Momentum Factor in Indian Markets: Evidence from the long side

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Abstract

Markets are frequently efficient but not always efficient. Hence, “Active” investors or those who engage in the activity of security selection and keep the market efficient must be compensated for their efforts and consequently earn a premium. Therefore, markets will always have passive and active investors. It is not easy however to earn premium as an active or quasi active investor. No pain No premium. Factor investing is a quasi-active style of investing which takes the rules-based features from passive investing and the feature of tilt towards an investment style from active investing. We look at why factor investing works over time. We ask if Momentum investing works in India. Since factor premiums are measured as spread between a long and short portfolio and there are constraints and frictions to shorting stocks, we examine if momentum factor works if we implement it only on the long side. We also see if accounting for the lottery effect and factoring in volatility adds value i.e. enhances returns or reduces volatility of a generic momentum strategy.

Momentum Factor in Indian Markets
Evidence from the long side

Introduction

Investment management industry can broadly be divided into two main functional parts:

Asset Allocation (how much to allocate to equity, debt, gold and real estate). The Asset Allocation decision is typically implemented using passive instruments like broad based index funds. Investors who solely use broad based indexes which give market returns are called "Passive" investors.

Security Selection (which stocks to buy and sell). This i.e., security selection involves taking a view on prospects of individual companies. This set of investors is called "Active" investors.

There is nothing passive about broad based indices like Nifty 50, Sensex 30, S&P 500 or the Nasdaq 100. It is more on the continuum of decision making and the beliefs that these investors have about the markets that this distinction is made between "Passive" and "Active" investors.

Efficient Market Hypothesis

Observing correctly that the market was frequently efficient, [EMT adherents] went on to conclude incorrectly that it was always efficient. The difference between these propositions is night and day.

Berkshire Hathaway Inc. 1988 Annual Report

The Efficient Market Hypothesis (EMH), an important concept underpinning financial markets, states that asset prices reflect all available information and there is no pattern in past prices that can have a bearing on future prices. Hence, "Active" investors or those who engage in the activity of security selection, cannot do better than the overall market. This hypothesis has some interesting consequences. For the market to be efficient, there must be market participants who price in information into security prices and play an "Active" role in making the market efficient by their actions. And for them to do this, there must be enough incentive or profits. So, if there are no "Active" investors, there is no one to make the market efficient, because "Passive" investors are price takers. This is a paradox that till date continues to be a conundrum for the EMH theory. This is also called the Grossman-Stiglitz paradox which says

that if asset prices **perfectly** reflected all information, then there would be no reason for anyone to collect information and trade assets, so asset prices could not perfectly reflect all information. Therefore, by the above argument, the market is always in the process of being pushed towards equilibrium or efficiency by investors who must be compensated for this. So, the market is **"frequently efficient"**. This gives rise to various methods or styles by which "Active" investors can earn their premiums.

Factor Investing: Passive and Active

In recent times a strategy called factor investing, which is quasi active, has come to the fore. It is quasi or semi active because it not as passive as buying an index fund, but neither is it as active as taking a view on individual stocks. Factor investing **tilts a portfolio towards an investment style or theme** like quality, value, or momentum. Factor investing is also known as "Smart Beta" or "Active Beta". Beta coming from the passive qualities of factor investing and "Smart" or "Active" coming from its similarity to active investing.

Therefore, Factors are simply properties or a set of properties that are common across a broad set of securities. Factors can also be defined as a quantitative way to express a qualitative theme like quality, value, or momentum. In this paper we take a closer look at the Momentum Factor.

Momentum Factor and The World's Longest Backtest

We discovered the world was not flat before we understood and agreed why.

Cliff Asness

Momentum in security prices exist and can be proven by empirical data and trends. Momentum is defined as the tendency for assets with a positive trend to continue to do well, and those that are falling continue to slide.

"The existence of momentum is a well-established empirical fact. The return premium is evident in 212 years (yes, this is not a typo, two hundred and twelve years of data from 1801 to 2012) of U.S. equity data, dating back to the Victorian age in U.K equity data, in over 20 years of out-of-sample evidence from its original discovery, in 40 other countries, and in more than

a dozen other asset classes. Some of this evidence predates academic research in financial economics, suggesting that the momentum premium has been a part of markets since their very existence, well before researchers studied them as a science."[1]

Academics have not yet agreed on why, but Momentum as a factor or investment style, works. However, there isn't a unified theory or a catchy story on why it works. It has worked for over 200 years, though it was academically discovered only about twenty-eight years ago.

