested across the world. However, the strong assumptions of zero transaction costs, freely available shorting of stocks, and infinite portfolio size restricted these researches only to academic world; a common investor remained devoid of any benefit from them. This research addressed the practical viability of the momentum strategy, both pure and volume augmented, from a small investor's point of view after incorporating all sorts of transaction costs and restrictions. Due to various restrictions and associated costs only long side of the momentum strategy was implemented for all 16 combinations of 3, 6, 9, and 12-month portfolio formation and portfolio holding periods. Returns were adjusted for risk under Fama-French (1993) conditions to arrive at the actual returns added by the strategy. Results prove that in Indian stock market, even after accounting for all sorts of transaction costs and exchange imposed restrictions, the pure momentum strategy can be profitably exploited. Augmenting with volume information can bring about marginal improvements, though only with early momentum strategy. However, this holds good only for short portfolio formation and portfolio holding periods. Indian market does not seem to recognise or reward medium or long-term momentum in stock returns. Whether these momentum returns have their roots in behavioural, risk based or some proportion of both reasons, needs deeper investigation.*

Keyword: *Momentum Returns, Small Investors, India*

INTRODUCTION

Return continuation in stocks and indices has long been documented in the literature (for example see, Jegadeesh & Titman, 1993; Chan, Jegadeesh, & Lakonishok, 1996, Rouwenhorst, 1998; Moskowitz & Grinblatt, 1999; Griffin, Ji, & Martin, 2003). However, the momentum strategy proposed by Jegadeesh and Titman (1993) has virtually become a standard for researchers analyzing return continuation and even a suggestive strategy for practitioners (Chen, Chou, & Hseih, 2015). So much importance has been garnered by 'momentum' that it has even been included as one of the risk premium factors in accepted asset pricing models (see Carhart, 1997).

Jegadeesh and Titman (1993) found in US markets that by taking long position in top decile and a short position in the bottom decile of companies sorted by their returns over past 3, 6, 9, and 12 months can result in abnormal profits of approximately 1% per month after holding each portfolio for 3, 6, 9, or 12 months. Other empirical research also reported similar results from different markets around the world. For example, Rouwenhorst (1998) found profits from such a strategy in 12 European countries; Griffin *et al.* (2003) found positive returns in 31out of 39 international markets. Profits were also reported by Chui, Titman, & Wei (2010) in Asian markets; Cakici, Fabozzi, & Tan (2013) in emerging markets. Asness, Moskowitz, & Pedersen (2013) and Hu and Chen (2011) evaluated momentum across a wide range of countries around the world and found consistent momentum returns. Specifically, in Indian context, Petr and Abdullah (2012) and Bernard and Deo (2015) found evidence of momentum returns.

Spurred by the wide ranging success of pure momentum strategy, a range of other papers explored ways to improve the profitability of a momentum strategy using other sources of information. For example, Biglova, Rachev, Jasic, & Fabozzi (2004) and Rachev, Jasic, Stoyanov, & Fabozzi (2007) ranked stocks in the formation period using a reward-risk criterion and found that such portfolios offered lower total return but a superior risk-adjusted performance. Similarly, Lee and Swaminathan (2000) incorporated the use of volume information during portfolio formation period and reported an improved performance of the momentum strategy.

* Associate Professor of Business Management with the School of Business Studies, Punjab Agricultural University, Ludhiana, Punjab, India. Email: navdeepaggarwal@pau.edu

** Assistant Professor of Business Management with the School of Business Studies, Punjab Agricultural University, Ludhiana, Punjab, India. Email: mgupta@pau.edu

Since then, a range of researchers have tested the ability of a volume-augmented momentum strategy to deliver superior returns. For example, Glaser and Weber (2003) tested the strategy for German market and Agyei-Ampomah (2006) tested the strategy in UK market. Others tested the effect of volume in different markets across the world; notable among them are Rouwenhorst (1999) who focused emerging markets; Chan, Hameed, & Tong (2000) and Chui *et al*. (2010) who worked on major international markets; Hameed and Kusnadi (2002) for their work on the strategy over six Asian markets; and Bornholt, Dou, & Malin (2015) who tested the volume effect in 37 countries across the globe. The results from these studies were mixed, with limited evidence found in the six countries that were tested in the Asian markets by Hameed and Kusnadi (2002) but significant evidence in the German and UK markets and 34 out of 37 countries studied by Bornholt *et al*. (2015). This suggests that the profitability of a momentum strategy enhanced with volume information is likely to be dependent on the market in which it is implemented.

