

References

- Agarwalla, S. K., Jacob, J., & Varma, J. R. (2014). Four factor model in Indian equities market. Retrieved from Retrieved from Indian Institute of Management, Ahmedabad website: <http://vslir.iima.ac.in:808>
- Al-Mwalla, M. (2012). Can book-to-market, size and momentum be extra risk factors that explain the stocks rate of return? Evidence from emerging market. *Journal of Finance, Accounting and Management.*, 3(2), 42-57.
- Balakrishnan, A., Maiti, M., & Panda, P. (2018). Test of five-factor asset pricing model in India. *Vision: The Journal of Business Perspective.*, 22, 153-162. doi:<https://doi.org/10.1177/0972262918766133>
- Ball, R., Gerakos, J., Linnainmaa, J. T., & Nikolaev, V. V. (2015). Deflating profitability. *Journal of Financial Economics.*, 117, 225-248. doi:<https://doi.org/10.1016/j.jfineco.2015.02.004>
- Banz, R. W. (1981). The Relationship between Return and Market value of Common Stocks. *Journal of Financial Economics*, 9(1), 3-18.
- Barber, B. M., & Lyon, J. D. (1997). Firm size book-to-market ratio, and security returns: A holdout sample of financial firms. *The Journal of Finance.*, 52, 875- 883. doi:<https://doi.org/10.1111/j.1540-6261.1997.tb04826.x>
- Basu, S. (1977). Investment performance of common stocks in relation to their Price-Earnings ratios: A test of the Efficient Market Hypothesis. *The Journal of Finance.*, 32(3), 663-682.
- Bhandari, L. C. (1988). Debt/Equity ratio and expected common stock returns: Empirical evidence. *The Journal of Finance.*, 43(2), 507-528.
- Black, F. J. (1972). The capital asset pricing: Some empirical tests. *Studies in the Theory of Capital Markets*, 79-121.
- Blume, M. (1970). Portfolio Theory: A step towards its practical application. *Journal of Business*, 43(2), 152-174.
- Cakici, N. (2015). The five-factor Fama-French model: International evidence. doi: <http://dx.doi.org/10.2139/ssrn.2601662>.

- Capaul, C., Rowley, I., & Sharpe, W. F. (1993). International value and growth stock returns. *Financial Analysts Journal*., 49(1), 27-36. doi:<https://doi.org/10.2469/faj.v49.n1.27>.
- Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of Finance*., 52(1), 57-82.
- Chan, K. C., & Chen, N. F. (1988). An unconditional asset-pricing test and the role of firm size as an instrumental variable for risk. *The Journal of Finance*. 43, 309-325. doi:<https://doi.org/10.1111/j.1540-6261.1988.tb03941.x>
- Chan, K. C., & Chen, N.-F. (1991, September). Structural and Return Characteristics of Small and Large Firms. *The Journal of Finance*., 46(4), 1467-1484.
- Chan, L. K., Hamao, Y., & Lakonishok, J. (1991). Fundamentals and stock returns in Japan. *The Journal of Finance*., 46, 1739-1764. <https://doi.org/10.1111/j.1540-6261.1991.tb04642.x>.
- Chan, L. K., Jegadeesh, N., & Lakonishok, J. (1996). Momentum strategies. *The Journal of Finance*., 51, 1681-1713. doi:<https://doi.org/10.1111/j.1540-6261.1996.tb05222.x>
- Chen, A. S., & Fang, S. C. (2009). Uniform testing and portfolio strategies for single and multifactor asset pricing models in the Pacific Basin markets. *Applied Economics*, 41, 1951-1963. doi:<https://doi.org/10.1080/00036840601131763>
- Chiah, M., Chai, D., & Zhong, A. (2015). A better model? An empirical investigation of the Fama-French five-factor model in Australia. doi:<https://doi.org/10.2139/ssrn.2557841>
- Chui, A. C., & Wei, K. C. (1998). Book-to-market, firm size, and the turn-of-the-year effect: Evidence from Pacific Basin emerging markets. *Pacific Basin Finance Journal*., 6, 275-293. doi:[https://doi.org/10.1016/S0927-538X\(98\)00013-4](https://doi.org/10.1016/S0927-538X(98)00013-4)
- Cochrane, J. H. (1991). Production-based asset pricing and the link between stock returns and economic fluctuations. *The Journal of Finance*., 46, 209-237. doi:<https://doi.org/10.1111/j.1540-6261.1991.tb03750.x>
- Cochrane, J. H. (1996). Cross-Sectional test of an investment-based asset pricing model. *Journal of Political Economy*., 104, 572-621. . doi:<https://doi.org/10.1086/262034>
- Connor, G., & Sehgal, S. (2003). Tests of the Fama-French model in India. *Decision*., 30, 1-20. Retrieved from [Retrieved from https://www.researchgate.net](https://www.researchgate.net)

