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Return Reversal Anomaly: Contrarian and Risk Adjusted Multifactor Examination of BSE Index

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Abstract:

Study of factors generating return reversal anomaly in emerging market is inconclusive and controversial. This study examines existence and risk adjusted multiple factors originating reversal profits in the short and long run in Bombay Stock Exchange (BSE), India biggest stock market on monthly bases from January, 2005 till December, 2019. Reversal profit existence are studied in short/long run via building (8*8=64) portfolios with formation period of J=1,3,6,12,24,36,48,60 month and holding period of K=1,3,6,12,24,36,48,60 months. Amongst 64, 23 reversal combination portfolios generated profitable excess returns where winner becomes loser and loser becomes winner portfolio. The highest and significant reversal profits are indicated with formation period of J= 60 months and holding period of K= 60 months indicating BSE Index to revert with profitable returns in a time span of 5 years. Further risk adjusted factors originating reversal effect in BSE market are examined via application of median based Quantile regression models. The study contributes with inclusion of volatailty and long term reversal factor in Fama & French five factor model. Results demonstrate volatailty and long-term reversal produce significant results depicting multi factor model to be more powerful and appropriate to reason for return reversal anomaly.

Keywords: Return Reversal Anomaly, Contrarian, Risk Adjusted Multifactor

1. Introduction:

The return reversal phenomenon refers to a trend change with change in price direction of expected return in stock market. Return reversal effect means a phenomenon where stock return undertakes a reversal factor in short-term or long-term horizon. The Winner Stocks (good performance stocks) in the past period tends to become Loser Stocks (poor performing stocks) in the forthcoming period. Similarly, Loser Stocks (deprived performance stocks) in the past tends to become Winner Stocks (good performing stocks) in the future. This provides investors with an incentive of earning abnormal returns by going with the decision of purchasing bad performing stocks and getting rid of good performing stocks. It is evident that return reversal effect takes place when investors sell (High demand) stocks and buy (Low Demand) stocks holding for short- and long-term periods, reversing the stock price trends. However, in theory, Efficient Market Hypothesis (EMH) states that market is efficient where share price of a stock should tell all relevant statistics and no abnormal return could be earned (Dimson & Mussavian, 2000). Return reversal effect is an irregularity or violation to efficient market hypothesis.

The existence of return reversal effect as well as the driving factors of return reversal effect had been explored by financial theorists and academicians with the application of different tests and methodologies in different markets (Maheshwari & Dhankar, 2015; Bornholt et al., 2015; Locke & Gupta, 2009; Kang, Liu & Ni, 2002; DeBondt & Thaler, 1985). These all researchers examined return reversal effect and supported different theories that gave different collective conclusions based on different economic and firm specific market characteristics. The reason behind the occurrence of return reversal effect is investor's overreaction to the market information also called overreaction hypothesis. (Blitz et al., 2013; Hong & Stein, 1999; DeBondt & Thaler, 1985). Based on overreaction hypothesis academicians also support liquidity to be the origin of return reversal effect where liquidity effect of certain stocks leads to high turnover rate demand exercising high volatility. This indicate if certain portfolio of stock has high liquidity rate or high stock turnover rate, the investor demand and supply rule is applied towards it. High demand results in overvaluing of stocks and when demand reaches at a declined level with strong supply power, the prices of stocks make a reversion with come back to their fundamental values. The immediate purchase with high demand in trade would move market prices away from their actual values. (Da, Liu & Schaumburg, 2013; George & Hwang, 2007; Avramov et al., 2006; Grinblatt & Moskowitz, 2004). The behavioral based explanation of return reversal effect is also given by Daniel, Hirshleifer and Subrahmanyam (1998) who documents overconfidence to be the cause of long-run return reversal effect.

Besides theories, another explanation for return reversal effect is risk-based explanation where return reversal occurs due to mispricing of risk amongst extreme and critical portfolios. Fama and French (2006) claimed the reason for short/long-term return reversal effects to be misspecification of portfolio risk. Academicians worked to explain variation in expected stock return in cross sectional variation analysis of asset price risk factors in linear (Fama and French, 1992) and non-linear (Ni, Wang & Xue, 2015) multifactor asset pricing models. The established stock market asset price risk factors which directly cause an impact on expected stock returns are evidenced and explained by researchers in emerging and developed markets (Hou, Xue & Zhang, 2015; Ho, Strange and Piesse, 2008; Fama & French, 2015). These established asset price driving risk factors studied and tested by researchers include the three-factor model (1. The surplus market return (MKT), 2. The size factor (SMB), 3. The valuation factor (HML)) of Fama and French, 1993, 4. The momentum factor (MOM)) related to four-factor model of Carhart, 1997 and 5. The liquidity factor (LIQ)) related to five factor model of Pastor and Stambaugh, 2003. The other established asset price risk factors include 6. Profitability factor (RMW), 7. Investment factor (CMA), 8. The short-term reversal factor (STR) 9. The long-term reversal factor (LTR) and 10. The market gearing factor (UMD) established by (Fama & French, 2015; Ho, Strange & Piesse, 2008; Hou, Xue and Zhang, 2015). These established multiple stock market factors are studied on different holding periods in different stock markets for the examination of return reversal effect by above mentioned researchers. The established theories provide us with different explanations and driving factors of return reversal effect that explains different combination of results tested and studied in different span of stock markets over different time periods.

In terms of study contribution, although the existing studies generate established factors described above with enlightening conclusions of return reversal effect with application of contrarian strategies (Maheshwari & Dhankar, 2015; Bornholt et al., 2015; DeBondt & Thaler, 1985) and risk driving cross-sectional factors analysis of return reversal effect (Fama and French 1996; 2012 and Carhart, 1997; 2015) but they all face typical problems with provision of multiple gaps. At first, the academicians (Fama & French, 1996; Carhart, 1997; Ho, Strange & Piesse, 2008; Malin & Bornholt, 2013) tested limited short number of driving factors where

only small number of economic theories (mentioned above) are studied separately in three, four and five factor models of Fama and French (1996). The established remaining factors are neglected behind. Rare studies are found who attempted to work on multi-factor model theory of investment in emerging market of India with inclusion of all established factors step wise in one equation especially for fresh sample test data till 2019. Second, existing literature brought testing of return reversal asset price risk driving factors in different markets with mean test methodologies; (Fama & French & Carhart Factors depends on mean test models). Mean test methodologies are not supported in the real-world market. The real data contains significant outliers, which produce biased mean test results as average mean is shifted towards significant data outliers. There lies a strong research gap with application of median test models called quantile regression models for identification of return reversal phenomenon in Indian stock market.

Third, in terms of Market gap; there exists a research gap for examination of investor behavior with fresh recent sample data of testing an abnormal return in economically unstable and politically influenced market of India. The emerging stock market of India could be considered different as compared to US stock market in terms of institutional structure, economic instability, political instability, liquidity and cultural background, etc. The Bombay Stock Exchange abbreviated as (BSE) is responsible for the large-scale trading of stocks in Indian market. The BSE was formed in the year of 1875 that calls for earliest stock exchange in the Asian continent. It has a good historical background with largest stock exchange in the region of South Asia. It is ranked as the tenth largest stock exchange in the world. Considering the size and prospects of the market, there is no doubt that international investors would like to move their investments in emerging market of India.

Most studies on return reversal phenomenon are found in developed nations on firm level characteristics (Bornholt et al., 2015; Da, Liu & Schaumburg, 2013). Efforts have been done to analyze the importance of firm specific risk factors particularly for risk premium in various emerging markets, which is in contradiction with the findings of Fama and French (2012) five factor model that entirely deals with the rational behavior of asset pricing in developed nations. Their results didn't hold in emerging markets (Locke and Gupta, 2009; Hameed and Kusnadi, 2002). The contribution of study lies to examine existence of return reversal effect and its leading significant key driving factors that originate return reversal anomaly in emerging market because of different firm specific characteristics. In emerging markets, investors of stock market are highly affected by political and economic conditions of the country and are sensitive to new market information. The new policies and regimes with new government bring much fluctuation in investor behavior pattern.

The objective of the study is two-fold. First, the study contribute with an examination of existence of return reversal effect in Bombay Stock Exchange stock market of India with application of Contrarian methodology via building loser and winner portfolios based on past J-month lagged returns and holding them for K-months for generating profitable approaches called contrarian strategies and seeking existence of reversal effect in India stock market. Second, the study contribute with examination of all established asset price risk driving factors (firm specific) which originate reversal effect in a step wise multifactor asset pricing model most relevant to the characteristics of emerging markets. The study also fulfills the objective of adopting median based testing methodology which support strong unbiased results with application of quantile regression models rather than adopting mean test methodology of linear regression models.