Dimensional Fund Advisors, (AUM $640 bn), where Gene Fama is a co-founder say that "Using momentum signals to inform buy and sell decisions can enhance returns when the momentum premium is positive, without incurring high and costly turnover"[2]. They go on to say that **information in the momentum premium** can be used when buying and selling stocks in general. **DFA uses momentum when it is already making decisions to enter or exit stocks**. This is a huge vote of confidence from those who say Momentum is a premier anomaly which should not exist (as it doesn't fit into the EMH theory framework). Jim Simons makes the point that empirical data backed by robust out of sample testing outranks an elegant theory however logical it may sound if it doesn't work in the real world and data does not support it. We must beware of curve fitting because any data set can be tortured enough to confess what one wants it to say.

Why do Factors or Investment Styles work even after they are discovered?

There are two broad reasons why factors work: Risk premium and Behavioural mispricing. In 2013, twenty years post the academic rediscovery of momentum investing Cliff Asness with his colleagues at AQR wrote a paper titled "Fact, Fiction and Momentum Investing" where they give their rationale for why momentum works.

- **Behavioural** – The most accepted behavioural theory for momentum factor is that investors have time frames from a day to decades and they take their time in expressing their view on new information that comes in i.e. there is underreaction at first and then gradually the information gets factored in. The other reasons could be that investors are conservative, are facing liquidity issues or are simply displaying the disposition effect.

[1] Asness, Frazzini, Israel and Moskowitz, Fact, Fiction and Momentum Investing (2014)

[2] https://www.dimensional.com/us-en/insights/have-investors-benefited-from-momentum-strategies

- **Risk** – The risk-based model put forth states that "high-momentum stocks face greater cash flow risk because of their growth prospects or face greater discount rate risk because of their investment opportunities, causing them to face a higher cost of capital."

Momentum, however, is quite difficult for many accept due to its simplicity and reliance on past prices to express a view on future returns. It is so simple to be happy, but it is so difficult to be simple, said Nobel Laureate Tagore. The simplicity of the momentum strategy is deceptively difficult to execute consistently and makes the behavioural rationale to be a more likely one. But is not easily arbitraged away and hence is robust over periods because it works over-time and not all the time. No pain, No Premium.

Heart of CANSLIM: Leading Stocks or Stocks with high Relative Strength

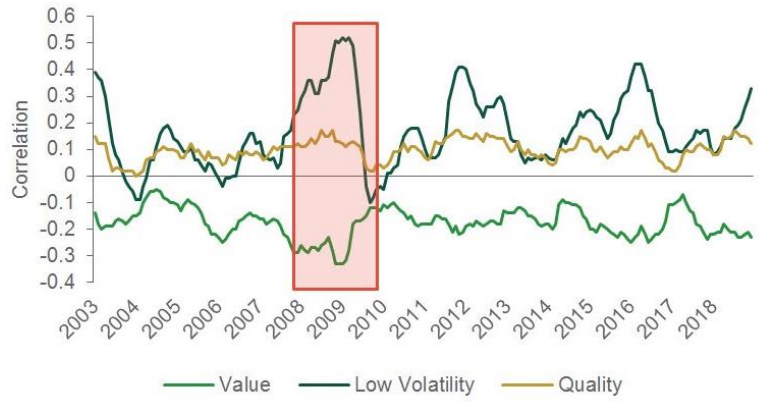
CANSLIM, created by Investor's Business Daily William J. O'Neil, is a system for selecting growth stocks using a combination of fundamental and technical analysis techniques[3]. It also uses Momentum, also called Relative Strength, in his model. The "L" in CANSLIM stands for Leader or Leading Stocks. In his all-time bestselling book called "How to Make Money in Stocks", O'Neil writes that the average Relative Strength Rating of the best performing stocks **BEFORE** their major run ups was 87 i.e. the stocks with an RS score of 87 or above were out performing 87% of all other companies in terms of price performance. In other words, the best stocks were already doing better than nearly 9 out of 10 others when they were starting out on their most explosive advance yet. In July 2020 O'Neil Global Advisors Inc., quantitative research team released a white paper called "RS Rating: It's All Relative" [4]. The key finding of this paper was that portfolio of stocks in the top 20% of RS Ratings have higher returns and lower volatility than those in the bottom 20%. These effects were also consistently robust over market cycles.

