# The background of momentum strategies finance essay

Finance

MOMENTUM STRATEGIESA report submitted in the partial fulfillment of the degree of BFIASubmitted byAshaya Jain75014Shaheed Sukhdev College of Business StudiesCertificateThis is to certify that the project report entitled ‘ Momentum Strategies’ is a project work carried out by Ashaya Jain at Shaheed Sukhdev College of Business Studies for partial fulfillment of BFIA. This report has not been submitted to any other organization for the award and other degree/Diploma. ContentsContentsAcknowledgementThrough this report I would like to take the opportunity to thank everyone who has made this report possible. First of all I would like to thank Ms. Vibhuti Vashisht, mentor, for giving me her much-needed guidance at every step. Then, I would like to thank Mrs. K. R. Shankar, HOD of BFIA, for her continued support and assistance. Last but not the least; I would like to thank everyone who interacted with me in one way or the other to help me successfully complete my research. Project Report Title: Momentum StrategiesArea of Project Work: FinanceName of the student with signature: Ashaya Jain _____Examination Roll Number of Student: 75014Name of the Supervisor with signature: Ms. Vibhuti Vashisht _____Name & Address of the college: Shaheed Sukhdev College of Business Studies, Vivek Vihar, Jhilmil Colony, Delhi-110095

## Abstract of the work being carried out-

Momentum strategies have drawn great attention in the past 2-3 decades. Through this research we try to figure out if momentum profits are possible in the Indian markets and which risk model absorbs these momentum profits in the best manner. The trading strategies can be classified into contrarian and momentum. Contrarian strategies are based on price reversal (i. e. past

losers are future winners) while momentum strategies are based on price continuation (i. e. past winners remain future winners). The strategies have been found time dependent. The contrarian strategies perform well for very short term (0 months - 3 months), see Lo and MacKinlay (1990) and long term (3 years - 5 years), see De Bondt and Thaler, (1985, 1987) while momentum strategies perform well for short term (3months - 12 months), see Jegadeesh and Titman, (1993). For identifying momentum profits, we have taken the data of NSE-500 for the past 10 years as it covers a major part of the total market capitalization and has companies which spread across various industries. The monthly average prices are taken and are adjusted for stock splits, bonus issues, dividends, etc. The RBI's 91-day T-bills are taken as the proxy for the risk free rate of return. We apply 12 month- 12 month strategy which involves a 12 month formation period followed by a 12 month holding period i. e. the stock movements are observed for the first 12 months and then the stocks so selected are held for 12 months. The portfolio has all the stocks in equal weightage and these are readjusted at the end on every month. We form 2 kinds of portfolios; the winner portfolios (Pn) and the loser portfolios (P1). We go long in the winner portfolio and short in the loser portfolio to form a zero balance portfolio. Hence, our total return is ' Pn – P1'. Then we check how much of these returns are absorbed by the CAPM and Fama French model. The excess returns (α) are tested for significance (1- tailed test). If the returns are significant (5% level), we can conclude that momentum profits do exist in the Indian Markets.

# Introduction

A lot of research in the past has indicated that the trading strategies based on past return can yield abnormal returns. This indicated towards the fact that the markets are Weak-form Inefficient. In weak-form efficiency, future prices cannot be predicted by analyzing prices from the past. Excess returns cannot be earned in the long run by using investment strategies based on historical share prices or other historical data. Technical analysis techniques will not be able to consistently produce excess returns, though some forms of fundamental analysis may still provide excess returns. Share prices exhibit no serial dependencies, meaning that there are no " patterns" to asset prices. This implies that future price movements are determined entirely by information not contained in the price series. Hence, prices must follow a random walk. This 'soft' EMH does not require that prices remain at or near equilibrium, but only that market participants not be able to systematically profit from market 'inefficiencies'. Since we base our strategies on past returns, we are assuming the markets to be Week-form Inefficient.[1]These trading strategies can be divided into 2 groups: Momentum Strategies: that state that the stock price will continue with its current movement i. e. past winners will be future winners and past losers will be future losers. Contrarian Strategies: that state that the stock price will see a trend reversal in the future i. e. past winners will be future losers and past losers will be future winners. Momentum is the empirically observed tendency for rising asset prices to rise further, and falling prices to keep falling. For instance, it was shown that stocks with strong past performance continue to outperform stocks with poor past performance in the next period