Remainder of paper is segregated in various sections. The second section presents theoretical background and literature review in terms of contrarian methodologies and asset price risk factor models. In third section, methodology and factor establishment are discussed. The fourth section represents results and discussion with conclusion and future research gap identification is explored in fifth section.

2. Literature Review:

A. Empirical Evidence of Reversal Effect (Contrarian Strategies)

De Bondt and Thaler (1985) were pioneers in building Contrarian Strategies. Contrarian means to move opposite to the normal trends and people behavior. It is a rational approach in which investment decisions are based on logic, goals and thoughtful planning about every unusual circumstance. Contrarian investor purchases those stocks that most people are selling and sells those stocks that most people are purchasing. Because contrarian investor intrigue that people are undervaluing the earnings of distressed stocks due to the overreaction in the market. These stocks are below their real value in the market and contrarian works on the factor where prices will move to their actual value in the forthcoming period. De Bondt and Thaler (1985) worked on monthly data of US stock market from 1926 to 1982. The focus of study was on the stocks who are likely to give return reversals in the form of exciting capital gains or losses in a decided period of time. Based on performance of past 36-month formation period, winner and loser portfolio were made by the selection of 35 best performing stocks and 35 worst performing stocks. The observations were exciting because the past stocks with worst performance showed more than better returns than the stocks having good performance in the past leading to return reversal effect. Motivated by their study, academicians re-worked on contrarian strategies in different stock markets. The results in favor of contrarian strategies arising long run reversal profits are reported by Hsieh and Hodnett (2011) for South Africa; Chou et al. (2007) for Japan; Dhouib and Abaoub (2007) for Tunisia; Bildik and Guley (2007) for Turkey; Ryan and Donelly (2000) for Ireland. In contrast Chouuachi and Douagi (2014) reported denial of presence of long run reversal profits in Canadian, Australian and Tunisian stock markets.

Concerned with the Asian emerging markets, Reddy et al. (2019) adopted the late stage contrarian methodology of Malin and Bornholt (2013) for the period of March 2011 to 2016 in Chinese stock markets. Their findings indicate the existence of long-run reversal effect with portfolio formation period (24 months) and holding periods (6, 9, 12, 24 months). They also reasoned small size portfolios with lower book to market ratios more than explains the generation of excess abnormal returns. Li, Qiu and Wu (2010) evidenced return reversal effect in China market. They established 25 contrarian portfolios for sample period of 1994 to 2007 on monthly scheduled stock returns. They documents the key cause of abnormal returns in the practical and realistic market is the overreaction of investor to the market information without investigating that the new information is correct or not. Wang and Chin, 2004 found previous trading stock to be the major driving factors for presence of return reversal and in China. Also, they point out market characteristics such as supremacy of individual investors and prohibition on short sales may be supportive in explaining these abnormal stock returns.

The emerging market of India reports different and mixed results. Hunjra et al. (2020) analyzed contrarian profitability in three South Asian Markets (Bangladesh, India and Pakistan). They reported positive results with existence of reversal profits if portfolio formation is based on size and high credit risk. Panda and Thangjum (2018) performed sectorial analysis with daily closing prices of ten sectors of Bombay Stock Exchange (BSE) for the time period of six years. Their results reported major sectors to follow contrarian profits existence and questions the

presence of weak Efficient Market Hypothesis in Indian Stock Market. Mehta and Sharma (2016) conducted contrarian strategy on 700 socks of National Stock Exchange of India and reported persistence of momentum profits which are in contradiction with contrarian results. Mohapatra and Misra (2019) examined short term and long-run loser and winner portfolios returns and found portfolios generated based on price to earnings ratio depicted strongest reversal results in Indian stock market. They also proposed that investors no longer confine themselves to firm specific information but are also responsive to global macroeconomic information. Other studies who demonstrated reversal profits include Maheshwari and Dhankar (2015) as they investigate long course reversal effect in the context of Indian stock market. They confirmed strong evidence of reversal effect in India with the help of cumulative abnormal return strategy. Sehgal and Balakrishnan (2019) using sample data comprising of 364 firms for timeframe of July 1989-March 1999 examined stock returns of India Market and demonstrate weak long run reversal profits if one-year gap is maintained in formation period and holding periods and reasoned overreaction of investors to be the cause of reversal effect. Locke and Gupta (2009) report that contrarian strategy is highly profitable in the Bombay Stock Exchange for the sample period 1991- 2004. They reasoned firm specific information (size, valuation, profitability and investment) to be the main source for generation of reversal profit. They generalized that Indian stock market contains contrarian profits due to contribution of prominent unacquainted individual investors and their capability of doing the noise trading. However, McInish, Ding and Pyun (2008) and Chowdhury (2015) document insignificant negative results of contrarian approach in Indian market. They reported negative return reversal existence in Indian stock market for sample period of 1991 to 2006. The empirical review led us to progress of first hypothesis:

H1. The short-run or long-run return reversal effect is present in the BSE Stock Market of India.

B. Risk Adjustments of Contrarian Strategies

The risk bearing adjustment rewards in terms of return reversal profits have been widely explored by academicians and researchers in the area of finance. According to CAPM model, there is only one factor market risk premium in order to estimate expected return. Fama and MacBeth (1973) studied CAPM model which was subjected to different types of standard tests by testing on diverse portfolio set of US market where CAPM revealed weak significant beta. This weak beta explained CAPM to be not powerful enough to explain dissimilarity in stock returns. The failure of CAPM model give rise to the growth of multifactor asset pricing model establishing the relation between risk-based factors and abnormal return whose findings are diverse in different markets. On account of diverse result, researchers introduced other factors rather than the market risk premium for exploration of driving factors in the short and long run. Banz (1981) uncovered that among other variables that contribute to the difference in returns; Size is a vital factor that influences variation in stock returns and initiate return reversal effect. The findings of study indicate that stocks having less market capitalization (small size stocks) usually give higher regular returns. Fama and French (1992; 1996; 2012) examined the explanatory power of cross-sectional variation of variables in three factor asset pricing model. They document SIZE and Book to Market Equity to be the more powerful measures of asset price risk factors in cross sectional variation of average returns in addition to market risk premium. Their finding indicates that small size firms with high book to market equity contribute toward higher expected returns in long run. They document small size firms are at innovation stage and in growth phase therefore make higher returns by doing their best. Second, the firms having poor prospects with low share prices and high book to market equity value are penalized with higher costs of capital than the firms with robust prospects. The high cost of

capital leads to high risk which leads them to have higher expected stock returns in future. The small size stocks companies bear larger cost of financing due to small market capitalization whereas large stocks do not capture that much risk because these stocks already have good growth sense. In short, the nature of the return on small stocks is more sensitive from the aspect of risk taken by a size factor as compared to the returns on big size stocks (SMB) and the return on high book to market equity stocks capture more risk comparatively low book to market equity stocks (HML). This highlights that the productivity of the long course return reversal phenomena is linked with value risk factor (HML) and size risk factor (SMB).

The failure of Fama and French model in clarifying the pervasiveness of stock returns in stock markets excluding US invited researchers and academicians to investigate all the possible reasons behind this in the context of emerging markets. Chiao et al., (2005) performed several tests and uncovered that Fama and French risk factors only explains the reversal effects in U.S market and they are unable to clarify the long course reversal effect in other markets. Chang et al., (2011) reported insignificance of value factor and size factor in the cross-sectional regressions of portfolio returns in Asian markets. Carhart (1997) worked further on Fama French model and introduced the momentum factor in the framework of three factor model. The study uncovered that higher past returns are responsible to give more than regular returns in the preceding years such rise give rise to leading role of momentum factor (MOM). Hou, Xue and Zhang (2015) worked on neo classical Q-theory of investment. They adopted Q-factors in multifactor asset pricing models. The examined almost 80 anomalies in cross section variation of abnormal returns. They document that in addition to market risk premium (MKT), size (SMB) and valuation (HML) profitability factor (RMW) and asset pricing risk factors investment factor (CMA) to be the most contributing factors in creating anomalies and initiating return reversal effect. They also proved and evidenced Q-factor model to be more superior and powerful in explaining abnormal return rather than Fama & French (1996) 3-factor model and Carhat (1997) 4-factor model. Similarly, Shoaib and Siddiqui (2017) examined the long-term relationship of return reversal factors in growing stock market of Pakistan, India and China. The study employed Quantile Regression methods with a sample of 1198 companies of three evolving markets dated of 2001 to 2013, they incorporated firm specific risk factors. These factors in addition to market effect (MKT) are size (SMB), value (HML), momentum (WML) and gearing factor. They revealed market momentum and volatility factor (UMD) to be a significant contributor of short-term return reversal effect. They further revealed growth stocks outperform value stocks in the long run in emerging economies. However, their study was limited to robustness check of Fama French five factor model. This led to a research gap to study all established factors step wise in one equation rather than adopting robustness of one, three and five factor model.