[3] https://www.investors.com/ibd-university/can-slim/

[4] https://www.oneilglobaladvisors.com/documents/FG/oneil/research/605570_OCM_Relative_Strength_Rating-OGA.pdf

Momentum Factor and Factor Momentum

Ehsani, Sina and Linnainmaa, Juhani T (2020) state that momentum in individual stock returns emanates from momentum in factor returns. Most factors are positively autocorrelated. Their results suggest that momentum also tends to time other factors.



The momentum factor also tends to have an overlap with other factors like quality and low volatility[5]. Thus, there may be stocks from the quality and low volatility universe of stocks which appear in the momentum factor universe of stocks. The only factor with which momentum has a negative correlation with is the value factor. And that factor can be added to a momentum portfolio to have a diversified factor portfolio.

Implementation and Robustness

Momentum factor also uses only price returns and is simple to implement as no accounting data or other sources are required. Its simplicity, however, does not stand it the way of being robust across markets and time periods. Van Vliet and Blitz (2018), use only past returns and shareholder yield to implement their Conservative Formula which is designed to make quantitative investing easy for investors by using three simple investment criteria which gives positive exposure to well known factors such as low-beta, quality, momentum, and value in one portfolio.

[5] https://pointofview.northerntrust.com/handle-the-momentum-factor-with-care-f6a9f7ff30aa

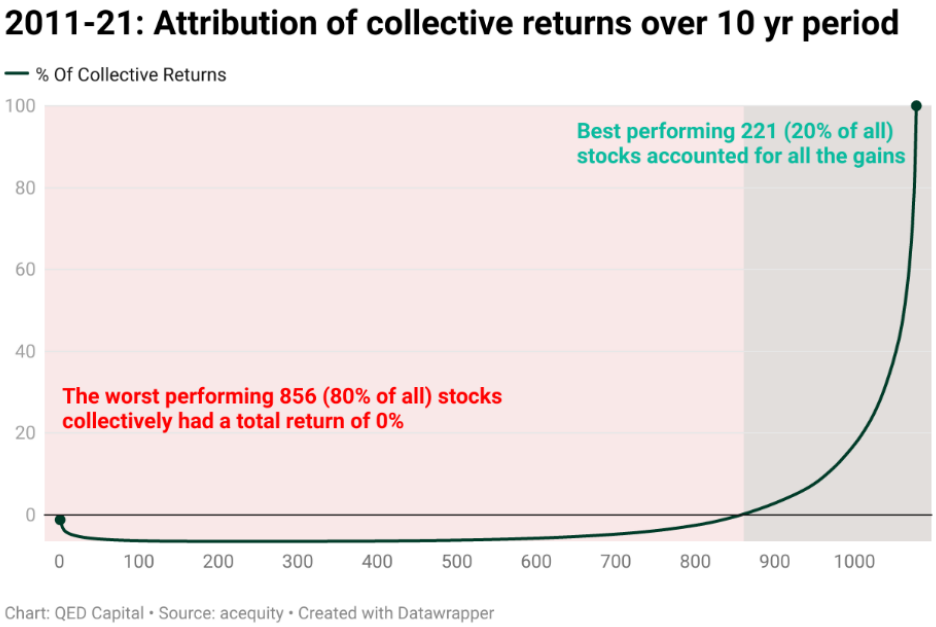
Avoiding Losers More Important Than Picking Winners

PARETO PRINCIPLE: OVER 80% OF STOCKS HAVE A LIFE-TIME RETURN OF ZERO

"Let me know where I am going to die, and I will never go there."

Charlie Munger

"The Capitalism Distribution" by Longboard Asset Management[6]. It stated over the long run 20 years, the 2000 (25% of all) best performing stocks accounted for all the gains in the stock market. In 2016, we looked at the data for to see if the same was true for Indian stocks. We looked at stocks listed on the NSE over a ten-year period from 2006 – 2016. And it turned out to be true for Indian stocks too. In fact it was even lower. Only 17% of stocks accounted for all the gains in the market between 2006-2016. We updated this for 2011 – 2021 period and found the numbers didn't change materially. About 20% of all stocks accounted for all the gains in the period 2011-2021.



This leads to the question Should we be doing something in which we have 1/5th odds of winning or focusing on something in which we have 4/5th odds of succeeding. If we focus on

[6] The Capitalism Distribution by Longboard Asset Management

weeding out losers and staying with winners, we need a strategy which helps us systematically execute this simply based on price input.