- Cooper, M. J., Gulen, H., & Schill, M. J. (2008). Asset growth and the cross-section of stock returns. *The Journal of Finance.*, 63, 1609-1651. . doi:<https://doi.org/10.1111/j.1540-6261.2008.01370.x>
- Daniel, K., & Titman, S. (1997). Evidence on the characteristics of cross-sectional variation in stock returns. *The Journal of Finance.*, 52, 1-33. . doi:<https://doi.org/10.1111/j.1540-6261.1997.tb03806.x>
- Dash, S. R., & Mahakud, J. (2014, December). Do Asset Pricing Models Explain Size, Value, Momentum and Liquidity Effects? The Case of an Emerging Stock Market. *Journal of Emerging Market Finance.* doi:<https://doi.org/10.1177%2F0972652714550927>
- Davis, J. L., Fama, E. F., & French, K. R. (2000). Characteristics, covariances, and average returns: 1929 to 1997. *The Journal of Finance.*, 55, 389-406. doi:<https://doi.org/10.1111/0022-1082.00209>
- De Bondt, W. F., & Thaler, R. (1985). Does the stock market overreact? *The Journal of Finance.*, 40, 793-805. doi:<https://doi.org/10.1111/j.1540-6261.1985.tb05004.x>
- Drew, M. E., & Veeraraghavan, M. (2003). Beta, firm size, Book-to-Market Equity and stock returns: Further evidence from emerging markets. *Journal of the Asia Pacific Economy.*, 8, 354-479.
- Fama, E. F., & French, K. (1995). Size and Book-to-Market factors in earnings and returns. *Journal of Financial Economics.*, 50(1), 131-155.
- Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. *The Journal of Finance.*, 47(2), 427-465.
- Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics.*, 33(1), 3-56.
- Fama, E. F., & French, K. R. (1996). Multifactor explanations of asset pricing anomalies. *The Journal of Finance.*, 51, 55-84. . doi:<https://doi.org/10.1111/j.1540-6261.1996.tb05202.x>
- Fama, E. F., & French, K. R. (1996). Multifactor explanations of asset pricing anomalies. *The Journal of Finance.*, 51(1), 55-48.

- Fama, E. F., & French, K. R. (1997). Industry costs of equity. *Journal of Financial Economics*, 43, 153-193. doi:[https://doi.org/10.1016/S0304-405X\(96\)00896-3](https://doi.org/10.1016/S0304-405X(96)00896-3)
- Fama, E. F., & French, K. R. (1998). Value versus growth: The international evidence. *The Journal of Finance*, 53, 1975-1999. doi: <https://doi.org/10.1111/0022-1082.00080>
- Fama, E. F., & French, K. R. (2006). Profitability, investment and average returns. *Journal of Financial Economics*, 82(3), 491-518.
- Fama, E. F., & French, K. R. (2006). Profitability, investment and average returns. *Journal of Financial Economics*, 82, 491-518. doi:<https://doi.org/10.1016/j.jfineco.2005.09.009>
- Fama, E. F., & French, K. R. (2007). Dissecting anomalies. CRSP Working Paper No. 610.
- Fama, E. F., & French, K. R. (2008). Dissecting anomalies. *The Journal of Finance*, 63(4), 1653-1678. doi:<https://doi.org/10.1111/j.1540-6261.2008.01371.x>
- Fama, E. F., & French, K. R. (2012). Size, value, and momentum in international stock returns. *Journal of Financial Economics*, 105, 457-472. doi:<https://doi.org/10.1016/j.jfineco.2012.05.011>
- Fama, E. F., & French, K. R. (2015). A five-factor asset pricing model. *Journal of Financial Economics*, 116, 1-22. doi:<https://doi.org/10.1016/j.jfineco.2014.10.010>
- Fama, E. F., & French, K. R. (2017). International tests of a five-factor asset pricing model. *Journal of Financial Economics*, 123, 441-463. doi:<https://doi.org/10.1016/j.jfineco.2016.11.004>
- Fama, E. F., & MacBeth, J. D. (1973). Risk, return, and equilibrium: Empirical tests. *Journal of Political Economy*, 81, 607-636.
- Groth, J. C., & Anderson, R. C. (1997). Capital structure: perspectives for managers. *Management Decision*, 35(7), 552-561.
- Guo, B., Zhang, W., Zhang, Y., & Zhang, H. (2017). The five-factor asset pricing model tests for the Chinese stock market. *Pacific-Basin Finance Journal*, 43, 84-106. doi:<https://doi.org/10.1016/j.pacfin.2017.02.001>

- Haugen, R. A., & Baker, N. L. (1996). Commonality in the determinants of expected stock returns. *Journal of Financial Economics.*, 41, 401-439. doi:[https://doi.org/10.1016/0304-405X\(95\)00868-F](https://doi.org/10.1016/0304-405X(95)00868-F)
- Hou, K., Xue, C., & Zhang, L. (2015). Digesting anomalies: An investment approach. *The Review of Financial Studies.*, 28, 650-705. . doi:<https://doi.org/10.1093/rfs/hhu068>
- Jegadeesh, N. (1992). Does market risk really explain the size effect? *Journal of Financial and Quantitative Analysis.*, 27, 337-351. doi: <https://doi.org/10.2307/2331323>.
- Jegadeesh, N., & Titman, S. (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. *The Journal of Finance.*, XLVIII(1), 65-91.
- Jegadeesh, N., & Titman, S. (2001). Profitability of momentum strategies: An evaluation of alternative explanations. *The Journal of Finance.*, 56, 699-720. . doi:<https://doi.org/10.1111/0022-1082.00342>
- Jensen, M. C., Black, F., & Scholes, M. S. (1972). The Capital Asset Pricing Model: some empirical tests. *Studies In The Theory Of Capital Markets.*, 79-121.
- Kapur, V. (2007). Is the Fama and French model a good indicator of market sectoral performance? (Honors thesis). Retrieved from http://www.stern.nyu.edu/sites/default/files/assets/documents/con_043260.pdf
- Kothari, S. P., Shanken, J., & Sloan, R. G. (1995). Another look at the cross-section of expected stock returns. *The Journal of Finance.*, 50. doi:<https://doi.org/10.1111/j.1540-6261.1995.tb05171.x>
- Kumar, S., & Tavishi. (2011). An empirical testing of Carhart model in Indian stock market. *International Journal of Business Policy and Economics*, 4, 241-276. . Retrieved from http://serialsjournals.com/journal-detail.php?journals_id=49
- Lakonishok, J., & Shapiro, A. C. (1986). Systematic risk, total risk and size as determinants of stock market returns. *Journal of Banking & Finance.* 10, 115-132. doi:[https://doi.org/10.1016/0378-4266\(86\)90023-3](https://doi.org/10.1016/0378-4266(86)90023-3)
- Lakonishok, J., Shleifer, A., & Vishny, R. W. (1994). Contrarian investment, extrapolation, and risk. *The Journal of Finance.*, 49, 1541-1578. doi: <https://doi.org/10.1111/j.1540-6261.1994.tb04772>.