Based on the above discussed literature, the diverse studies on emerging markets highlight different outcomes. There are many important liquidity issues in emerging markets. These liquidity issues will result in high volatility effect, increased transaction costs and uncertainty in the practicality of value and size effect (Bekaert et. al., 2007; Schoenfeld, 2011; Zaremba and Konieczka, 2014; Silva and Chavez, 2008). The Bombay stock exchange accounts for most large volumes in Indian stock market giving rise to high volatility in the market. Besides testing only one, three or five factor model, current study attempts to examine multi-factor model with inclusion of volatility factor for highlighting liquidity issues and long-term reversal factor for highlighting risk adjusted return anomaly based on market reversal effect in the long run. More study on the competency of the multivariable asset pricing model is required to enlighten short and long run stock return anomalies with median test methodology approach for real world market data. This study bridges the gap with the aim to identify vital factors of reversal effect

in evolving markets in different quantiles amongst all established factors with application Quantile Regression models. With respect to literature, we drive our hypothesis as follows:

H2: Multi-factor Asset Pricing model has strong explanatory power to demonstrate stock return anomalies than five factor model.
H3: The Volatility and Reversal factor risk adjustments contribute in explaining risk bearing rewards for stock returns.

3. Data & Methodology:

This study utilizes the data on monthly closing stock returns for the sample of all non-financial companies listed in BSE-500 index. The sample period of the study consists of 15 years from January-2005 to December-2019. Financial companies are not included as accounting period of financial companies closes in December while it closes in June for the non-financial companies. So, it is not possible to compare the different variables used in this study at a specific point of time. Moreover, financial and non-financial sectors (companies) have different capital structures. We also do not include service sectors due to its small sample size as total service firm's ratio represent only 18 percent of total listed companies on BSE-500 index. The study used the **ASM program** of STATA software for building portfolios and formation/holding periods of contrarian strategy portfolios.

In terms of data filtration only such firms are selected which are: (1) equity by nature, (2) traded in the local currency (3) listed on the domestic stock exchange. (4) Continuously traded for building of balanced and overlapping panel portfolios. To compose balanced panel portfolios company's data prior to 2005 are not included to tackle delisting and new-listing company's data error for our sample period. Therefore, our sample begin from January, 2005 and ends on December, 2019. Mostly high market capitalization stocks are traded frequently. The reason of selection based on market capitalization is to avoid the inactive stocks and to neglect microstructure concerns of the stock market (Blitz et al., 2013; Hameed and Kusnadi, 2002). There are 327 non-financial companies listed in 40 sectors of BSE-500 index. Amongst 327 companies, 273 companies are selected based on availability of continuous trading data from 2005 to 2019 to prepare balanced portfolios for determination of reversal effect in Indian stock market. The final sample data filtration results 273 companies of BSE-500-Index.

In methodology at first stage, contrarian methodology of (Malin & Bornholt, 2013; Maheshwari & Dhankar 2015) is applied to form winner and loser portfolios on monthly bases to reveal existence of short- and long-term return reversal effect with examination of stocks in different formation and holding periods in Indian stock market. On the second stage, the causality would be robust via testing multifactor-model theory with application of quantile regression models to find significant asset price risk factors which leads to return reversal effect in India based on highest reversal period data revealed in contrarian methodology.

3.1 Existence of Return Reversal with Contrarian Methodology:

At the start of every month, individual companies' stocks are graded on their past J-month cumulative abnormal monthly returns from January, 2005 till December, 2019 of 273 stocks of BSE-500 index. For creation of equal weight portfolios, the formation period called *J* and holding period called *K* are created. Malin and Bornholt (2013) examined formation period

shortest of 36 months and longest of 60 months with longest holding period of 24 months. In our study formation periods are *J* = 1, 3, 6, 12, 24, 36, 48, 60. Portfolios are held for *K*-month holding period returns where in our study *K* = 1, 3, 6, 12, 24, 36, 48, 60 to examine ultra-short, short, medium, long and ultra-long term return reversal effect. The ranked J-month formation period returns are divided in equal weight quintiles of 20%. Each month t, the strategy buys the loser (L) portfolio consisting of bottom 20% of stocks that have lowest past J-month formation period returns and sells the winner portfolio stocks (W) consisting of 20% stocks with highest J-month returns. The contrarian arbitrage portfolio called loser minus winner portfolio (L-W) spreads are generated. For ultra-short K= 1 month and short-term contrarian profit K = 3, 6 months are examined. For long term K = 36, 48 ultra-long-term K= 60 months are examined that is up to 3-5-year span of reversals. Stock returns are also examined for 12- and 24-months holding period returns for medium term reversal effect from 1-2 years. We also skipped 12 months between *J* month that is formation period and *K* month that is holding period to help evade long run reversals being counterbalance by short run persistence of stock returns (Malin & Bornholt, 2013). This study also adopts the overlapping portfolio approach proposed by Jegadeesh and Titman (1993) particularly for holding period returns for all stock monthly returns. According to them, the average monthly return for k month holding period is expressed as an equal weighted average of portfolio returns from the recent month and the prior k-1 months. For example, for each month the loser portfolio monthly return for three months holding period is expressed as an equal weighted average of portfolio returns for the current month, the last month, and the portfolio returns from two months ago. Hence, the overlapping portfolios confirm that subsequent monthly returns are non-overlapping in nature that allows us to use for t-statistics. This popular method given by Jegadeesh and Titman (2006) increase test power. As results are produced with each combination of J month and k month returns, the prime discussion will focus on stocks with 1 month holding returns for short term reversal, 12 & 24 months returns for medium term and 48, 60 months returns for long term reversals with other findings revealed for robustness purpose.

3.2. Results: *Existence of Return Reversal with Contrarian Methodology*

Table 1A, 1B represent descriptive statistics of all loser portfolios for ultra-short term (US), short term (S), medium term (M), long term (L) and ultra-long term (UL) formation and holding periods respectively. With respect to formation periods and holding periods there are (8*8=64) winner portfolios and (8*8=64) loser portfolios. For space saving only J= 1, 60 is represented. Table 1A and 1B are a clear depiction of reversal existence in Indian stock market. In each J when held to k periods, the mean value appreciates from lowest value to highest value with rise in holding periods depicting rise in reversal effect as stocks are held till long term holding periods. For example, in Table 1A where formation period J = 60, the mean value of portfolio return is 20% if stocks are held for K= 1 month. This mean value declines till 13% if stock is held for K= 60 months. This indicate reversal effect where winner stocks are becoming loser stocks if held for long term period. Similarly, the vice versa effect is depicted in Table 1B, where J= 60 and K =1 mean value return of 20% appreciates till mean value of 25% where K =60 demonstrating loser portfolios to become winner portfolios if held till 60 months.

With equal weight mean of loser and winner portfolios, we obtain a spread of loser minus winner portfolio (L-W) for each of 64 formation and holding period returns represented in table 3. If the spread (L-W) depicts negative excess returns, this indicates that loser remain loser and winner remain winner, no reversal effect is originated. But if the spread (L-W) depicts positive excess returns, this indicates loser had become winner and winner becomes loser giving return reversal excess returns.