When Munger urges us "Invert always invert", he is telling us that, to build a portfolio winners we must avoid picking losers.

Does the Momentum Factor Work In India?

The short answer is Yes. Now let us look at the data.

Momentum is defined, as the tendency for assets with a positive trend to continue to do well, and those that are falling continue to slide. Therefore, to implement this we rank stocks based on their returns over the look back period of say 3-12 months. This medium term look back period is what Jegadeesh and Titman(1993) find to be the optimum look back time frame to capture momentum signals. They find returns and prices to be mean reverting in the short-term period like a month or in long term periods like 3-5 years. In a long only portfolio, we buy the top-ranking stocks and hold them for a month before carrying out the previous step again. Stocks that have dropped out the top ranks are sold and those that have taken their place are bought. For details on these implementation steps please see the Appendix.

Does this simple strategy work on Indian stocks? This question has been answered by many studies done on this factor in India and the most comprehensive one is done by Agarwalla, Koshy and Varma (Four Factor Model In Indian Equities Market, 2014).

NSE Indices Ltd. has also launched Factor indexes also called Smart Beta or Active Beta indexes on various factors. We compare the returns of Winner Big to the Nifty 200 Momentum 30[7] (Momentum 30) index returns and the Nifty 50 returns from 2005-2014 to see in-sample results and from 2014 to 2019[8] to see out of sample results.

[7] https://www.niftyindices.com/indices/equity/strategy-indices/nifty200-momentum-30

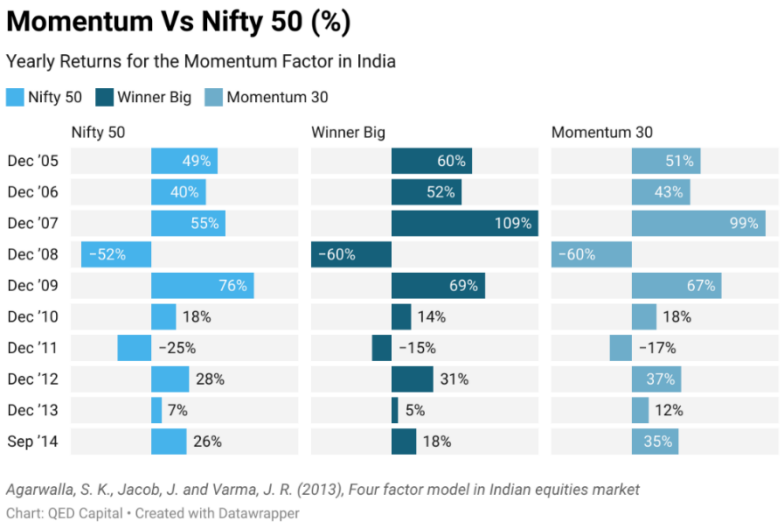
[8] Winner Big portfolio returns are available only till 2019

Annual Returns	Nifty 50	Winner Big	Momentum 30
2005-2014*	16.3%	19.4%	20.2%
2014-2019^	12.2%	19.5%	19.7%

**In Sample Returns ^Out of Sample Returns*

Table: QED Capital • Source: Agarwalla, S. K., Jacob, J. and Varma, J. R. (2013), Four factor model in Indian equities market, nseindia.com • Created with Datawrapper

Both in sample data and out of sample (OOS) data show that Winner Big and its proxy, Momentum 30 outpace the Nifty 50. In fact, in the OOS period i.e., 2014-2019, the spread between momentum portfolios and the broad based index widens.



Agarwalla, S. K., Jacob, J. and Varma, J. R. (2013), Four factor model in Indian equities market

Chart: QED Capital • Created with Datawrapper

We therefore use Momentum 30 as a proxy for Winner Big Momentum portfolio and extend the study to June 2021.

If one looks at the yearly returns chart (in sample period), one will see that momentum did much better than the Nifty 50 in 2007, but also had a larger fall in 2008. We look at how we can improve this aspect and make the generic momentum strategy more implementable with lesser volatility.

"Quality" of Momentum – The path matters

Momentum has been studied by academic researchers and practitioners for over 20 years now. Various ideas on improving the generic momentum strategy have been examined in detail.