- Lam, F. E., & Wei, K. J. (2011). Limits-to-arbitrage, investment frictions, and the asset growth anomaly. *Journal of Financial Economics.*, 102, 127-149. doi:<https://doi.org/10.1016/j.jfineco.2011.03.024>
- Lewellen, J. (2002). Momentum and autocorrelation in stock returns. *The Review of Financial Studies.*, 15, 533-564. doi:<https://doi.org/10.1093/rfs/15.2.533>
- L'Her, J.-F., Masmoudi, T., & Suret, J.-M. (2004). Evidence to support the four-factor model from the Canadian stock market. *Journal of International Financial Markets, Institutions & Money*, 313-328.
- Li, E. X., Livdan, D., & Zhang, L. (2009). Anomalies. *The Review of Financial Studies.*, 22(11), 4301-4334. . doi:<https://doi.org/10.1093/rfs/hhp023>
- Lim, B. Y., Wang, J. (., & Yao, Y. (2018). Time-series momentum in nearly 100 years of stock returns. *Journal of Banking & Finance.*, 97(C), 283-296.
- Lin, Q. (2017). Noisy prices and the Fama-French five factor asset pricing model in China. *Emerging markets Review.*, 31, 141-163. . doi:<https://doi.org/10.1016/j.ememar.2017.04.002>
- Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *The Review of Economics and Statistics.*, 47, 13-37.
- Litzenberger, R. H., & Ramaswamy, K. (1979). The effect of personal taxes and dividends on capital asset prices: Theory and empirical evidence. *Journal of Financial Economics.*, 7(2), 163-195.
- Lyandres, E., Sun, L., & Zhang, L. (2008). The new issues puzzle: Testing the investment-based explanation. *The Review of Financial Studies.*, 21(6), 2825- 2855. . doi:<https://doi.org/10.1093/rfs/hhm058>
- Markowitz, H. (1952). Portfolio Selection. *The Journal of Finance*, Vol.7, No. 1.
- Modigliani, F., & Miller, M. (1958). The cost of capital, corporation finance and the theory of investment. *American Economic Review*, Vol 48, No.3 (Jun) 261-297.
- Modigliani, F., & Miller, M. (1963, June). Corporate income taxes and the cost of capital: a correction. *American Economic Review.*, 53(3), 433-443.

- Mohanty, P. (2002). Evidence of size effect on stock returns in India. *Vikalpa: The Journal for Decision Makers.*, 27(3), 27-38. doi:<https://doi.org/10.1177/0256090920020304>
- Moskowitz, T. J., & Grinblatt, M. (1999). Do industries explain momentum? *The Journal of Finance.*, 54(4), 1249-1290. . doi:<https://doi.org/10.1111/0022-1082.00146>
- Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics.*, 13(2), 187–221.
- Nartea, G. V., Ward, B. D., & Djajadikerta, H. G. (2009, April). Size, BM, and Momentum Effects and the Robustness of the Fama-French Three-Factor Model: Evidence from New Zealand. *International Journal of Managerial Finance*, 179-200. doi:<http://dx.doi.org/10.1108/17439130910947895>
- Nguyen, N., Ulku, N., & Zhang, J. (2015). The Fama French Five Factor Model: Evidence from Vietnam. Retrieved from Retrieved from New Zealand Finance Colloquium website: <http://www.nzfc.ac.nz/archives/2016/papers/updated/49.pdf>
- Novy-Marx, R. (2010). The other side of value: Good growth and the gross profitability premium. (NBER Working Paper No. 15940). Retrieved from Retrieved from National Bureau of Economic website: <http://www.nber.org/papers/w15940>.
- Novy-Marx, R. (2012). The other side of value: the gross profitability premium. *Journal of Financial Economics.*, 108 (1), 1-28.
- Reinganum, M. R. (1981). A new empirical perspective on the CAPM. *Journal of Financial and Quantitative analysis*, 16, 439-462.
- Roll, R. (1981). A possible explanation of the small firm effect. *The Journal of Finance.*, 36, 879-888. . doi:<https://doi.org/10.1111/j.1540-6261.1981.tb04890.x>
- Ross, S. A. (1976). The Arbitrage Theory of Capital Pricing. *Journal of Economic Theory.*, 13, 341-360.
- Rouwenhorst, K. G. (1998). International momentum strategies. *The Journal of Finance.*, 53, 267-284. . doi:<https://doi.org/10.1111/0022-1082.95722>
- Rouwenhorst, K. G. (1999). Local return factors and turnover in emerging stock markets. *The Journal of Finance.*, 54, 1439-1464. . doi:<https://doi.org/10.1111/0022-1082.00151>