with an average excess return of about 1% per month (Jegadeesh and Titman, 1993, 1999). The existence of momentum is a market anomaly, which finance theory struggles to explain. The difficulty is that an increase in asset prices, in and of itself, should not warrant further increase. Such increase, according to the efficient-market hypothesis, is warranted only by changes in demand and supply or new information (cf. fundamental analysis).[2]Jegadeesh and Titman (1993), document strategies which buy stocks that have performed well in past and sell stocks that have performed poorly in the past generate superior returns over 3 - 12 months period thus suggesting strong momentum profits for U. S. market. Rouwenhorst (1998) report momentum strategies are profitable for equities in 12 European markets. Moskowitz and Grinblatt (1999) document strong industry momentum effects, whereas Grundy and Martin (2001) show that momentum strategies have been profitable in the U. S. market since 1920's.[3]The probable cause behind momentum returns is believed to be that investors underreact to firm specific news. It is believed that investors initially underreact and later overreact to any firm specific news or information. It has also been noted that such strategies work well for smaller companies with low analyst attention. Conrad and Kaul (1998) argue that profitability of momentum strategies is due to cross-sectional variation in mean returns of individual securities. In short, momentum traders seek to exploit the suboptimal behaviors of others. To establish that the momentum strategies yield abnormal returns, we test them against the risk-return models. The popular risk factor models are that Capital asset pricing model and the Fama French model. CAPM is a one factor model with market return

as the only risk factor. This test was vastly used until it was challenged by the Fama French 3-Factor model, which includes firm size, market and value, which explain the cross-sections of returns better than the CAPM model. Fama French model claimed to capture most of the inconsistencies of the CAPM model but yet failed to capture the momentum returns.

## Capital asset pricing model

It is a model for pricing an individual security or portfolio. For individual securities, we make use of the security market line (SML) and its relation to expected return and systematic risk (beta) to show how the market must price individual securities in relation to their security risk class. The SML enables us to calculate the reward-to-risk ratio[clarification needed] for any security in relation to that of the overall market. Therefore, when the expected rate of return for any security is deflated by its beta coefficient, the reward-to-risk ratio for any individual security in the market is equal to the market reward-to-risk ratio, thus: frac {E(R_i)- R_f}{eta_{i}} = E(R_m) - R_fThe above formula can be rearranged as follows: E(R_i) = R_f + eta_{i} (E(R_m) - R_f), where: E(R_i)~~ is the expected return on the individual security or a portfolio. R_f~ is the risk-free rate of interest. In our case it will be the return on 91-day T-billseta_{i}~~ (the beta) is the sensitivity of the expected excess asset returns to the expected excess market returns, E(R_m)~ is the expected return of the market

## Fama–French model

The traditional asset pricing model, known formally as the Capital Asset Pricing Model, CAPM, uses only one variable, beta, to describe the returns of

a portfolio or stock with the returns of the market as a whole. In contrast, the Fama–French model uses three variables. Fama and French started with the observation that two classes of stocks have tended to do better than the market as a whole: (i) small caps and (ii) stocks with a high book-to-market ratio (BtM, customarily called value stocks, contrasted with growth stocks). They then added two factors to CAPM to reflect a portfolio's exposure to these two classes: r= R_f+eta_3(K_m-R_f)+b_scdotmathit{SMB} +b_vcdotmathit{HML}+alphaHerer is the portfolio's expected rate of return, is the risk-free return rateis the return of the whole stock market. The " three factor" eta is analogous to the classical eta but not equal to it, since there are now two additional factors to do some of the work. mathit{SMB} stands for " small (market capitalization) minus big" and mathit{HML} for " high (book-to-market ratio) minus low" This paper studies the momentum returns for Indian markets. This study covers the period from January 2001 to December 2012. We test the returns for portfolios based on past returns (single sorted) and past returns and company characteristic.