Evidently, momentum investing as an investment strategy is well documented in literature, the body of applied research as it pertains to individual investors is relatively small (Foltice & Langer, 2015). Unfortunately, momentum investing, as originally proposed by Jegadeesh and Titman (1993), assumes a zero-cost trading strategy which assumes away various market frictions, such as transaction costs, bid-ask spreads, and short-selling constraints. Carhart (1997) even concluded that momentum trading, as proposed by Jegadeesh and Titman (1993), turned unviable after incorporating these trading costs. Asness, Frazzini, Israel, & Maskowitz (2014) even pointed out that transaction costs for a retail investor were up to 10 times higher than those for an institutional manager. Moreover, buying and selling hundreds of stocks could only be possible in research works and not actual investments by individuals.

The problem does not end here. Short-selling (as required in the original momentum strategy) involves very high costs because of the associated collateral and margin requirements (for details of collaterals and margin requirements and other conditions for short-selling, visit the security lending and borrowing (SLB) section of www.nseindia.com), loan interest, and potential risk of a short squeeze or even non-availability of short-selling (for example, National Stock Exchange allows short-selling only on those stocks which are available under F&O section). Not only that; retail investors face a significant downside risk on short selling of uncovered positions in the portfolio (Foltice & Langer, 2015). The risk of the borrowed stock being unexpectedly recalled further aggravates the situation (Brooks, Davies, & Kim, 2006). These factors make short selling by small investors, not only very costly but also very risky to the extent that it holds the potential of wiping out all the gains earned from the long leg of the trade. Moreover, relevant literature shows that above normal performance of momentum trading arises mainly from the winner portfolio rather than the loser portfolio (see Jegadeesh & Titman, 1993; Grinblatt & Moskowitz, 2004; Bernard & Deo, 2015; Foltice & Langer, 2015). In this article therefore, absolute practical feasibility of an individual investor profiting from momentum trading only by longing the 'winner' portfolio while incorporating the impact of all transaction costs has been explored.

Overall, this study contributes to finance literature inat least two ways. First, it provides evidence on practical viability of momentum strategy by incorporating all transaction costs for an individual as Grundy and Martin (2001) and Korajczyk and Sadka (2004) argue that the trading cost may deter investors from applying the momentum strategy. Second, practical restrictions on a manageable portfolio size for an individual have also been addressed.

RESEARCH METHODOLOGY

In this investigation, two distinct types of momentum strategies have been employed: a pure momentum strategy and a volume-based momentum strategy; both are detailed below:

Pure Momentum Strategy

The pure momentum strategy was based on Jegadeesh and Titman (1993) study. Using closing prices of 31st March, 2010, all the companies listed on National Stock Exchange were arranged in descending order of their *J* months returns (*J* = 3, 6, 9, or 12; month refers to a trading month and not a calendar month) called as the portfolio formation period) and divided into deciles (literature has also cited companies being divided into terciles (see Bornholt, Dou & Malin, 2015) and quintiles (see Aggarwal & Gupta, 2009). For each period, the top decile was termed as the 'winner' portfolio and bottom decile was termed as the 'loser' portfolio. As the study focused on momentum returns from 'winner' stocks only (stocks with highest positive returns), focus remained on the top decile companies. In this decile also, only those companies were retained which met the following criteria:

- Company has a sufficient stock price.
- Company has a positive book-to-market ratio.
- The company did not delist during the period under study.
- There was no stock split, reverse split or stock bonus etc.
- All the data as required in the study are available for the particular stock.

These conditions could lead to survivorship bias for certain types of studies. However, since the focus was on winner stocks only, this bias should not impact the validity of the findings. In their studies of momentum investing, Agyei-Ampomah (2007); Siganos (2010) assigned a return of 0% to the companies that delisted during the portfolio formation period, which ultimately resulted in exclusion of such companies from the sample.