Table 2 reports the contrarian strategy results of short- and long-term reversals existence in BSE-500 index. The contrarian method buys the loser (L) and sells the winner (W) portfolio to build a neutral portfolio loser minus winner (L-W). Column 1 indicates the formation periods (*J*) while column 3 till 10 reports equal weighted average monthly returns in percentages over the (*K*) months holding periods. By calculating the spread of (L-W), the table represents total of (8*8=64) reversal combinations where J= 1, 3, 6, 12, 24, 36, 48, 60 and k = 1, 6, 12, 24, 36, 48, 60. Here; where J/k= 1 month represents ultra-short term reversal period; where J/k= 3, 6 represents short term reversal period; where J/k= 12, 24 represents medium term reversal period; where J/k = 36, 48 represents long term reversal period and where J/k = 60 represents ultra-long term reversal period. These 64 reversal combinations results are dividend in four panels. Panel A represents short term reversals combinations where formation period J= 1, 3 6, 12 and holding period K = 1, 3, 6, 12. Panel B represents similar formation period J of panel A, but stocks are held for long term holding period k = 24, 36, 48, 60 to examine longer term reversal combinations. Panel C represents formation period to be long interval with J = 24, 36, 48, 60 but holding period k = 1, 3, 6, 12; this represents with long term formation of equal weighted portfolios, does it matter to create reversal in short term holding periods. Panel D represents J = 24, 36, 48, 60 with K = 24, 36, 48, 60; this represents the results of contrarian methodology with long term formation period as well as held to long term holding periods.

Similar to the results of (Hunjra, 2020; Mohapatra and Misra, 2019; Panda and Thangjum, 2018), amongst 64 reversal combinations represented in all Panels (A, B, C, D), 23 reversal combinations depict positive excess returns where loser becomes winner and winner becomes loser. Out of 23 contrarian results, 10 reversal combinations are significant. For example, in Panel D, where J = 60 and K = 60, loser portfolio generates 19% return and winner portfolio generate 13% return. The spread (L-W) generates highly significant positive 6% reversal excess return with highest t value of 37.18. Panel A depicts no contrarian profits, the arbitrage portfolio loser minus winner (L-W) depicts negative returns. No reversal effect is found in Panel A. The loser continues to be loser and winner continues to be winner. Panel B depicts 5 reversal combinations with positive excess returns when J/K = 12/48 and when J = 1, 3, 6, 12 and K = 60. The results of Panel B arbitrage portfolios (L-W) are not significant. Significant negative excess profit result is found only when k= 24. This represents that in India a momentum return continues as long as for two years afterwards reversal began to exit and appreciate as long as till five years holding period. Panel C indicates 4 short term reversal combinations where J= 60 and k = 1, 3, 6, 12 months. This represents if portfolios formation is based on previous cumulative returns of 5 years, in that case contrarian profit exits if stocks are held from 1 till 12 months but none of the reversal combinations are significant in Panel C. Panel D indicates highest number of reversal combinations and significant contrarian profits. Total 14 reversal combinations depict positive excess returns in Panel D. Amongst 14 reversal combinations, 10 reversal combinations are significant. The highest significant contrarian results at p-value of 1% level is reported is three reversal combinations where 1(J= 48; K = 60), 2(J=60; K=48), 3(J=60; K=60). The highest t-value is reported of 37.18 where J= 60 and K = 60 which is significant at 1% level. This represents in BSE-500 index high reversal effect exits if stocks are held for 4 and 5 years and if portfolios are constructed based on previous 4- and 5-year returns. These results are in consistent with (Reddy et al., 2019; Maheshwari and Dhankar, 2015; Malin and Bornholt, 2013). In summary, the combination (J=60/k=60) depicts highest significant ultra-long-term reversal profit of 69% with highest t-value of 37.18 representing existence of long-term reversal in BSE index. Momentum effect is also depicted in BSE-500 index in Ultra short term, short term and medium-term periods but are significant only where (J, K = 12, 24). Significant long-term reversal result in 6% excess return profit where J = 48 and K = 48.

3.3 Asset Price Risk Adjustments with Multifactor Quantile Regression Models:

To examine whether the earnings of contrarian strategies should be considered for bearing risk, current study attempts to examine all established firm specific asset price risk driving factors in multi-factor called Q-factor model. With reference to literature review, the long established firm specific asset price risk factors contain the three factors of Fama and French (1993) Market Risk Premium (MKT), Size factor (SMB) and Valuation factor (HML)]; the four-factor of Carhart (1997) with fourth as Momentum Factor (MOM). The Liquidity factor (LIQ) of Pastor and Stambaugh (2003). The long-term reversal factor (LTR), Volatality factor (UMD), Investment factor (CMA) and Profitability factor (RMW) established by Hou, Xue & Zhang (2015) and Fama & French (2015).

As objective of the study is to examine reversal in stock returns, therefore, portfolios formation is based on size factor and monthly cumulative abnormal returns of t-60 – t-2. We chose 5-year formation span because as demonstrated above in contrarian methodology where J/K = 60 months indicates the highest and significant reversal results in stock market of India. Based on Fama and French (2015), we subdivide monthly stock returns of 273 companies into 5 quintiles based on Size factor. Similarly, we subdivided monthly stock returns of 273 companies into 5 quintiles based on past 60 month's cumulative abnormal returns. This leads to the creation of (5*5=25) portfolios which allows for variation in cross sectional analysis. Each month from January, 2005 till December, 2019, the monthly average excess returns are calculated for each of 25 portfolios. The portfolios are rebalanced monthly. The excess returns are calculated as (Ri-Rf) where Ri is current month return minus previous month return divided by previous month return. To calculate Market rate of return (Rm), we used Total Market Return Index on daily basis. Rm is calculated as current month total market return index minus previous month total market return index divided by previous month total market return index. The risk-free rate of return (Rf) is basically the 1-year Treasury bill rate of the whole BSE-500 index.

Quantile regression is a renowned research technique used to detect causal relationship between regressors and specific quantile of the dependent variable (Koenker & Bassett Jr, 1978). Least Absolute deviation (LAD) has a key importance for being the special case of Quantile regression which corresponds to adjusting the conditional median of the response variable (the risk premium). Also, it provides well conditional disbursement of the response variable as compared to conditional mean in the OLS analysis. Academicians and researchers can find it an opportunity to investigate a certain percentage of the response variable affected by the regressors included in the model. It is the robust method of modeling because it is free from the adoption of assumptions of the normal distribution. Following the methodology of Fama and French (2015), the Quantile regression model is applied with models represented as follows.

$$R_i - R_f = \beta_1^{(p)} + \beta_2^{(p)}(R_m - R_f)_{it} + \beta_3^{(p)}(SMB)_{it} + \beta_4^{(p)}(HML)_{it} + \beta_5^{(p)}(CMA)_{it} + \beta_6^{(p)}(RMW)_{it} + \beta_7^{(p)}(UMD)_{it} + \beta_8^{(p)}(LMW)_{it} + \mu_{it}^{(p)} \quad \dots (1)$$

Where R_i = Stock returns of i company at time t, R_f = Risk free Rate, R_m = Market return of the stock market, SMB = Small minus Big in terms of size, HML= High minus Low in terms of value factor, CMA= Conservative minus aggressive in terms of investment factor, RMW= Robust minus weak in terms of profitability factor, UMD = Up minus down in terms of volatility factor, LMW= Loser minus winner in terms of past t-60 to t-2 cumulative returns. And PER = high PER minus low PER in terms of gearing factor. Testing Variables used in the model and their portfolios establishment criteria are

explained below. The script (p) represent the quantile function of dependent variable. We have taken default median value to be as (p).

We define the testing independent factors as ***1) Market Factor (MKT):*** *Excess market return calculated as value weighted market return minus one-month Treasury bill rate.* ***Size Factor (Small minus Big):*** *Size is taken with total market capitalization measured as total number of shares outstanding multiplied by share price. For analysis, it is calculated as difference between return on a portfolio of small size stocks and return on a portfolio of big size stocks.* ***Valuation Factor (High minus Low)****: Valuation factor is calculated as book to market equity. This represent difference between return on high valuation stocks minus returns of low valuation stocks Investment factor could play a similar role as valuation factor.* ***Investment Factor (Conservative minus Aggressive):*** *Investment is calculated as annual change in total assets divided by 1 year lagged total assets. For analysis it is taken as difference between return on a portfolio of conservative investment stocks to return on a portfolio of aggressive investment stocks.* ***Profitability Factor (Robust minus Weak):*** *Profitability is calculated as income before extraordinary items divided by 1 year lagged book equity. Book equity is calculated as the sum of total shareholders' equity and balance sheet deferred taxes and investment tax credit if available minus book value of preferred stock. For analysis it is taken as difference between return on a portfolio of high-robust profitability stocks to return on a portfolio of weak-low profitability stocks****. Volatility Factor (Up minus Down)****: Volatility is a statistical measure of the dispersion of returns for a given security. In most cases, the volatility and risk of security have a direct relationship. If the volatility factor increases, the risk of security also increases. Volatility is measured as variance between returns of the same security. The up minus down is formed to incorporate the effect of firm future growth opportunity that helps in defining the variations in current stock returns. The UMD is up-minus-down and is the difference between the returns of portfolios of up-higher volatility and returns of the portfolios of down-lower volatility.* ***Long Term Reversal Stock Factor (Loser minus Winner):*** *Equal weighted cumulative abnormal returns are calculated from month t-60 to t-2 for at least five years. Based on cumulative returns winner and loser portfolios are segregated in terms of 5 quintiles. The difference between the equal weighted average return of lowest quintile loser portfolio minus stock returns of top quintile winner portfolio is long term reversal risk premium factor.*