A series of frequent gradual changes attracts less attention than infrequent dramatic changes. Investors therefore under react to continuous information.[9]

The general conclusion that many have arrived to is one of the robust ways to improve a generic momentum strategy is to look at the **path** through which a stock fulfils the criteria of being a momentum stock. Vogel and Gray give an analogy of "Frog in Pan"[10]. If a frog is put in a pan of boiling water, it will immediately jump out. However, if the same frog is put in a pan of room temperature water and then the temperature is increased gradually, the frog will sit in the pan longer until it is fully cooked. What they are trying to convey is that if a stock moves 50% or 100% up or down in a noticeably short period of time, it will attract attention from investors and will get priced very quickly. This is also called the Lottery Effect[11]. Whereas a stock which moves along in a grinding or less volatile manner, will get lower attention from investors and hence there is more returns to be made when such a stock is bought. The trend is also much smoother in the latter case. Andreas Clenow[12] also outlines the use of volatility as an important input to improve a generic momentum strategy.

Adding volatility as an input in a generic momentum strategy may cause it to underperform in strong uptrends. However, one must be mindful of the Rouchefoucald maxim that states that we all have strength enough to bear the misfortunes of others. This is important, because in down years the generic momentum strategy has larger drawdowns than the market index and in the context of higher returns it may appear that we will be able to bear the pain of large drawdowns.

[9] Da, Gurun, Waracha (2014)
[10] Vogel and Gray, Quantitative Momentum
[11] https://www.cnbctv18.com/market/the-lottery-effect-why-investors-get-attracted-to-beaten-down-stocks-7174811.htm
[12] Clenow, Stocks on the Move

At QED Capital, we have been running our momentum strategy called Q-Mom (Quality[13] Momentum) within our AlphaBets portfolio. Volatility of the stock is also an input in our process of measuring momentum rank of a stock. Stocks that have low volatility are ranked higher than those that have high volatility.

Out of Sample Period Analysis

We look at the OOS sample period results for Momentum 30 and our volatility adjusted momentum portfolio. We find that by adding volatility to the generic momentum measure, results in better returns as well as lower volatility even in the monthly return stream. We present the monthly metrics below.

2014 - 2021

Monthly Returns	Nifty 50	Momentum 30	Q-Mom
Average	1.2%	1.8%	2.0%
Max	14.7%	13.9%	14.0%
Min	−23.2%	−19.4%	−13.3%
Std Dev	5.0%	5.0%	4.4%
Max DD	−29.3%	−21.7%	−17.0%

Table: QED Cap • Created with Datawrapper

The OOS period annual results show that using volatility adjusted momentum ranking has not reduced the returns but has resulted in lower drawdown and lower standard deviation.