Modern portfolio theory advocates a portfolio size of 12 to 18 stocks (see Aggarwal & Gupta, 2009). Treading a middle path, top 15 stocks from the 'winner' decile, for each portfolio formation period, were retained as the constituents of the momentum portfolio and an equally weighted portfolio was created by making an investment of Rs 10,000/- in each stock. This portfolio was then held for a period of K months (K = 3, 6, 9, or 12; called as portfolio holding period) separately. This yielded a total of 16 portfolio formation-holding period combinations. The process was repeated till 31st December, 2014. Different lengths of the portfolio formation and portfolio holding periods helped us identify the ideal combination of the formation and holding periods.

Volume Augmented Momentum Strategy

The volume augmented momentum strategy was based on a two-way independent sort between momentum and past trading volume. As in case of pure momentum strategy, for each portfolio formation period of J months (J = 3, 6, 9, or 12), based on the J months returns, companies were sorted into deciles (R1 to R10). Adapting Lee and Swaminathan (2000) methodology, additional focus was laid on the trading volume, defined as the average turnover over the portfolio formation period. Here, turnover is the ratio of the number of shares traded in the portfolio formation period to average number of shares outstanding during the period (refers to the float and not the total number of shares issued by the company). The companies falling in the top decile, as identified above, were sorted into terciles (V1 to V3) with V1 consisting of companies having largest trading volume and so on. Volume-based momentum portfolios were then carved out from the intersection of these deciles and terciles.

Lee and Swaminathan (2000) suggested two volume-based momentum strategies: the early stage momentum strategy, which involves buying low-volume winners and selling high-volume losers to capture those stocks that exhibit momentum over a longer period, and the late stage strategy, which involves buying high-volume winners and selling low-volume losers to capture companies that experience faster reversal of momentum. However, as the focus of the study was on the long side of the momentum portfolio, we created only long positions in the volume based winner portfolios (R1V1 for high volume winners and R1V3 to represent low volume winners). Equally weighted long positions were then created in the top 15 stocks in both the portfolios with each stock having an investment of Rs 10,000. As in case of pure momentum based strategy, different combinations of the length of the portfolio formation and portfolio holding periods helped us identify the ideal formation and holding periods.

Bid-Ask Spread

Though transaction costs (bid-ask spread, commissions, trading fees etc.) play an important role in ensuring efficiency in markets, an accurate estimation of the actual costs for the different strategies is quite difficult (Shleifer & Vishny, 1997) as transaction costs tend to vary over time (Berkman, 1996) and may also depend on the size of transaction. As bid-ask prices were not available on NSE website, we had to consider proxies. Common approaches to proxies include assuming a constant bid-ask spread (see Capelle-Blancard & Chaudhury, 2001), estimating on the basis of a sample of bid-ask quotations (see Phillips & Smith, 1980) or deriving from the moments of the transaction prices (for example, see Smith & Whaley, 1994). Following Capelle-Blancard and Chaudhury (2001), this study assumed the bid-ask spread to be equal to 0.75% of the reported transaction price.

Costs Other than Bid-Ask Spread

These transaction costs depend on whether the trader is an exchange member, a non-member institutional investor, or a retail investor / trader trading through a broker. Certainly, these costs are the largest for the trader who is trading through a broker. However, as it is not possible to ascertain theses costs for other two types of traders, we took into consideration costs incurred while trading through a broker. We carried out a pilot survey of different brokerage firms in Ludhiana city and arrived at the following average figures:

- **Brokerage** - charged @ 0.05% on the transaction price on both sale and purchase of stock
- **Service tax** - different rates of service tax were in force during the course of the study. The same have been listed below and applied accordingly:

  1st April 2010 to 31st Mar 2012 - 10.30%

  1st April 2012 to 31st May 2015 - 12.36%

  1st May 2015 to 14th Nov 2015 - 14.00%

  15th Nov 2015 onwards - 14.50%
- **Stamp duty, Exchange charges, SEBI charges** - charged @0.013% of the transaction price on both sale and purchase of stock
- **Securities Transaction Tax (STT)** - charged @ 0.10 of transaction price on both sale and purchase of stock