3.4. Risk Adjustments Results and Discussion:

Table 3A represents summary statistics of all established factors. It represents average mean excess return of all 273 stocks listed in BSE index. Table 1 represents the highest maximum value of reversal factor LMW of 43%. This gives a clear indication of importance of reversal factor incorporation as highest risk adjusted behavior of reversal factor is demonstrated amongst other established factors. Table 3B represents summary statistics of monthly equal weighted average returns of (5*5=25) portfolios formed on size and past 60 months cumulative abnormal returns of 273 stocks. Table 2 is a clear demonstration of segregation between loser and winner portfolios as P1 loser portfolio demonstrate mean return of 11% and P25 winner portfolio demonstrate mean return of 33% in the long run with span of 60 months formation periods.

Table 4A represents correlation matrix of mean excess return of loser portfolio P1 as dependent variable and table 4B represents correlation matrix of mean excess return of winner portfolio P25 as dependent variable. The most important to highlight in correlation matrix is behavior of reversal factor. The LMW factor has a significant positive correlation with excess returns of loser portfolio P1 and negatively correlated with excess returns of winner portfolio P25. This represents a clear demonstration of investment in small size companies leads to long term reversal profits as small size companies bears more risk and value effect.

Table 5 compared regression results of all established factors by academician's one factor model, three factor model, five factor model and our study 7-factor model. The dependent

variable to be tested in table 6 is equally weighted monthly cumulative average returns formed on past t-60 to t-3 of all 273 stocks sample data. The portfolio wise discussion of 25 portfolios results are represented in table 7.

As per the findings of Fama French (2015), the famous one factor capital asset pricing model weakly works in our testing market depicting market risk bearing premium to be the weak factor with market beta of 0.56 less than 1. The three-factor model involves market risk premium, size and valuation factor. The size factor SMB- beta depicts significant ($p < 1\%$) positive results depicting more the size risk spread and market premium risk spread higher the excess returns. The coefficient of alpha lowers from 1.43% to 0.67% with lower t-value of 1.83 indicating size and value factor to be a significant determinant of excess returns rather than only market risk premium model which fails the one factor model in India market. This value of SMB-beta positive result reveals smaller firms accruing better risk bearing reward than the bigger ones in India supporting the results of (Shoaib and Siddiqui, 2017). This depicts smaller firms to become winner in the long run to generate higher excess returns as they have value premium. The HML-beta is with negative sign in all the models from model (3) to model (8). However, it is significant in only 8 factor model. This clearly indicates the growth of Indian markets. Big firms have growth factor and during the growth of firm's risk premium is negatively affected. Higher the HML- growth factor lower would be the excess returns. The alpha also further slightly declined providing an indication of HML factor to be contributor in explaining excess returns. The four-factor model takes on inclusion of volatility factor. This study contributes with explaining how volatility plays an important role via adding volatility factor into famous three factor model. Volatility factor could also be used as proxy measure of Liquidity. Stock high turnover ratios lead to high liquidity and making stock prices and returns more volatile. (Reddy et al., 2019) states Liquidity factor to be the highest likely contributor to explain excess abnormal returns in market. Volatility factor UMD-beta is positive and significant ($p < 1\%$) in all models. The positive (UMD) is consistent with supporting that investor with high volatility in markets bear high risk leading to higher return adjustments to reimburse them for substantial cost of trading these assets and vice versa (Ibbotson et al., 2013). The highest value of UMD-beta is depicted in four factor model 45.8% with highest t- value of 8.01. The alpha reduces from 0.67 to 0.63 with rise in t-value. It can be concluded rising volatility causes risk whereby expected returns are increased. The 6- factor model includes profitability factor and investment factor of (Fama and French, 2015). Both factors RMW and CMA have significant ($p < 1\%$) negative relation with stock excess returns. This depicts aggressive investment firms with weak profits perform better in earnings returns with high profitability risk spread and investment risk spread than conservative in investments and with robust profitable firms. The important thing to be noted is alpha is down 0.33 from 0.63 but is not significant. The Size factor SMB-beta becomes significantly negative with inclusion of RMW and CMA factor. This represents bigger firms to outperform more than smaller ones due to aggressive investment and weak profitability of the firms. The 7-factor model alpha is down to significant ($p<5\%$) value of 0.44 with 1.77 t-value. The 7-factor model include reversal factor. The reversal factor LMW-beta is positive and significant ($p<1\%$) at 6.372 (1.52 t-value). This indicates loser firms to outperform more than winner firms giving reversal risk premium effect in the long run which leads loser firms to become winner and winner firms to become loser. The important aspect here is the 6-factor model where volatility was included alpha reduced to 0.33 but was not significant; however, the inclusion of reversal risk spread gives reduces alpha value of 0.44 (1.77 t-value) which is also significant ($p<1\%$). This explains and approach to objective of our study that demonstrate reversal factor to be the strongest determinant of abnormal excess returns of Indian stock market if in contrast volatility factor is also taken into account. These results are possible in two scenarios. At first either market is

illiquid, the broaden illiquidity gap among winner and loser intends loser portfolio to earn higher returns to compensate for illiquidity (Acharya and Pedersen, 2005). The second scenario is where volatile bearish market is depicted by positive beta of LMW factor (Daniel and Moskowitz, 2013). This inferred positive significant effect of LMW factor is demonstrated where market is highly volatile representing strong connection between stock returns, reversal effect and volatility effect, hence fulfilling the objective of our study.

The last model 8 represents regression result where instead of excess returns as dependent variable the reversal factor LMW risk premium spread is taken as dependent variable to test either rise in market, size, value, profitability, investment and volatility risk spread leads to rise in reversal risk spread leading to high reversal effect in the long run. The alpha and market risk premium are nearly zero in Model 8 determining not a significant contributor in arising reversal anomaly in Indian stock market. The remaining other factors have significant negative relation with LMW reversal factor risk spread. The lower the size, value, profitability, investment and volatility risk spread higher would be the reversal risk spread and the spread becomes lower when loser are becoming winner and winner are becoming loser depicting again existence of strong reversal effect.

In terms of explanatory power of results, the results demonstrate how with inclusion of each factor in one factor model the R-square power increases. The one factor model only explains 22% of the model, where this power is increased to 33% where Size factor and HML factor are included in the model. The power further increased to 48% with inclusion of profitability and investment factor in the model. The highest R-square power is demonstrated of Model 7 48% and model 8 56% where reversal factor is examined and explains reversal factor to be strong contributor in explaining abnormal stock excess returns. This fulfills the objective of our study that multifactor asset pricing models have more explanatory power to explain stock return anomalies.

Table 6A represents quantile regression results of highest loser portfolio P1 and highest winner portfolio P25. The regression results of all 25 portfolios are presented in Table 7B. However, to save space highest loser P1 and highest winner P25 portfolio results are explained separately and in detail for examination of reversal effect. The third row represents results of loser minus winner risk spread. Column 2 represents raw return based on contrarian methodology average mean return. Column 3 till 10 represent risk adjusted returns with quantile regressions. According to Fama and French (2015), the lower the value of alpha, the stronger the indication of risk bearing rewards inclusion due to important role played by other factors. The one factor capital asset pricing model demonstrates very weak risk bearing factor of 0.002 in loser portfolio and -0.003 in winner portfolio. The remaining established factors contribute in risk bearing reward. But highest shift is found in LMW factor. The loser portfolio generates 0.15 % risk spread. This demonstrates that investment in small companies have value premium due to high risk involved and generates high returns in the long run whereas the winner portfolio generates negative -6.25% risk spread indicating winner stock to become loser stocks in the long run with low risk premium involved. As per the findings of (Reddy et al., 2019 and Malin and Bornholt, 2013), our results give a risk bearing reward of 6.40% in terms of return reversal factor. The table clearly represents reversal factor to be a strong determinant of portfolio returns. The behavior and possible relationship of other risk bearing factors including reversal factor are explained in more detail in table 6B.