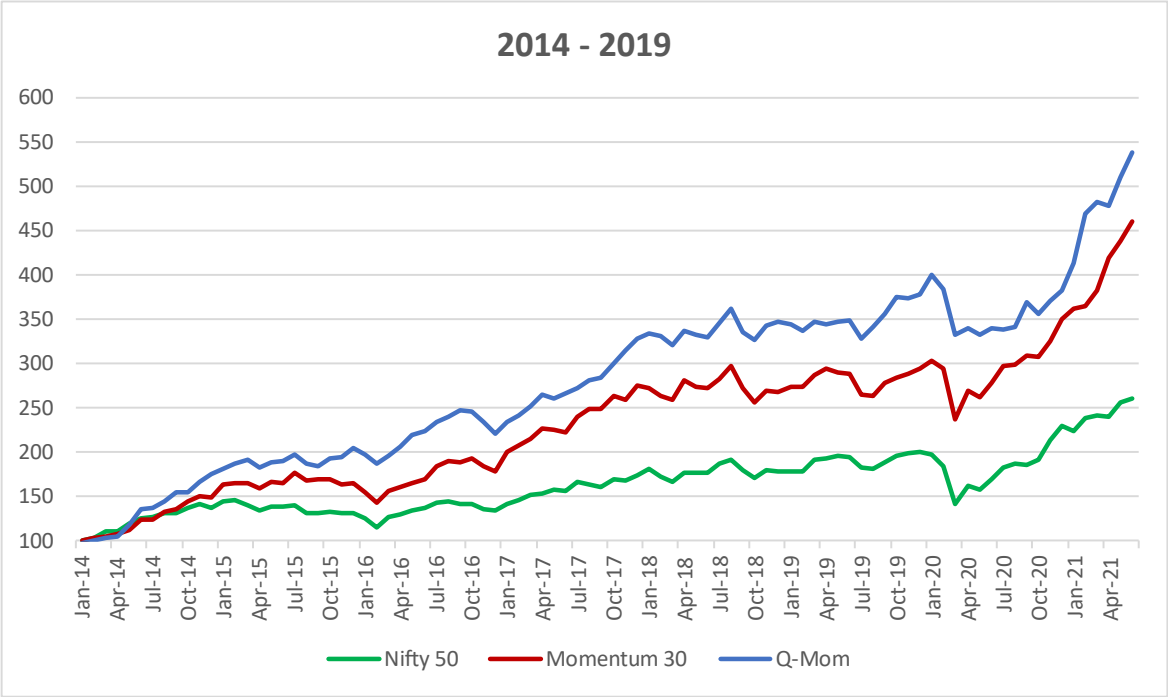
2014-2021

Annual	Nifty 50	Momentum 30	Q-Mom
Returns	13.6%	22.6%	25.8%
Volatility	17.2%	17.3%	15.4%
Max DD	−29.3%	−21.7%	−17.0%

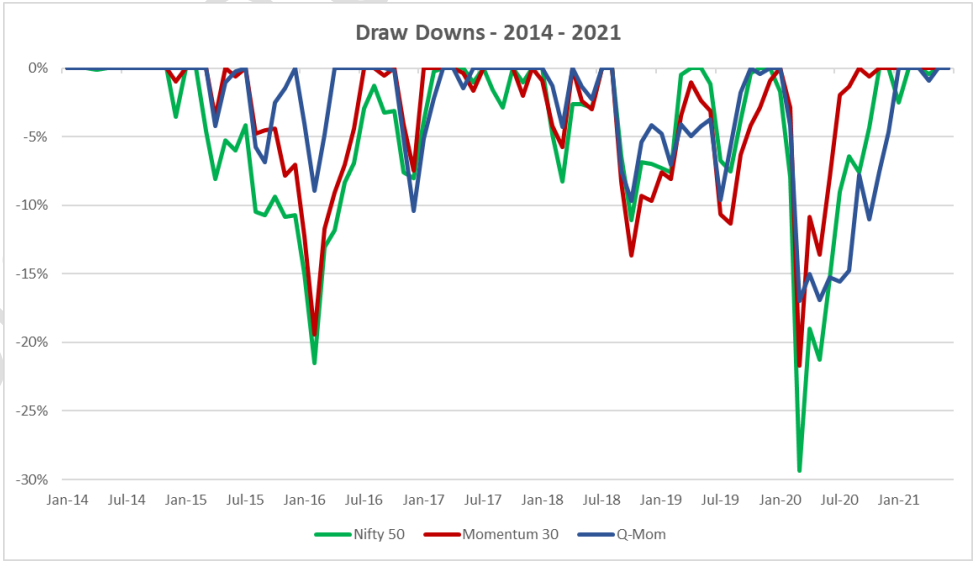
Table: QED Capital • Created with Datawrapper

[13] Quality here is measured by volatility of the return path refers to quality of momentum

Rs. 100 invested in 2014 in the Nifty 50 would have grown to Rs. 261 by 2021. A similar amount invested in the Momentum 30 and Q-Mom would grow to Rs. 461 and Rs. 538 respectively. This (as shown in the table above) translates into CAGR of 13.6% for the Nifty 50 vs 22.6% for the Momentum 30 portfolio with almost similar volatility in returns.