Percent net returns from each portfolio were calculated as follows:

$$R_{jk} = [(P_s - P_p - TC) / P_p] \times 100$$

where, R_{jk} = Percentage return from a portfolio with j months formation and k months holding period

P_p = Purchase price for the portfolio

Ps = Selling price for the portfolio

TC = Transaction costs

Risk Adjustment of Returns

The three factor model proposed by Fama and French (1993) is consistent with models of market equilibrium (Flam & Westman, 2014) and can well be interpreted as models for performance attribution. Therefore, we used this model as such with the following regressions which attributes excess returns to three systematic risk factors as follows:

$$R- R_f = \alpha + \beta (R_m - R_f) + \lambda(SMB) + \delta(HML) + \varepsilon$$

Here, R is the return from the long portfolio during time t (portfolio and time subscripts have not been shown); R_m is the return from broad market based index, R_f is the risk free rate of return, α is the return left unexplained or the value added by the trading / investment strategy, popularly known as Jensen's Alpha (Jensen, 1967); β is the measure of exposure of portfolio returns to broad market excess returns ($R_m - R_f$); λ is the measure of exposure of portfolio returns to size factor (SMB); δ is the measure of exposure of portfolio returns to value factor (HML); and finally, ε is the regression residual (for details of the risk factors considered above, see Fama & French, 1993). Construction of these risk factors has been detailed in the forthcoming text.

Construction of Size and Value Factors

We followed the methodology of Davis, Fama and French (2000) in constructing the SMB and HML factors. To create portfolios that track the firm size (SMB) and book-to-market (HML) risk factors, we made use of companies constituting S&P CNX 500 index of National Stock Exchange. This is a broad-based value weighted index with a representation of almost all the industrial sectors in the country. The companies included account for a major portion of market capitalisation and average trading volume in equities.

For a given portfolio holding period, the companies in the index were sorted by market capitalisation and book-to-market (B/M) ratio (source: Capital Markets Online). Using market capitalisation, the small company group (group S) included all companies with capitalisation below the median and the rest constituted big companies (group B). Similarly, the companies were sorted into three groups based on book-to-market ratio: a low ratio group (group L) with 33% lowest B/M ratio, a medium ratio group (group M), and high ratio group (group H) with top 33% B/M ratios. The intersection of the two size groups with three B/M groups resulted in six groups of companies. Six such portfolios as (S/L, S/M, S/H, B/L, B/M, B/H) were constructed each holding period and the returns from each were recorded; leading to generation of six time series of returns for the different holding periods.

Return from the size portfolio (SMB) was calculated as the difference in returns of an equally weighted long position in the three small companies' portfolio and an equally weighted short position in the three big companies' portfolio. Thus, for each portfolio holding period,

$$SMB = 1/3(S/L + S/M + S/H) - 1/3(B/L + B/M + B/H)$$

Similarly, return from the value portfolio HML (high minus low) was calculated as the returns from equally weighted long position in high B/M ratio portfolio and a short position in low B/M ration portfolio. Thus, for each portfolio holding period,

$$HML = 1/2(S/H + B/H) - 1/2(S/L + B/L)$$

Data Analysis

Ordinary least squares regression was applied to carry out the analysis using following equations:

$$(R_i - R_{fi}) = a + b (R_{mi} - R_{fi}) + s (SMB_i) + h (HML_i) + e_i$$

$$\text{or } a = (R_i - R_{fi}) - b (R_{mi} - R_{fi}) - s (SMB_i) - h (HML_i) - e_i$$

where

R_i = Average return from the momentum portfolio during i^{th} combination of formation and holding period

R_{mi} = Return from the market portfolio during holding period of the i^{th} combination of formation and holding period

R_{fi} = Risk free rate of return during holding period of the i^{th} combination of formation and holding period

b = Measure of exposure to market

s = Measure of exposure to size factor

h = Measure of exposure to value factor

SMB_i = Returns from size portfolio during holding period of the i^{th} combination of formation and holding period

HML_i = Returns from value portfolio during holding period of the i^{th} combination of formation and holding period

a = Jensen's Alpha or returns due to the momentum strategy

e_i = Random error term

For the purpose of analysis, total returns index for Nifty, which includes the effect of dividends was used as a proxy for market returns and MIBOR rates were used as a proxy for risk free rate of return. Returns from different stocks in the winner portfolios were also adjusted for any dividends during the portfolio holding periods.