Table 6B represents double sorted 25- portfolios regression results on size and past cumulative abnormal returns of t-60 to t-3. To study reversal relations between 25 portfolios, one needs to focus on trend of loser portfolios excess returns varying from small size to big size companies

and winner portfolios excess cumulative abnormal returns varying from small size to big size companies. The intercepts represent very low values in all portfolios representing all remaining 7 factors to be strong determinant of excess returns in all portfolios. The market premium risk factor (Rm-Rf) depicts very weak relation with beta values less than 1 and lowest t-values indicating one factor model does not help explain market excess return in India (Maheshwari and Dhankar, 2015). The interesting relation is depicted in SMB factor 25 portfolios. If we study the trend the small size companies with lowest past cumulative excess returns (portfolio 1), the result depicts higher risk spread of SMB generating highest 1.523 excess return as risk bearing reward, whereas big size companies with lowest past cumulative returns depict lowest excess returns of -0.762. This represents if one invests in portfolio 1 with small sized firm and lowest cumulative returns tends to produce profits via becoming winner in five-year span with occurrence of reversal effect. The HML factor indicate presence of value effect in India market, where small sized companies with lowest past cumulative returns produce positive results of 0.276 and big sized companies with lowest past cumulative returns depict negative result of -0.125. Volatility factor also depicts similar results to Size and Value factor. The profitability and investment factor depict opposite results where big firms with low past cumulative returns generate higher excess returns. The reversal factor describes reversal risk spread. Higher the return risk spread between loser and winner portfolios higher the returns. The LMW factor depict small companies with low excess returns generate highest excess returns. The loser became winner with 0.1482 excess returns and winner became loser with -0.3846 excess returns.

4. Conclusion:

This paper highlights the existence of contrarian profits as well as risk bearing reward adjustment factors of contrarian profits in Indian Bombay Stock Exchange Market for the period January 2005 through December 2019. For examining existence of return reversal effect, contrarian methodology of Malin and Bornholt (2013) is applied to seek mean reversal period in India stock market. Following Shoaib and Siddique (2017), for examining risk adjustments of contrarian profit rewards, established asset price risk factors (market premium, size, value, profitability and investment) are explored in India Market. As India market is highly volatile emerging market, this study further examined Fama French five factor model with addition of volatility factor as well as itself loser minus winner return reversal factor risk spread naming the model as multi factor asset price regression models. The study also contributes via examining median methodologies via Quantile Regression models instead of mean methodologies of linear regression models.

Results confirm the presence of long run reversal effect in India stock market. However, the reversal effect is strongest with reversal period span of 60 months. Short term reversal is not found in Indian stock market. However, for future research if someone studies via rebalancing portfolio returns on daily bases or weakly basis, the results of short-term reversal effects could be explored. This recommends that the potential investors in Indian stock market should concentrate on right price departures due to preliminary overreaction effect. This is not astonishing as Indian market is expected to be dominated by those individual investors who have limited scope of available market information.

The firm specific asset price risk factors components explain a prominent percentage of contrarian returns for small and medium sized firms. The quantile regression results of 25 portfolios revealed small and medium sized firms nominating loser portfolios to depict higher excess returns and big sized firms nominating winner portfolios to depict lower excess returns in the long run period span of 60 months depicting reversal effect in Indian stock market.

Amongst the established asset price risk factors, Size, Volatility and Loser minus winner (LMW) are found to be the leading contributing factors for explaining risk bearing rewards in Indian stock markets. The results confirmed the presence of value effect and volatility effect in small sized companies which leads them to become winner portfolios in the future. The multi-factor asset price model proved to have more explanatory power in explaining abnormal returns compared to Fama French three four or five factor models. With addition of each factor, the intercept decreases and explanatory power is increased. The highest explanatory power is found in model 7 and 8 where volatility and long-term reversal factor are added in addition to five factor model. In a nut shell, small sized firms in Indian stock markets contribute very much in obtaining contrarian returns. The Indian highly volatile market and value effect of small sized firms leads to long run reversal effect.

For implications regulatory bodies, policymakers and SEBI should design, implement and evaluate regulations to support small and medium sized firms to better reflect their stock prices. Small size companies have value effect; therefore, policy makers and regulators should design sound policies such as strict accounting rules, transparent and comprehensible disclosure of accounts on frequent basis and incentive-based policy for local and foreigner institutional investors to invest their money in small and medium size companies. These enhanced policies would help small sized companies' information and stock prices to become more effective and also would facilitate investor to build contrarian profits and contribute in improving the overall market efficiency.

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Contrarian Methodology Results

Table 1 A: Summary Statistics for Winner Portfolios (J=1,60); (K=1,3,6,12,24,36,48,60)

Portfolios	Obs	Mean	Std. Dev.	Min	Max
USW (J=1, K=1)	215	0.2527	0.7267	-3.040	2.226
SW (J=1, K=3)	213	0.2534	0.6999	-2.938	2.2544
SW (J=1, K=6)	210	0.258	0.707	-2.882	2.3945
MW (J=1, K=12)	204	0.2686	0.7141	-2.881	2.5511
MW (J=1, K=24)	192	0.2681	0.7131	-2.798	2.5436
LW (J=1, K=36)	180	0.2293	0.6932	-2.800	2.5175
LW (J=1, K=48)	168	0.2187	0.688	-2.792	2.5292
ULW (J=1, K=60)	156	0.1941	0.6986	-2.794	2.5178
USW (J=60, K=1)	157	0.2057	0.7632	-3.198	2.9773
SW (J=60, K=3)	155	0.1978	0.7647	-3.164	2.9732
SW (J=60, K=6)	152	0.1847	0.7651	-3.144	2.9879
MW (J=60, K=12)	146	0.1856	0.7425	-3.149	2.904
MW (J=60, K=24)	134	0.1609	0.7447	-3.116	2.8118
LW (J=60, K=36)	122	0.2128	0.6485	-1.485	2.7772
LW (J=60, K=48)	110	0.16	0.5042	-1.137	1.4819
ULW (J=60, K=60)	98	0.1308	0.515	-1.123	1.536

Table 1 B: Summary Statistics for Loser Portfolios (J=1,60); (K=1,3,6,12,24,36,48,60)

Portfolios	Obs	Mean	Std. Dev.	Min	Max
USL (J=1, K=1)	215	0.2246	0.7083	-2.291	3.0893
SL (J=1, K=3)	213	0.2409	0.706	-2.475	2.7945
SL (J=1, K=6)	210	0.2457	0.6818	-2.478	2.4497
ML (J=1, K=12)	204	0.2526	0.6805	-2.532	2.322
ML (J=1, K=24)	192	0.2524	0.6926	-2.631	2.3311
LL (J=1, K=36)	180	0.2258	0.6849	-2.61	2.3645
LL (J=1, K=48)	168	0.2185	0.6818	-2.622	2.3484
ULL (J=1, K=60)	156	0.2006	0.6976	-2.630	2.3652
USL (J=60, K=1)	157	0.2093	0.6633	-2.151	2.4061
SL (J=60, K=3)	155	0.2049	0.6654	-2.192	2.3239
SL (J=60, K=6)	152	0.2009	0.6682	-2.191	2.2892
ML (J=60, K=12)	146	0.2019	0.6603	-2.202	2.2274
ML (J=60, K=24)	134	0.2049	0.678	-2.255	2.1971
LL (J=60, K=36)	122	0.2239	0.6186	-1.275	2.1488
LL (J=60, K=48)	110	0.2305	0.5473	-1.095	2.0427
ULL (J=60, K=60)	98	0.2596	0.5573	-1.071	1.9805

Here, USW= ultra-short term winners, SW= short term winners, MW= medium term winners, LW= long term winners, ULW= ultra-long term winners. Here, USL= ultra-short term losers, SL= short term losers, ML= medium term losers, LL= long term losers, ULL= ultra-long term losers.