- Sapp, T., & Tiwari, A. (2004). Does stock return momentum explain the “Smart Money” effect? *The Journal of Finance.*, LIX(6).
- Sehgal, S., & Subramaniam, S. (2012). An empirical investigation of the profitability anomaly in the Indian stock market. *Asian Journal of Finance & Accounting.*, 4(2), 347-362. . doi:<https://doi.org/10.5296/ajfa.v4i2.2777>
- Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance.*, 19(3), 425-442.
- Singh, H. S., & Yadav, S. S. (2015). Indian stock market and the asset pricing models. *Procedia Economics and Finance.*, 30, 294-304. . doi:[https://doi.org/10.1016/S2212-5671\(15\)01297-6](https://doi.org/10.1016/S2212-5671(15)01297-6)
- Stattman, D. (1980). Book values and stock returns. *The Chicago MBA: A Journal of Selected Papers.*, 4(1), 25-45.
- Sun, L., Wei, K. C., & Xie, F. (2014). On the explanations for the gross profitability effect: Insights from international equity markets. doi:<https://doi.org/10.2139>
- Sundqvist, T. (2017). Tests of a Fama-French five-factor asset pricing model in the Nordic stock markets. Retrieved from Retrieved from <https://helda.helsinki.fi/dhanken/handle/123456789/167972>
- Taneja, Y. P. (2010). Revisiting Fama French three-factor model in Indian stock market. *Vision: The Journal of Business Perspective.*, 14, 267-274. . doi:<https://doi.org/10.1177/097226291001400403>
- Teplova, T., & Mikova, E. (2015, May). New evidence on determinants of price momentum in the Japanese stock market. *Research in International Business and Finance.*, 34, 84–109.
- Titman, S., Wei, K. C., & Xie, F. (2004). Capital investments and stock returns. *Journal of Financial and Quantitative Analysis.*, 39, 677-700. . doi:<https://doi.org/10.1017/S0022109000003173>
- Titman, S., Wei, K. C., & Xie, F. (2009). Capital investments and stock returns in Japan*. *International Review of Finance.*, 9, 111-131. . doi:<https://doi.org/10.1111/j.1468-2443.2009.01087.x>

- Titman, S., Wei, K. C., & Xie, F. (n.d.). Access to Equity Markets, Corporate Investments and Stock Returns: International Evidence. doi:<http://dx.doi.org/10.2139/ssrn.1571648>
- Titman, S., Wei, K. J., & Xie, F. (2013). Market development and the asset growth effect: International evidence. *Journal of Financial and Quantitative Analysis.*, 48(5), 1405-1432.
- Tong, L. I. (2016). Empirical research of asset growth and future stock returns based on China stock market. *Management Science and Engineering.*, 10(1), 33-37.
- Tripathi, V. (2008). Company fundamentals and equity returns in India. doi:<https://doi.org/10.2139/ssrn.1247717>
- Wang, H., & Yu, J. (2013). Dissecting the profitability premium. doi:<https://doi.org/10.2139/ssrn.1711856>
- Wei, K.-C. (., Xie, F., & Titman, S. (2003). Capital investments and stock returns. . NBER Working Paper No. w9951.
- Xing, Y. (2008). Interpreting the value effect through the Q-theory: an empirical investigation. *The Review of Financial Studies.*, 21, 1767-1795. . doi:<https://doi.org/10.1093/rfs/hhm051>
- Yao, T., Yu, T., Zhang, T., & Chen, S. (2010, September). Asset growth and stock returns: Evidence from Asian financial markets. *Pacific-Basin Finance Journal*, 19(1), 115-139. doi:<http://dx.doi.org/10.2139/ssrn.1683784>
- Zaremba, A., & Czapkiewicz, A. (2017, June). Digesting anomalies in emerging European markets: A comparison of factor pricing models. *Emerging Markets Review.*, 31 , 1-15.
- Zhang, L. (2005). The value premium. *The Journal of Finance.*, 60(1), 67-103. doi:<https://doi.org/10.1111/j.1540-6261.2005.00725.x>

THE PROCESS OF FORMING SINGLE-SORT AND DOUBLE-SORT PORTFOLIOS

In order to form portfolios on the basis of Value, using the P/B ratio as a proxy, the study follows the same process as we did earlier when forming portfolios on the basis of the size factor. Companies are sorted on the basis of the P/B ratio and then distributed into ten equally weighted portfolios ($P_1 - P_{10}$). P_1 is a portfolio comprising of high value companies, also termed as value stocks, whereas P_{10} is a portfolio of companies which have the lowest value and are generally termed as growth stocks. Returns for each month of the first year of study, from January 2000 to December 2000 are then estimated for all of the ten portfolios. Thereafter, the portfolios are then revised in December of every year using the same process as in the case of market cap. Next, the sample securities are arranged in ascending order of ROE, the return on equity, which is used as a proxy for profitability, and then segregated into equally weighted decile portfolios, as done earlier in the case of Market Cap and Value factors, with P_1 comprising of companies having the lowest profitability, henceforth referred to as weak stocks, and P_{10} comprising of companies having the highest profitability, which will be referred to as robust stocks for the remainder of this study. As per the practice established by now, the mean returns are estimated for each of the ten portfolios for each year of the study period from January 2000 to December 2019. The portfolios are also revised at the end of December of each year. Next, the companies in the sample are ranked on the basis of the Investment factor, which is used as a proxy for asset growth. As before, the companies are then ranked in ascending order of asset growth and allocated to ten equally weighted portfolios. P_1 is a portfolio of companies having the least growth in assets, also termed as conservative companies, whereas P_{10} is a portfolio comprising of companies which aggressively invest in acquiring new assets and are consequently termed as aggressive companies. Mean returns are then established for each of the ten portfolios for each year of the study period, with portfolios being revised in December of each year. Next, the sample securities are ranked on the basis of