## DATA and SOURCE

The data comprises of monthly share prices adjusted for stock splits, stock dividends and rights issues of 500 companies that form a part of National Stock Exchange4 CNX-500 index5 from January 2001 to December 2012. The data is obtained from Capitaline software. The sample companies account for more than 96 percent of market capitalization and trading activity in Indian equity market. Hence our data set fairly represents market performance. The monthly stock prices are converted to monthly return series. The other characteristics like market capital, PE ratio and BV/P ratio have also been

obtained from Capitaline software. The monthly return on 91-day treasury bills had been used as the proxy for risk free rate of return. The data for the same has been obtained from Reserve Bank of India (RBI) website.

# Methodology

## Single sorted portfolio

We first sort the securities on the basis of past returns. The returns of t-1 period are sorted in ascending order. The top 100 stocks (with lowest returns) form portfolio P1, the next 100 form P2 and likewise the last 100 (with highest returns) form portfolio P5. On the basis of this, we go long in portfolio P5 in time period t. Using this methodology we form the portfolios for the 12-12 and 6-6 strategy. 12-12 strategy means we have a 12 months formation period and 12 months holding period. Similarly for 6-6 strategy we have a 6 months formation period and 6 months holding period. The process is repeated till we reach the end of the sample period.

## Double sorted portfolios

These are formed on basis of company characteristic and past returns. In the time period t-1, the companies are divided into 2 groups, Low (bottom 50% P/E ratio, E1) and High (top 50% P/E ratios, E2). This is called independent sorting as both categories of portfolio formations i. e. on basis of returns and on basis on P/E, are independent of each other. Now we club the two categorizations to get 10 portfolios namely, P1E1, P2E1, P3E1, P4E1, P5E1, P1E2, P2E2, P3E2, P4E2 and P5E2. We go long in P5E1 i. e. the portfolio with maximum past returns and low P/E. To calculate the returns of our holding portfolio we take the simple average of the monthly returns of the stocks in

this portfolio as we are allocating equal weightage to each stock. Thus we get a series of monthly returns from 2002 to 2012 for single sorted and double sorted portfolios for 12-12 and 6-6 strategy.

## Calculating (Ri – Rf)

After calculating the returns for the portfolios under 12-12 and 6-6 strategy, both by single sorting and double sorting (Ri), we reduce the returns by the risk free rate to get the excess returns (Ri-Rf). Rf is obtained for each month by dividing the annualized yield of the 91-day T-bill issued in the first week of the corresponding month by 12.

## Calculating Rm-Rf

The returns for the CNX500 index are taken as the proxy for market return as the index accounts for 96% of the market capitalization. Hence, its result closely reflect the movement of the entire market.

## Constructing SMB and HML

Firstly, the companies were categorized into 2 groups based on their size (market capitalization). The categorization in time period t was done on the basis on the yearly average market capitalization of time period t-1. The companies are sorted in descending order of market capitalization. The top 90% are categorized as ‘ Big’ (B) while the bottom 90% are categorized as ‘ small’ (S). Then we sort the stocks on the basis of their book to market ratio or Book value to price ratio. The categorization in time period t was done on the basis on the BV/P ratio of time period t-1. The companies were sorted in descending of their BV/P ration. The top 30% were categorized as ‘ Value’, the next 40% were categorized as ‘ Neutral’ and the next 30% were

categorized as ‘ Growth’. Then we formed 2X3 portfolios, namelyBig ValueSmall ValueBig NeutralSmall NeutralBig GrowthSmall GrowthWe calculate the monthly returns for each portfolio by taking the simple average of all the stocks that form a part of it in that particular year.

## SMB = 1/3(Small Value + Small Neutral + Small Growth) – 1/3(Big Value + Big Neutral + Big Growth)

## HML = ½(Big Value + Small Value) – ½(Big Growth + Small Growth)

## Testing with CAPM

Now that we have 4 portfolios: 12-12 StrategySingle sortedDouble Sorted6-6 StrategySingle sortedDouble SortedWe test each of these with the CAPM model using regression analysis with 95% confidence interval. We get α and β values.