EMPIRICAL FINDINGS

In this section, returns from the different momentum strategies taken up in the study have been presented. The returns presented are for different combinations of portfolio formation periods (J = 3, 6, 9, 12 months) and portfolio holding periods (K = 3,6,9,12 months) and have been annualised to facilitate comparison. The returns presented are net of all transaction costs. In addition, Jensen's Alpha, that is the return added by the momentum strategy after adjusting for the risks under Fama-French (1993) conditions has also been presented.

Table 1 presents selected summary statistics for the returns to a 'winner' only portfolio based on Jegadeesh and Titman (1993, 2001) pure momentum strategy for different combinations of portfolio formation and portfolio holding periods. As seen in the table, shorter formation and shorter holding periods seem to be the best suited to this kind of strategy as highest mean return of 21.04% were produced by the portfolio with 3 months' formation and 3 months' holding period; closely followed by 3 months' formation and 6 months' holding period at 20.89% with slight reduction in the standard deviation. For longer portfolio formation periods, whether 6 months, 9 months, or 12 months, the net returns were far lower across all holding periods. Even negative returns of 8.01% were produced by a portfolio with 12 months' formation and holding period.

Table 1: Annualised Return Statistics for Pure Momentum Strategy

Mean returns for different combinations of portfolio formation and holding periods have been shown. Figures in parenthesis show the standard deviation of returns.

Formation period (J months)	Parameter	Holding period (K months)			
		3	6	9	12
	Returns net of transaction costs (%)	21.04 (58.14)	20.89 (54.09)	12.44 (35.54)	8.18 (22.21)
3	Jensen's Alpha (%)	12.46*	11.16*	2.07^{NS}	-0.22^{NS}
	Returns net of transaction costs (%)	11.24 (53.24)	7.88 (48.65)	5.03 (30.32)	1.85 (20.14)
6	Jensen's Alpha (%)	7.14*	4.54**	1.87**	0.07^{NS}
	Returns net of transaction costs (%)	9.04 (51.12)	7.21 (47.54)	4.01 (32.22)	1.48 (18.46)
9	Jensen's Alpha (%)	3.54*	2.21**	0.09^{NS}	-0.12**
	Returns net of transaction costs (%)	10.02 (43.44)	5.10 (42.41)	2.65 (33.21)	-8.01 (17.56)
12	Jensen's Alpha (%)	2.94*	1.95**	1.02^{NS}	-2.31*

* p<0.01;** p< 0.05;NS non significant

Jensen's Alpha, which represents the actual value added by the investment/ trading strategy after adjusting for risks proposed by Fama-French (1993), also presents almost similar picture. Highest Alpha of 12.46% (p<0.01) was produced by a portfolio with 3 months' formation period and 3 months holding period; closely followed by 11.16 (p<0.01) for a 6 months holding period. Across all lengths of formation periods, significant positive Alpha was offered by 3 months holding period; though it was much smaller for larger formation periods. Longer holding periods, especially 9 months and 12 months, either produced insignificant Alpha or negative significant Alpha. This clearly shows that pure momentum strategy, with only long leg of the trade and after adjusting for all types of transaction costs, holds worth in Indian stock market. However, this holds good only in short term as Indian market does not seem to offer medium or long term momentum returns.

Table 2: Annualised Return Statistics for Volume Augmented Early Momentum Strategy (R1V3)

Mean returns for different combinations of portfolio formation and holding periods have been shown. Figures in parenthesis show the standard deviation of returns.