the momentum factor, at the end of December 2000 (*year t*). The momentum factor can be explained as the tendency of security prices to exhibit a similar behavior in the immediate future as they have shown in the most recent past. Thus, if a security has given good returns over the past twelve months, then there is a high probability that price action for the security will follow a similar pattern over the next twelve months. The momentum effect generally tends to fade after a year. Thus, using the aforementioned parameter, the companies are then ranked in ascending order, from those showing the weakest momentum in price movement to the ones showing the strongest momentum effect. Thereafter, they are then assigned to ten equally weighted portfolios. P_1 is a portfolio of securities that have performed the poorest in the past one year, and are thus termed as losers, while P_{10} is a portfolio of securities that have given the highest returns in the past one year, and are therefore termed as winners. Returns for all these ten portfolios are then estimated for each year of the overall study period, and these portfolios are revised at the end of December of each year. Next, the sample securities are double sorted. Firstly, the sample is ranked every year on the basis of Market Capitalization in December of every year. The ranked securities are then divided into two groups using the median, wherein securities in the bottom half are considered as small companies and placed in a portfolio which is denoted as S. Securities falling the upper half are considered as large companies and are placed in a portfolio denoted as L. Secondly, the sample securities are ranked in ascending order of their P/B ratios, and then segregated into three groups using a 30-40-30 sorting strategy. Sample securities in the bottom 30 % are classified as having high value and this portfolio is thus termed as H. Securities falling in between the bottom 30 % and the top 30 % are considered as having moderate value and are this portfolio is henceforth termed as M, whereas securities in the top 30 % bracket are growth stocks, which generally tend to have low value, and this portfolio is consequently denoted as L. The study then proceeds to form six portfolios. The portfolios are formulated at the intersection of the two size groups and

the three value groups. The portfolios thus formed are classified as S/L (small/low value), S/M (small/moderate value), S/H (small/high value) and B/L (big/low value), B/M (big/moderate), B/H (big/high value). The S/L is a portfolio comprising small market cap companies having low value, whereas B/L would be a portfolio comprising of securities of companies which are big sized, by way of market cap, but have low value. Similarly, the S/H portfolio comprises of small market cap companies that have high value, as measured by the PB ratio, whereas the B/H portfolio includes large market cap companies that have high value. Monthly returns for these six portfolios are calculated for every month of the year being reviewed. These portfolios are then reformulated at the end of December every year and monthly returns for each of the six portfolios are estimated for each year of the overall sample period. Thereafter, the study ranks the sample securities at the end of the calendar year, or December 1999 (*year t*), going by the ROE, or profitability. Classification of the sample is then done along the same break points of 30-40-30, as had been done in case of the value factor. The bottom 30 per cent of the sample stocks are termed as Weak stocks, while the top 30 per cent of the sample securities are termed as Robust. The sample of securities lying in between are put in the Neutral portfolio. Then, using the intersections of the same size groups as before and the three profitability groups formed now, six portfolios, namely B/W (big/weak), B/N (big/neutral), B/R (big/robust) and S/W (small/weak), S/N (small/neutral), S/R (small/robust) are formed. Monthly returns for these are then calculated from January 2000 (*t*) to December 2000(*t+1*). Going forward, the sample securities are re-ranked on the basis of ROE, at the end of December of each year, after which six portfolios are formed at the intersection of size and profitability, as done before and the returns are calculated for the portfolios for the subsequent year, and this revision process is followed for the complete study period. Next, the sample stocks are ranked in ascending order on the basis of the investment factor, wherein we evaluate the growth in the total assets of a company, at the end of December of every year. The sample is then segregated into three groups

using the 30-40-30 breakpoints. The bottom 30 per cent is a portfolio consisting of companies that have the least growth in total assets and is therefore termed as Conservative portfolio (C), whereas the portfolio comprising of the top 30 percent companies in terms of asset growth is termed as the Aggressive portfolio (A). The companies falling in the middle 40 per cent range are neither aggressive nor conservative and are thus designated to a Neutral portfolio (N). Then, at the points where the two size groups and the three investment groups intersect, six portfolios are constructed. These portfolios are B/C (big/conservative), B/N (big/neutral), B/A (big/aggressive), S/C (small/conservative), S/N (small/neutral) and S/A (small/aggressive). The portfolio S/C consists of small sized companies that invest conservatively whereas the S/A will be a portfolio of small sized companies that are aggressively investing in assets. Similarly, B/C is a portfolio of large companies that have shown a conservative approach towards investing in assets during the previous financial year, while B/A is a portfolio of large companies which are aggressively investing in assets. Monthly excess returns for these portfolios are estimated for each month of the following year, from January 2000 to December 2000. These portfolios are revised in December of every year and monthly returns for these are calculated for each for the overall duration of study. Lastly, the sample securities are then ranked in ascending order on the basis of the momentum effect, at the end of December of every year. These securities are then segregated into one of three groups using the 30-40-30 break points, where the bottom 30 percent is a group comprising of securities that have exhibited the weakest momentum effect and are termed as Losers (L), while those in the top 30 percent consists of companies that have had the strongest momentum effect and are therefore termed as the Winners (W). The group in the middle comprises of stocks that have shown a moderate momentum behavior and are designated as M. Then, using the intersections of the two groups formed on size and the three formed on momentum, six portfolios, namely S/L (small/losers), S/M (small/moderate), S/W (small/winners), and B/L (big/losers), B/N