## Ri - Rf = α + β (Rm - Rf)

## H0 = the α value is insignificant

## H1 = the α value is significant

For our theory that the momentum portfolios give abnormal returns, we need a p value < 0. 05 so we can reject the null hypothesis. A significant α value means that we are earning abnormal returns.

## Testing with FAMA FRENCH MODEL

The above mentioned 4 portfolios are tested with the Fama French model to check for any abnormal returns. r= R_f+eta_3(K_m-R_f) +b_scdotmathit{SMB}+b_vcdotmathit{HML}+alphaAfter applying regression analysis, we get the values for α, β3, bs , bv. If the value of α is

significant, we can conclude that the model fails to capture the effect of price momentums in the market.

## Results

## CAPM

StrategyCoefficientst StatP-value6-6 strategySingle Sortedα0. 0166797054. 2856352440. 0000342627β0. 98301610520. 6433319. 64641E-44Double Sortedα0. 0159579953. 1140765030. 002292018β1. 10639599417. 915529443. 31005E-3612-12 StrategySingle Sortedα0. 0087373792. 2012522220. 029483051β1. 03632271821. 274773493. 58494E-44Double Sortedα0. 0087171362. 0857872430. 039152963β1. 09594627422. 036266281. 22574E-43The α coefficients show the abnormal profits earned per month. However, to reject the null hypothesis we have to check the P-value. In all the above cases, P-value <0. 05 (or t Stat > 2), thsu we reject the H0 and accept the H1. Hence, all the strategies can be applied to generate abnormal returns. In other words, the CAPM fails to explain the momentum profits.

## FAMA FRENCH MODEL

StrategyCoefficientst StatP-value6-6 strategySingle SortedIntercept0. 0081610842. 1722099710. 031682473CNX 5000. 947865920. 673764461. 28769E-42SMB0. 3730636225. 8275000314. 30815E-08HML0. 2086157133. 5343862230. 000569479Double SortedIntercept0. 0080438451. 6673107620. 098017683CNX 5001. 0355457117. 870804287. 27842E-36SMB0. 4968885035. 2540868676. 4076E-07HML0. 3654791054. 6811290237. 45958E-0612-12 StrategySingle SortedIntercept0.

0032246320. 8427032420. 400966333CNX 5001. 03991505322. 269527887. 39853E-46SMB0. 2798051934. 2913667723. 47326E-05HML0. 0396451150. 6594732070. 510776713Double SortedIntercept0. 0012045450. 3104016680. 756812537CNX 5001. 06495927523. 235925071. 87031E-45SMB0. 4511248986. 0569244731. 76044E-08HML0. 192056253. 0798488040. 002586157In the above table, it is clear that the P-Value < 0. 05 only in case of Single Sorted 6-6 Strategy. In all the other cases, it greater than 0. 05. This means that only for Single Sorted 6-6 Strategy we reject H0 and accept H1 i. e. we get a significant abnormal return as a result of this strategy. For the other 3 strategies, the α value is insignificant, hence, we cannot earn abnormal profits in the long run.

## Conclusions

The above results clearly indicate that the CAPM model is not able to explain the abnormal returns in any of the portfolios. This may be due to the already established shortcomings of the CAPM model that there are other factors like cross sectional variances which may affect the returns of stocks over a period. Also the CAPM explains 72-80% of the movement in the portfolios. The remaining may be attributed to a variety of causes, momentum returns being one of them. As far as Fama French model in concerned, only the 6-6 single sorted strategy is able to give abnormal returns. in all other cases, the model explains the movement of the stocks and the momentum strategies are not successful. The reasons behind the strategies not working can be that in case of 12-12 strategies, the portfolios are not revised as often as the 6-6 strategies. Thus, they don’t remain as updated as in case of 6-6 strategies. In case of 6-6 double sorted portfolios, one of the sorting factors

(P/E Ratio) is similar to one of the construction factors of Fama French (BV/P Ratio). Hence the model is able to capture the effects of this strategy. Although the Fama French model explains 78-86% of the movement is the portfolios, yet there are some factors which are outside the purview of the model. Our evidence has important implications for portfolio managers and investment analysts who are continuously in pursuit of trading systems that provide extra normal returns. Our research contributes both to asset pricing as well as behavioral finance literature.