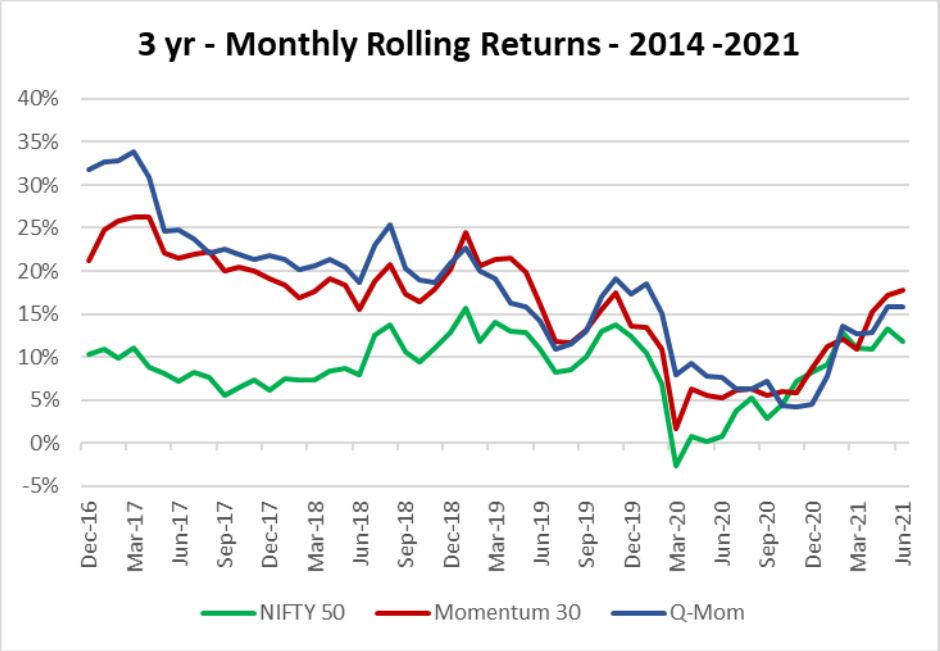
Drawdowns in the Momentum 30 and Q-Mom portfolio has been much lower than the Nifty 50 in the post 2014 OOS sample.



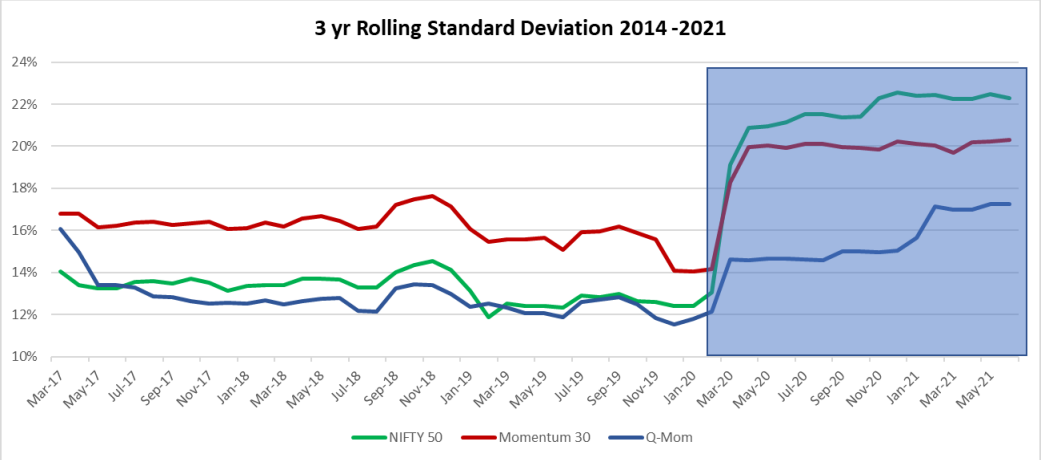
Even in the most volatile period in the OOS period, i.e. March 2020, Nifty 50 saw a much larger drawdown than the Momentum 30 and Q-Mom also with spike in volatility.

3 years monthly rolling metrics.

Point to point returns can be susceptible to starting point bias. So, we look at 3 year monthly rolling returns for the period. The best 3 year returns for the Nifty 50 are 16% vs 26% and 34% for Momentum 30 and Q-Mom respectively. The Nifty 50 sees a minimum return of -3% while for Momentum 30 and Q-Mom it does not dip into negative territory over a monthly rolling 3-year period. In hindsight, this has been an extraordinarily strong period for the momentum factor.



The monthly rolling standard deviations chart below shows that in the pandemic fall, the volatility of the broad-based index expanded and went much higher than even the Momentum 30 or generic momentum strategy and remains elevated. The volatility of the Q-Mom or volatility adjusted momentum was lower than generic momentum strategy and in line with the broad-based index. It also jumped in the post pandemic period but is still much lower than the broad-based Nifty 50 index and the Momentum 30 index.



Conclusion

The data presented shows that even a generic momentum factor strategy can give a premium over a broad market index consistently over a period of 3 years and above. Adding a measure of volatility or the path taken by a security on its way to becoming a momentum or high return stock, does add value in reducing volatility without compromising returns. This makes a volatility adjusted momentum strategy more implementable than a generic momentum strategy and it is more likely that an investor can stick to it even in volatile times. Factors have the rules-based consistency of a passive strategy and the ability to tilt a portfolio to a theme or style like an active investor giving elements of both strategies.