(big/neutral) and B/W(big/winners) are formulated. Monthly returns for these portfolios are estimated for the ensuing year, following which the securities are ranked again and the six portfolios are reformulated at the end of December of each year. The aforementioned process of estimating monthly returns for the subsequent year is then repeated and this process is followed for each year till the study period gets over.

THE PROCESS OF FORMING FACTOR INPUTS FOR THE VARIOUS MODELS

The excess returns on the portfolio are also regressed against the Fama-French Three-factor model in the following way:

$$R_{pt} - R_{ft} = \alpha_{it} + \beta_1(R_{mt} - R_{ft}) + \beta_2SMB_t + \beta_3HML_t + \varepsilon_{it} \quad (2)$$

Where SMB is a risk factor explained as the difference between returns for small size firms and large sized firms, or in other words, small minus big. The SMB is a diversified portfolio which reflects the risks and returns as a function of company size. The SMB factor is estimated by taking the difference of the simple average returns of the three small size portfolios formed at the intersection of the size and value factors and the simple average returns of the three big size portfolios. This factor is formed in such a way so as to ensure that it is no way influenced by the value effect. The SMB factor is estimated in the following manner:

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

On the other hand, the HML is explained as high minus low, and is a diversified portfolio that mimics the risks and returns associated with the value factor. It is estimated by taking the difference of the average returns of the two high value portfolios and the two low value portfolios at the intersection of the size and value factors. This factor is formed in such a way that the effect of the size factor is negated.

$$HML = (S/H + B/H) / 2 - (S/L + B/L) / 2 \quad (4)$$

Then, the excess returns on the portfolio are regressed against the four factors of the Carhart Four-factor model, which adds a momentum factor to the three factors of the Fama-French Three-factor model. The model specifications of the Carhart Four-Factor model are as follows:

$$R_{pt} - R_{ft} = \alpha_{it} + \beta_1(R_{mt} - R_{ft}) + \beta_2SMB_t + \beta_3HML_{it} + \beta_4MOM_{it} + \varepsilon_{it}$$

The Momentum factor is explained as the difference between the excess returns of the winner portfolio, comprising of companies which have had the highest returns in the past twelve months, and the loser portfolio, which consists of companies whose shares have fared the poorest in the same time period. β_4 is the sensitivity coefficient for the momentum factor. The factor is constructed so as to control for the influence of the size factor.

$$MOM = (S/W + B/W)/2 - (S/L + B/L)/2$$

Thereafter, we regress the portfolio returns on the Fama-French Five-factor model which includes market, value, size, investment and profitability as the affecting factors. The Fama-French Five-Factor model is as follows:

$$R_{pt} - R_{ft} = \alpha_{it} + \beta_1(R_{mt} - R_{ft}) + \beta_2SMB_t + \beta_3HML_t + \beta_4CMA_t + \beta_5RMW_t + \varepsilon_{it}$$

RMW, or Robust Minus Weak, and CMA, Conservative Minus Aggressive, are the proxies for the profitability and investment factors, respectively. The HML factor has already been explained above. However, the SMB factor for the FF Five-Factor model is constructed in accordance with Fama and French (2015), which is

$$SMB = (SMB_{p/b} + SMB_{ROE} + SMB_{INV})/3$$

The portfolio RMW is one that mimics the behavior of a portfolio formed on the factor of Profitability, or ROE. It is estimated using the difference of the average of returns on two robust portfolios and the average of returns on two weak portfolios. The factor is constructed in such

a manner so as to ensure that it is not biased on the size factor and is estimated in the following way:

$$RMW = (S/R + B/R)/2 - (S/W + B/W)/2$$

The portfolio CMA is one that follows the returns on a portfolio constructed on the basis of the investment factor, or asset growth. It is calculated using the difference of the simple average of the two conservative portfolios and that of the two aggressive portfolios. The factor is constructed with the intent of keeping it free from the influence of the size.

$$CMA = (B/C + S/C)/2 - (B/A + S/A)/2$$

β_4 and β_5 are the sensitivity coefficients for the Profitability and Investment factors.

The portfolio returns are also regressed against two improvised models as suggested by this study. The first model is arrived at by removing the value factor and adding a momentum factor to the existing Fama-French Five-Factor model, and is shown below:

$$R_{pt} - R_{ft} = \alpha_{it} + \beta_1(R_{mt} - R_{ft}) + \beta_2SMB_t + \beta_3CMA_t + \beta_4RMW_t + \beta_5MOM_{it} + \varepsilon_{it}$$

-----eq. (v)

The second model adds a sixth factor, momentum, to the present Fama-French Five-Factor model and is given below:

$$R_{pt} - R_{ft} = \alpha_{it} + \beta_1(R_{mt} - R_{ft}) + \beta_2SMB_t + \beta_3HML_t + \beta_4CMA_t + \beta_5RMW_t + \beta_6MOM_{it} + \varepsilon_{it}$$

All of the factors in the two models shown above have been previously explained in this section.