Formation period (*J* months)	Parameter	Holding period (*K* months)			
		3	6	9	12
3	Returns net of transaction costs (%)	22.21 (57.54)	20.98 (55.21)	13.12 (37.12)	10.32 (24.32)
	Jensen's Alpha (%)	12.65*	10.74**	3.24^{NS}	-0.09 ^{NS}
6	Returns net of transaction costs (%)	12.34 (52.74)	9.35 (51.24)	8.01 (39.41)	5.85 (23.35)
	Jensen's Alpha (%)	7.85*	5.05**	1.94**	0.79 ^{NS}
9	Returns net of transaction costs (%)	9.59 (50.21)	8.11 (48.54)	4.97 (40.32)	2.97 (20.21)
	Jensen's Alpha (%)	5.05*	2.98*	0.86**	0.05^{NS}
12	Returns net of transaction costs (%)	10.97 (47.58)	5.88 (48.89)	3.15 (42.21)	1.21 (18.56)
	Jensen's Alpha (%)	3.42*	2.05**	1.24 ^{NS}	1.28^{NS}

* p<0.01;** p< 0.05;NS non-significant

Selected summary statistics for the returns to a volume augmented early momentum 'winner' only portfolio based on Lee and Swaminanthan's (2000) strategy have been presented in Table 2. As earlier, returns for different combinations of portfolio formation and portfolio holding periods are shown. Here also, the picture remained more or less the same. While there was marginal improvement in the mean return for almost all formation and holding periods vis-a-vis pure momentum strategy (for example, 22.21% against 21.04% for a 3 months' formation and 3 months' holding period), the basic structure of returns was retained. Shorter formation and shorter holding periods were best suited even after augmenting the momentum with volume information. The Jensen's Alpha also presented the same scenario. Although volume augmented early momentum strategy produced better Alphas across the board, the fundamental picture remained the same with shorter formation and holding periods producing better and significant Alpha (12.65% (p<0.01) for 3 months' formation and holding period; 10.74% for 3 months' formation and 6 months' holding period) and insignificant positive or negative Alpha for longer formation and longer holding periods, especially 9 or 12 months. This brings forward two things: volume augmented early momentum can provide marginally better returns as compared to pure momentum; momentum returns persist only for shorter durations reemphasising that Indian market does not offer medium or long term momentum returns.

Table 3: Annualised Return Statistics for Volume Augmented Late Momentum Strategy (R1V1)

Mean returns for different combinations of portfolio formation and holding periods have been shown. Figures in parenthesis show the standard deviation of returns.

Formation period (*J* months)	Parameter	Holding period (*K* months)			
		3	6	9	12
3	Returns net of transaction costs (%)	19.36 (58.21)	19.17 (58.54)	9.22 (46.58)	2.25 (26.21)
	Jensen's Alpha (%)	10.25*	9.17*	1.87^{NS}	-2.14**
6	Returns net of transaction costs (%)	10.95 (56.29)	6.14 (59.65)	2.22 (51.24)	-1.85 (39.65)
	Jensen's Alpha (%)	5.84*	3.05**	-2.20**	-2.84*
9	Returns net of transaction costs (%)	8.65 (51.87)	7.14 (49.54)	2.03 (43.85)	-2.05 (38.86)
	Jensen's Alpha (%)	3.06*	2.27**	-2.17**	-2.91*
12	Returns net of transaction costs (%)	7.95 (51.57)	3.10 (50.69)	2.24 (43.85)	-3.98 (34.21)
	Jensen's Alpha (%)	2.65**	0.95^{NS}	-3.02**	-4.31*
* p<0.01;** p< 0.05;NS non-significant					

To better understand the impact of volume information in capturing the momentum in stock returns, volume augmented late momentum strategy was implemented, wherein, long positions were created in 'winner' stocks with highest volume. However, volume augmented late momentum returns were found to be less attractive across all formation and holding periods. Although, as earlier, shorter formation and shorter holding period returns were the highest, they fell short of the earlier two strategies. For example, 19.36% return from 3 months' formation and 3 months' holding periods, which was highest for this strategy, was less than that offered by pure momentum and volume augmented early momentum strategy (21.04% and 22.21% respectively). The same held true for Jensen's Alpha also, though the basic returns structure of longer formation and longer holding periods was still maintained. In fact, significant negative Alpha was produced by portfolios with longer formation and holding periods; again underlining the fact that Indian markets do not offer long term momentum returns.