Other areas of research in the future can be to look at range of holding periods and rebalance frequency. Do shorter rebalance frequencies overcome higher turnover friction cost. Is it better to leverage and implement momentum in the more larger cap liquid space or focus on the mid and small cap space. What if there are constraints on capital and one takes mid and small cap space as a proxy of leverage.

Reference Papers and Further Reading

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6. Ehsani, Sina and Linnainmaa, Juhani T., Factor Momentum and the Momentum Factor (December 9, 2020).
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Articles and White Papers

9. The Lottery Effect — Why investors get attracted to beaten down stocks?
10. RS Rating: It’s All Relative by Timothy Marble and Ronald P. Ognar, Quantitative Research, O’Neil Capital Management

Appendix

Agarwalla, Koshy and Varma (Four Factor Model In Indian Equities Market, 2014) write that during the period from January 1994 to December 2014, the average annual return of the momentum factor was 21.9%; the average annual return on the value portfolio (HML) was 15.3%; that of the size factor (SMB) nearly 0%; and the average annual excess return on the market factor (MRP) was 11.5%. (Graph Below).

The time series of daily, monthly and yearly factor returns and the returns of the underlying portfolios are made available at http://www.iimahd.ernet.in/~iffm/. Their objective is to provide data for the Indian market like what is provided for the US market at Kenneth French's website (French, n.d.).

The starting of the estimates from 1993 is motivated by several considerations. First, interest rates in India were deregulated only in the early 1990s and therefore there was no market determined risk-free rate for earlier periods. Second, the standard source of machine-readable stock price and corporate financial data (the Prowess database published by the CMIE) begins only in the early 1990s. For this study, they have relied on data from Prowess and cannot therefore go back beyond the early 1990s. The study has computed returns using data which are adjusted for survivor ship bias and data that hasn't been adjusted for survivorship bias. **The change in the factor returns due to the above adjustment is somewhat trivial.** This somewhat trivial outcome in terms of return occurs primarily due to the use of value weighted portfolios. Understandably, for the distressed firms, a significant portion of the loss in market capitalisation is already captured in the available trading data.

The data that they use is adjusted for survivorship and corporate events. However, we also take comfort from the findings in the paper, (2013), "Four factor model in Indian equities market", that the impact of survivorship on a factor strategy is trivial or not statistically significant to chance the conclusions of the study.

Their portfolio are broken down into Winner portfolios (long side) and Loser portfolio (short side) which one would typically avoid or short if one were running a long short portfolio. Most returns are driven by the long side of the portfolio, and it is also practical as most investors in India are

long only investors. Also, investible portfolios in the form of factor funds are available on the long side.

Since the paper was last updated and published in 2014, we look at the momentum factor returns from 1993 to 2014. We also try and look at which Nifty Momentum Index is closest to the Winner Big Portfolio in terms of returns, volatility, and drawdown. We find that the Nifty 200 Momentum 30 almost completely overlaps with the Winner Big Portfolio.

Let us first look the rules of the momentum strategy, as outlined in Agarwalla et al. which are on the lines of Jegadeesh and Titman, 1993.

1. Universe of stocks is classified as Big and Small by market capitalization. In this paper we focus on the "Big" or large cap universe here.
2. Momentum returns at the end of month t is the 11 months return from the end of month t-12 to t-1.
3. The top 30% of stocks by returns are taken in the portfolio. The median portfolio size is 105.
4. The stocks are weighted by market capitalization.
5. Returns for the month t+1 is calculated for the portfolio.
6. At the end of month t+1, steps 1 and 2 are repeated.

Nifty 200 Momentum 30 as a proxy for Winner Big

We also look at more granular OOS monthly data here. The OOS return, standard deviation and drawdown returns show that Winner Big statistical measures are better than the broad-based Nifty 50 index measures. Also, Winner Big is remarkably like Momentum 30 return features even when we look at monthly data.

2014 - 2019

Monthly	Winner Big	Momentum 30	Nifty 50
Average	1.6%	1.6%	1.0%
Max	13.1%	12.6%	10.8%
Min	−9.1%	−8.3%	−7.6%
Std Dev	4.5%	4.4%	3.8%
Max DD	−17.9%	−19.4%	−21.5%

Table: QED Cap • Created with Datawrapper