The Effect of Domestic Slowdown on Momentum Profitability: Evidence from The Indian Market

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ABSTRACT: We examine momentum profits from April 2014 to February 2020, dividing the aforementioned time span into two sub-periods; the Boom years spanning from 2014 to end of 2016, marked by high optimism and the slowdown years from 2017 till end of 2019 which were marred by sequentially deteriorating economic indicators. Momentum returns were tracked for the 110 odd largest companies by way of market cap and listed on the National Stock Exchange. During the Boom years, fifteen of the sixteen momentum strategies tested gave results that were both economically as well as statistically significant, thus confirming to the existing literature. However, the study also found five of the momentum strategies to still give results that significantly outperform the benchmark index during the subsequent period of economic decline and turmoil, thus providing some evidence supporting the persistence of momentum profits even during conditions when the macro environment might seem unfavorable.

KEYWORDS: Economic Slowdown, Indian Stock Market, Investment Strategies, Momentum, Momentum Strategies.

INTRODUCTION

To this day there still exists a lot of academic debate and controversy around the quiet-widely-followed practice of forming portfolios based on momentum; wherein the fund manager tracks historical data of securities and analyzes past returns in order to formulate investment strategies that could help generate significant profits in the near term. This is in stark opposition to the Efficient Market Hypothesis, proposed by Eugene Fama (1970), long considered a cornerstone of finance literature, which states that security prices, at any given time, are reflective of all the information available in the market and thus, are fairly valued all the time. As a consequence, the Efficient Market Hypothesis, which will hereafter be referred to as EMH, claims that it is impossible to generate excess returns by timing the market to either select undervalued securities or sell seemingly overvalued stocks. Therefore, proponents of the EMH believe it is impossible to outperform the market by searching for value, whether using fundamental analysis or technical analysis or both.

However, detractors of the EMH have for long pointed at various anomalies to punch holes into the aforementioned claims by pointing to individuals like Warren Buffet and Peter Lynch, among a host of numerous others, who are firm believers in the principle of value investing and have been able to consistently generated excess returns over a significantly long period of time, thereby suggesting that whatever investing strategy they were using really works and is no flash in the pan, boldly flying in the face of the EMH. Another market anomaly that seems to shake the belief systems as propagated by the EMH is the existence and persistence of the momentum effect, i.e., the tendency of prices to continue moving in a particular direction for the short-term mostly as a consequence of fairly recent historical trends. There is significant evidence to prove that investing strategies based on momentum effects are not only limited to seemingly impractical academic exercises but are widely followed by both fund managers and investors alike. There is a vast amount of research which has dedicated itself to proving the persistence of the momentum effect in most of the equity markets of the developed world. Similarly, considerable research has also been devoted to identify the existence and persistence of momentum effects in the Indian stock market as well. Despite its wide acceptance as a dependable investing strategy, detractors point to the instability of momentum returns, especially during times of market turbulence, as enough reason to temper expectations from the said strategy. In this regard, numerous studies investigating the influence of the global financial crisis on momentum returns have been conducted in the not so distant past. A similar study conducted in the backdrop of the global financial crisis of 2008 confirmed the susceptibility of momentum investing strategies during a financial crisis (Maheshwari & Dhankar 2017). It was the onset of the subprime lending crisis that served as the catalyst for the financial meltdown of 2008. Prevailing notions at that time suggesting the domestic economy was more or less insulated from developments in the western world were quickly dispelled as the Indian stock market witnessed a sharp fall that saw the SENSEX lose half of its value within the course of a year.

However, the period from 2014 to 2020 makes for an interesting case study. The months running up to the general elections of 2014 and the subsequent couple of years that followed seem to have been marked by a general sense of optimism as the citizens of the Indian republic, seemingly tired of the policy paralysis that usually ails a coalition government, gave a strong mandate to a particular political party to helm the affairs of the country for the next five years. However, the initial buoyancy gradually tapered off as the economy witnessed a decline over several consecutive quarters. The probable causes of the decline may be varied and debatable, however, general consensus will concur that the demonetization exercise in 2016 and the apparently rushed rollout of the GST in 2017 did cause major disruptions in the economy and may have contributed to the deceleration in the economy. The decline across several consecutive quarters was also appropriately reflected in the gradual decline as witnessed in the BSE Midcap and Smallcap indices starting from the beginning of 2018. Despite numerous economic indicators not painting a rosy picture, large cap indices like the SENSEX and the NIFTY continued to move in an uptrend during the same period, suggesting that a lot of investors were moving money out of the riskier midcap and small cap stocks and allocating funds into more dependable large caps during this time. Previous studies on momentum profitability conducted in the backdrop of the global financial crisis observed momentum profits that were high in the pre-crisis period, turned negative during the crisis period (Maheshwari & Dhankar 2017). However, it is common knowledge that the previous crisis that the economy experienced was an outcome global financial meltdown of 2007 which had its epicenter in the US and the ripple effects of which were felt far and wide, whereas

the slowdown in the Indian economy as witnessed from 2018 onwards had reasons that were more indigenous. It is in this backdrop that we would like to revisit momentum profits to develop a better understanding of investor behavior, especially during times of economic turbulence. We believe there is a strong case to be made to further study the profitability of momentum strategies in the Indian stock market, the literature on which is still scant, and an even stronger case to be made for studying the profitability of momentum strategies during times when the economy is facing turbulence owing to reasons that are more localized than global.