Table 2
Return Reversal Contrarian Strategy

Panel A: Short Term Reversals

J	Portfolio	Holding Period Returns K=1	K=3	K=6	K=12
1	Winner	0.253	0.253	0.26	0.279
	Looser	0.225	0.229	0.237	0.227
	LMW	-0.028	-0.024	-0.023	-0.051
	t-value	12.003	9.297	9.483	20.191 **
3	Winner	0.253	0.257	0.269	0.277
	Looser	0.241	0.248	0.232	0.239
	LMW	-0.012	-0.009	-0.037	-0.038
	t-value	7.223	4.348	16.83 *	15.018
6	Winner	0.258	0.266	0.276	0.273
	Looser	0.246	0.24	0.24	0.235
	LMW	-0.012	-0.025	-0.036	-0.038
	t-value	9.932	14.68	16.918 *	15.879 *
12	Winner	0.269	0.271	0.267	0.273
	Looser	0.253	0.251	0.245	0.244
	LMW	-0.016	-0.021	-0.023	-0.029
	t-value	1.118 *	1.531	1.962	1.861

Panel B: Long Term Reversals

J	Portfolio	Holding Period Returns K=24	K=36	K=48	K=60
1	Winner	0.281	0.247	0.233	0.206
	Looser	0.221	0.219	0.215	0.209
	LMW	-0.06	-0.027	-0.018	0.004
	t-value	23.002 **	9.942	6.616	1.263
3	Winner	0.279	0.231	0.228	0.198
	Looser	0.227	0.209	0.212	0.205
	LMW	-0.052	-0.022	-0.017	0.007
	t-value	20.397 **	8.173	6.258	2.513
6	Winner	0.286	0.236	0.223	0.185
	Looser	0.238	0.223	0.21	0.201
	LMW	-0.048	-0.013	-0.013	0.016
	t-value	19.193 **	5.02	4.983	5.763
12	Winner	0.255	0.231	0.207	0.186
	Looser	0.216	0.226	0.207	0.202
	LMW	-0.039	-0.005	0.001	0.016
	t-value	0.988 *	8.38	9.977	5.455

Panel C: Short Term Reversals

J	Portfolio	Holding Period Returns K=1	K=3	K=6	K=12
24	Winner	0.268	0.273	0.285	0.256
	Looser	0.252	0.247	0.256	0.225
	LMW	-0.016	-0.026	-0.029	-0.032
	t-value	19.715 **	22.561 **	20.542 **	17.242 *
36	Winner	0.229	0.229	0.237	0.231
	Looser	0.226	0.222	0.231	0.225
	LMW	-0.004	-0.006	-0.006	-0.006
	t-value	-4.912	-5.907	4.598	3.485
48	Winner	0.219	0.22	0.217	0.201
	Looser	0.218	0.216	0.213	0.2
	LMW	-0.001	-0.004	-0.004	-0.001
	t-value	0.378	4.806	3.853	3.485
60	Winner	0.194	0.191	0.183	0.186
	Looser	0.201	0.197	0.191	0.195
	LMW	0.006	0.006	0.008	0.01
	t-value	10.442	6.408	7.049	6.711

Panel D: Long Term Reversals

J	Portfolio	Holding Period Returns K=24	K=36	K=48	K=60
24	Winner	0.232	0.203	0.187	0.161
	Looser	0.216	0.204	0.202	0.205
	LMW	-0.016	0.001	0.014	0.044
	t-value	7.667	0.093	5.802	18.169 *
36	Winner	0.2	0.185	0.165	0.213
	Looser	0.199	0.199	0.207	0.254
	LMW	-0.002	0.014	0.042	0.041
	t-value	-0.832	6.614	19.059 **	18.704 *
48	Winner	0.186	0.165	0.217	0.16
	Looser	0.192	0.201	0.252	0.22
	LMW	0.007	0.035	0.035	0.061
	t-value	3.67	18.058 *	17.775 *	33.496 ***
60	Winner	0.168	0.217	0.162	0.131
	Looser	0.194	0.247	0.216	0.192
	LMW	0.026	0.03	0.053	0.069
	t-value	15.719	17.062	32.642	37.183

* * *** ***

Notes: This table represents 8 J formation periods (1, 3, 6, 12, 24, 36, 48 and 60) months. These are held for 8 K holding periods (1, 3, 6, 12, 24, 36, 48 and 60) months. This represents (8*8=64) reversal combinations. The mean values of 64 reversal combinations of losers and winners are represented. The LMW represent excess returns of Loser minus Winner arbitrage effect. The positive excess returns represent reversal effect and negative excess returns represent momentum effect. Here, J/K = 1 represent ultra-short term reversal effect; J/K= 3, 6 = short term effect; J/K = 12/24 = medium term reversal effect; J/K = 36/48 = long term reversal effect and J/K = 60 = ultra-long term reversal effect. The t-values of loser minus winner excess returns are represented. The significance level of t-values is represented at 10 percent level (*); at 5 percent level (**) and at 1 percent level (***).

Results: Fama & French Risk Adjusted Returns Models

Table 3A: Summary Statistics

	Summary Statistics			
Variable	Mean	Std. Dev.	Min	Max
$R_i - R_f$	1.476	6.665	-27.2	23.28
$R_m - R_f$	0.510	6.867	-27.9	32.96
SMB	0.014	0.042	-0.20	0.133
HML	-0.015	0.058	-0.12	0.398
UMD	-0.005	0.101	-0.28	1.099
RMW	-0.013	0.055	-0.13	0.208
CMA	-0.010	0.051	-0.21	0.221
LMW	-0.008	0.225	-2.84	0.435

Table 3B: Summary Statistics of equal weighted average monthly returns of portfolio 1 and portfolio 25

$R_i - R_f$	Mean	Std. Dev.	Min	Max
p1	-0.11679	0.081274	-0.86401	-0.02288
p25	0.331999	2.265407	0.079522	27.60524

Table 4A: Correlation Matrix of Loser portfolio (P1):

	$R_i - R_f$	MRP	SMB	HML	UMD	RMW	CMA	LMW
$R_i - R_f$	1							
MRP	0.1496	1						
SMB	-0.0677	-0.0504	1					
HML	-0.5791	-0.0081	-0.6218	1				
UMD	-0.7002	0.1253	-0.2562	0.7868	1			
RMW	-0.4026	-0.1185	-0.7564	0.7974	0.5535	1		
CMA	-0.3166	-0.0704	-0.5174	0.6355	0.4817	0.5188	1	
LMW	0.8035	0.0073	-0.1221	-0.6031	-0.8714	-0.3466	-0.3561	1

	$R_i - R_f$	$R_m - R_f$	SMB	HML	UMD	RMW	CMA	LMW
$R_i - R_f$	1							

$R_m - R_f$	-0.0457	1						
SMB	0.147	-0.0791	1					
HML	0.5808	0.0703	-0.653	1				
UMD	0.8615	0.076	-0.2908	0.8102	1			
RMW	0.3351	-0.1235	-0.7708	0.791	0.569	1		
CMA	0.3689	0.0222	-0.5071	0.6159	0.5185	0.5097	1	
LMW	-0.9846	0.038	-0.1098	-0.5968	-0.8692	-0.3536	-0.3629	1

Table 4B: Correlation Matrix of Winner Portfolio (P25):

Table 5: Multi-Factor Regression Models on All Sample Data:

The sample data consists of 273 companies monthly stock excess returns listed on BSE 500 Index from January 2005 to December 2019. The dependent variable is monthly average excess returns of all 273 stocks. The excess returns are calculated as 273 stocks average monthly returns minus Treasury bill (Ri-Rf). The independent variables include Size factor (SMB) that is risk spread of small minus big portfolio. HML is risk spread of high book to market equity minus low book to market equity. UMD is risk spread of up-high volatility stocks minus down-low volatility stocks. RMW is returns risk spread of robust profitable firms minus weak profitable firms. CMA is returns risk spread of conservative investment firms minus aggressive investment firms. LMW is return risk spread of loser stock returns firms minus winner stock returns firms. Table 6 represent quantile regression result of all data without segregation into 25 portfolios

Factors	1-factor	3-factor	4-factor	6-factor	7-factor	Reversal
Alpha	1.436	0.679	0.639	0.331222	0.47676	0.000605
	3.45	1.83	1.93	1.15	1.77	0.15
	***	*	*		**	
MKT	0.567	0.615	0.526	0.397549	0.366511	0.000696
	9.34	12	11.25	8.81	8.67	1.13
	***	***	***	***	***	
SMB		47.163	54.649	-50.0361	-34.8779	-3.84841
		4.19	4.76	-3.92	-1.72	-22.08
		***	***	***	*	***
HML		-10.375	-39.879	-12.3698	-8.29321	-0.86026
		-1.27	-3.15	-1.05	-0.72	-5.37
			***			***
UMD			45.486	32.19418	44.62105	-1.21619
			8.01	6.34	5.5	-8.23
			***	***	***	***
RMW				-103.087	-101.525	-1.4431
				-9.51	-9.08	-20.84
				***	***	***
CMA				-19.3631	-15.4706	-0.40876