Literature offers two competing explanations of the momentum returns − the risk-based (for example see, Jegadeesh & Titman, 1993; Fama & French, 1996; Grundy & Martin, 2001; Chordia & Shivakumar, 2002; Griffin *et al*., 2003; Liu & Zhang, 2008) and the behaviour-based (for instance see, Barberis, Shleifer, & Vishny, 1998; Hong & Stein, 1999; Hong, Lim, & Jeremy, 2000; Grinblatt & Moskowitz, 2004; Israel & Moskowitz, 2013). The behavioural models typically explain momentum as either an under-reaction or delayed overreaction phenomenon. In the case of under-reaction, information travels slowly into prices for a variety of reasons such as investor conservatism, inattentiveness, liquidity issues, or disposition effect-the tendency to sell winners too quickly and hold onto losers too long. In the case of overreaction, investors may chase returns, providing a feedback mechanism that drives prices even higher (Asness *et al*., 2014).

However, risk-based explanation for momentum premium argues that economic risks that affect company investment and growth rates can impact the long-term cash flows and dividends offered by the company that actually generate momentum patterns. The idea is that high-momentum stocks face greater cash flow risk because of their growth prospects or face greater discount rate risk because of their investment opportunities, causing them to face a higher cost of capital.

Although, the jury is still out to take any conclusive decision whether risk or behavioural explanations matter more, yet for a retail investor the distinction does not hold any relevance. This is so because both the risk and non-risk based explanations offer some economic reason for the premium to exist as well as persist. Only deeper research can lead to any conclusive decision regarding behavioural or risk based or some proportion of both as the reason behind momentum effect in financial markets.

CONCLUSION

Momentum strategy proposed by Jegadeesh and Titman (1993) virtually became a benchmark for those looking to profit from return continuation. So strong had been the impact of this research that it not only has been tried and tested nearly all across the world but momentum has even been accepted as a risk factor in asset pricing models. As would have been done with any successful idea, attempts were made to improve on pure momentum strategy by incorporating other information; most notable among them being Lee and Swaminanthan (2000) volume augmented momentum strategy. This strategy however, produced mixed results and it was concluded that success of this strategy was market dependent. While these researches remain invaluable to the finance literature, the strong assumptions of zero transaction costs, freely available shorting of stocks and infinite portfolio size restricted these researches only to academic world; a common investor remained devoid of any benefit from them.

This research addressed the practical viability of the momentum strategy, both pure and volume augmented, from a small investor's point of view after incorporating all sorts of transaction costs and restrictions. Due to various restriction imposed by the stock exchanges on short selling of stocks and huge costs associated with short selling, only long side of the momentum strategy was implemented with portfolio size restricted to 15 top winner stocks, both for pure as well as volume augmented momentum strategy. Net returns figures were generated for all 16 combinations of 3, 6, 9, and 12 months' portfolio formation and portfolio holding periods and were then adjusted for risk under Fama-French (1993) conditions to arrive at the actual returns added by the strategy. Results showed that the pure momentum strategy was suitable only for shorter formation and shorter holding periods as 3 months' formation and 3 months' holding period portfolio produced the highest returns of 21.04%; closely followed by 3 months' formation and 6 months' holding period at 20.89% with slight reduction in the standard deviation. For longer portfolio formation periods, whether 6 months, 9 months, or 12 months, the net returns were far lower or negative across all holding periods. Jensen's Alpha, which represents the actual value added by the investment/trading strategy after adjusting for risks proposed by Fama-French (1993), also presented similar picture as highest Alpha of 12.16% ($p<0.01$) was produced by a portfolio with 3 months' formation period and 3 months' holding period; closely followed by 11.16 ($p<0.01$) for a 6 months' holding period. On augmenting the strategy with volume information, the early stage momentum lead to a marginal improvement in returns figures across the portfolio formation and holding periods. However, even now, the shorter formation and holding period of 3 months turned out to be best with net

returns of 22.21% and Jensen's Alpha of 12.65%. The late momentum strategy however, turned out be less useful as the returns produced were less than even the pure momentum strategy.

This brings forth one clear conclusion that in Indian stock market, even after accounting for all sorts of transaction costs and restrictions faced by individual investors, the pure momentum strategy can be profitably exploited. Augmenting with volume information can marginally improve the returns, though only with early momentum strategy. However, all these hold good only for short portfolio formation and portfolio holding periods. In addition, it needs a deeper exploration to see whether the momentum returns for individuals arise from behavioural reasons or risk-based reasons or some proportion of both reasons.

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