				-2.77	-2.26	-4.29
				***	**	***
LMW					6.372	
					1.52	
					***	
R-Sq	0.2256	0.3324	0.3676	0.4849	0.4873	0.5631

Table 6 A and Table 6B: Double Sorted 25 Portfolios Regression Results based on Size and past 60 months cumulative abnormal returns

The sample data consists of 273 companies monthly stock excess returns listed on BSE 500 Index from January 2005 to December 2019. The stocks are ranked in ascending order and double sorted based on market capitalization and past 60 months cumulative abnormal returns. Based on market capitalization equal weighted 5 portfolios are built with 20% quintiles criteria such that portfolio 1 gives smallest size firms and portfolio 5 gives biggest size firms. Similarly, based on past 60 months cumulative abnormal returns equal weighted 5 portfolios are built with 20% quintiles criteria from lowest monthly returns portfolio to highest monthly returns portfolio. This gave out (5*5=25) portfolios based on double sort method. The dependent variable in table 7A and 7B is equal weighted monthly average excess returns for each of 25 portfolios. The excess returns are calculated as portfolios equal weighted monthly stock returns minus Treasury bill (Ri-Rf). The independent variables include Size factor (SMB) that is risk spread of small minus big portfolio. HML is risk spread of high book to market equity minus low book to market equity. UMD is risk spread of up-high volatility stocks minus down-low volatility stocks. RMW is returns risk spread of robust profitable firms minus weak profitable firms. CMA is returns risk spread of conservative investment firms minus aggressive investment firms. LMW is return risk spread of loser stock returns firms minus winner stock returns firms. Table 7 A represent median quantile regression results of portfolio 1 and portfolio 25 to examine reversal effect in detail between highest loser P1 and highest winner portfolio P25. Table 7B represent quantile regression results of all 25 portfolios.

Table 7A: Risk Adjusted Returns Quantile Regression Models of lowest Loser Portfolio P1 and highest winner Portfolio P25:

	Raw Return	Alpha	MRP	SMB	HML	UMD	RMW	CMA	LMW	R-square
Loser P1	0.192	-0.109	0.002	-0.683	-0.415	0.005	-0.400	-0.065	0.151	0.320
		-23.75	2.21	-2.19	-2.23	0.04	-2.25	-0.63	2.33	
		***	**	**	**		**		**	
Winner P25	0.131	0.158	-0.003	16.868	4.550	4.356	4.968	2.015	-6.257	0.420

		5.67 ***	-0.79	7.69 ***	3.82 ***	5.22 ***	4.4 ***	3.15 ***	-13.68 ***	
LMW	0.069	-0.267	0.005	-17.55	-4.964	-4.351	-5.367	-2.080	6.408	0.6

Table 7B: Multifactor Regressions of 25 portfolios data sorted on Size & past 60 months cumulative abnormal monthly returns

			α						***t*(α)**		
Small	-0.1087	-0.1025	-0.1014	-0.101	-0.095	Small	-21.28	-27.13	-27.7	-25.39	-31.46
2	-0.0323	-0.0305	-0.0312	-0.0312	-0.0327	2	-14.46	-16.98	-18.05	-17.48	-17.6
3	0.0085	0.0087	0.0087	0.0101	0.0106	3	4.85	5.5	4.99	5.08	7.13
4	0.0555	0.0555	0.0568	0.0544	0.0539	4	30.14	28.67	31.45	32.87	34.44
Big	0.2049	0.1695	0.1546	0.1474	0.138	Big	10.08	11.47	0.99	15.08	3.76
			Rm-Rf						***t*(β1)**		
Small	0.0013	0.0013	0.0011	0.0012	0.0011	Small	1.75	2.2	1.84	1.84	2.3
2	0.0003	0.0006	0.0007	0.0004	0.0004	2	1.01	1.95	2.55	1.51	1.29
3	0.0004	0.0004	0.0005	0.0003	0.0001	3	1.43	1.68	1.7	1.03	0.36
4	0.0004	0	-0.0001	0.0005	0.0005	4	1.65	0.02	-0.25	2.01	1.92
Big	-0.0028	-0.0017	-0.002	-0.001	0.0002	Big	-0.91	-0.74	-0.08	-0.66	0.04
			SMB						***t*(β2)**		
Small	1.5234	-1.6173	1.3362	-1.4975	1.5491	Small	-6.5	-9.55	-8.19	-8.46	-8.2
2	-0.7941	0.1369	-0.0632	-0.0685	0.0359	2	1.01	0.55	-0.26	-0.28	0.14
3	-0.5961	0.1771	0.1911	0.1179	0.2759	3	1.36	0.84	0.79	0.43	1.36
4	-1.8671	0.0488	0.1138	0.1525	0.4003	4	0.6	0.62	0.46	2.12	1.9
Big	-0.7625	-0.7000	0.2750	0.5130	0.880	Big	20.69	10.79	1.06	15.39	5.8
			HML						***t*(β3)**		
Small	0.2760	-0.5088	-0.3374	0.4495	-0.3166	Small	-2.22	-3.09	-2.13	-2.63	-2.25
2	-0.2150	-0.0718	-0.0526	-0.0670	0.0487	2	0.56	-0.74	-0.56	0.7	0.5
3	-0.2100	-0.0521	-0.0752	-0.0062	-0.1031	3	0.13	0.63	0.8	0.06	1.28
4	-0.4530	-0.0319	0.1076	-0.0328	-0.1163	4	-1.11	0.4	1.11	0.45	1.41
Big	-0.1250	-0.0440	0.4210	0.4850	-0.2070	Big	4.13	2.7	0.26	3.52	1.37
			UMD						***t*(β4)**		
Small	-0.2393	-0.1921	-0.2837	-0.2999	-0.2978	Small	-2.82	-2.92	-4.44	-4.35	-5.06
2	0.019	0.0206	-0.0256	-0.0124	-0.0356	2	0.51	0.27	-0.35	-0.16	-0.38
3	0.0234	0.0232	-0.0058	0.0031	0.0455	3	0.34	0.35	-0.08	0.04	0.72
4	0.0181	-0.0014	0.0128	0.0141	0.039	4	0.61	-0.04	0.17	0.47	0.59
Big	5.3336	2.2629	2.3835	2.3317	3.238	Big	15.46	8.9	0.86	13.23	5.04
			RMW						***t*(β5)**		
Small	-0.6883	-0.9561	-0.8042	-0.6444	-0.6427	Small	-3.79	-5.83	-5.12	-3.77	-4.9
2	-0.1387	0.0149	-0.1016	-0.2238	-0.0848	2	-1.74	0.14	-1.01	-2.09	-0.77
3	0.0671	-0.0628	-0.0047	-0.0406	-0.0119	3	0.73	-0.73	-0.05	-0.35	-0.14
4	-0.0393	-0.1349	-0.1208	-0.0963	0.0752	4	-0.61	-1.91	-1.19	-1.53	0.87
Big	5.6419	1.6103	1.615	1.5957	2.2823	Big	7.96	3.03	0.28	4.28	1.76
			CMA						***t*(β6)**		
Small	-0.1614	-0.123	-0.0364	-0.1933	-0.1837	Small	-1.48	-1.37	-0.41	-1.92	-2.19
2	0.012	0.0254	0.0306	-0.0189	-0.079	2	0.25	0.49	0.61	-0.37	-1.39
3	0.0533	0.0229	0.0278	0.0073	0.016	3	1.16	0.51	0.55	0.13	0.37
4	0.0365	0.0379	-0.0106	0.0211	0.0857	4	0.94	0.88	-0.2	0.54	1.91
Big	1.7997	0.5956	0.8881	0.9389	1.1087	Big	4.18	1.81	0.25	4.07	1.38
			LMW						***t*(β7)**		

Small	0.1482	0.0634	0.1617	-0.1512	0.1034	Small	0.85	0.47	1.26	-1.09	0.95
2	0.0403	0.025	0.0306	0.0458	0.0388	2	0.54	0.39	0.5	0.71	0.54
3	0.0547	0.0705	0.0647	0.0628	0.1059	3	0.93	1.25	1.05	0.89	1.94
4	-0.0112	0.0818	0.0939	0.1058	0.0803	4	-0.19	1.22	1.48	1.75	1.43
Big	-0.3846	0.1629	-0.076	0.0919	0.2912	Big	-0.58	0.33	-0.01	0.27	0.25