The present study contributes to the current literature in numerous ways. The study not only adds to the literature on the existence and persistence of momentum profitability across the globe, but also adds to the literature detailing the evidence of momentum profitability in the Indian stock market. The key contribution of this paper is that it explores momentum profits in the Indian stock market during times of economic distress which have been brought about by factors that are localized and cannot be attributed to some crisis in a distant country, and thus can be considered a first in its kind. Our findings stand in stark contrast to the relatively small body of literature along the same lines, but which seem to suggest the failure of momentum as an investment strategy during a financial crisis. Studies conducted in the past suggest several periods, termed as momentum crashes, where momentum strategy has not only failed to generate any meaningful returns but has also caused losses for the investors (Daniel et al 2012). This study aims at finding if such a momentum crash can also be observed among the large cap stocks in the Indian stock market. We hope that our findings will provide valuable insight into investor behavior during times of market stress and will act as a valuable precedent for the future as well. The rest of the paper is organized as follows: Section 2 provides a brief review of the relevant literature, followed by Section 3 which gives a description of the data and the testing methodology used. The empirical results of the study and related observations are presented in Section 4. Section 5 contains a brief discussion about the observations of the study while Section 6 discusses the practical implications of the research. The conclusions derived from the findings of the study are presented in Section 5.

REVIEW OF LITERATURE

The sample used in our study comprises stocks of 110 companies, listed on the National Stock Exchange and largest by way of market capitalization during the period from 2014-2020. As mentioned towards the end of the section on Literature review, we analyze momentum profits for our sample for a period of six years, three of which were marked by an economic slowdown, so as to identify whether significant gains can be made during times of economic uncertainty by adopting a momentum strategy or would an investor be simply better off buying the NIFTY index during such phases. Monthly arithmetic returns of all the stocks in the sample were calculated using monthly adjusted closing price data collected from the Centre for Monitoring Indian Economy (CMIE) Prowess database. Data related to the monthly closing price for the NIFTY index was collected from Yahoo Finance, while data related to the risk-free rate of return was collected from the RBI website. In consensus with existing literature, the NIFTY index has been used as a proxy for measuring returns on the market portfolio and the interest rate on a post office savings account has been used as a proxy for the risk-free rate of return.

Moreover, monthly price data has been preferred over daily price data, as it has been found that the daily price data has a lot of random noise associated with them (Mun et al 2000). Similar studies conducted earlier also use monthly price information to avoid the distortions that may arise

out of the bid-ask spread or out of infrequent trading (Jegadeesh & Titman 1993; Chordia & et al 2002; Cooper et al., 2004; Daniel et al., 2012). Both the W and L portfolios are then held for the subsequent K months (K = 3, 6, 9 or 12 months) holding period. Holding period average returns (AR) are then calculated using the arithmetic mean return method for both the W (winner) and L (loser) portfolios. Based on the portfolio formation and holding periods, a total of sixteen JK momentum strategies are tested in our study.

The study uses momentum portfolios, which are constructed using the methodology, which has now been popularized as the JK strategy, as proposed by Jegadeesh and Titman in their seminal work (1993). Simply put, the JK strategy involves forming portfolios of stocks based on their returns in the past J months and then holding such portfolios for the next K months. Firstly, stock returns for each month of the J month period (J = 3, 6, 9 or 12 months) are calculated using the adjusted monthly closing prices. At the end of each J months, stocks are then ranked in ascending order of their cumulative returns over the J month period. Based on the rankings, the stocks are then segregated into deciles and assigned to one of the equally-weighted decile portfolios, wherein the top decile portfolio is termed as the loser portfolio, since it contains the worst performing stocks, and is thus assigned the letter 'L' and the bottom decile portfolio is termed as the winner portfolio and is assigned the letter 'W', as it contains the best performing stocks over the past J month formation period. The combination of J and K months yields a total of sixteen momentum strategies. For example, a J3K3 strategy would imply a portfolio that was formed after evaluating stock returns for the past three months (J = 3) and then held for the subsequent six months (K = 3).

Separate tests of momentum strategies have also been conducted wherein a month is skipped between the portfolio formation and holding period to mitigate the effect of the bid-ask bias, lagged reactions and price pressures. Portfolios are also rebalanced at the end of each month of the K month holding period. New portfolios are formed for each month of the portfolio formation period and this process is repeated for the six-year period under study, from April 2014 to May 2020. An investment strategy based on momentum involves selling the losers and buying the winners. Thus, momentum profits over a K month holding period are calculated as follows:

$$\text{Momentum Returns (K months)} = \text{ARA} = \text{AR}_w(K) - \text{AR}_L(K) \quad (1)$$

Where $\text{AR}_w(K)$, $\text{AR}_L(K)$ and ARA are the average returns on the winner, loser and arbitrage (W-L) portfolios during the holding period (K), respectively.

Moreover, t-test is used to evaluate the statistical significance of the observed momentum profits. The 't' test is calculated as follows:

$$t = \frac{[\text{AR}]_{(A,t)}}{S_{(A,t)} / \sqrt{N}}; \text{ Where } S_{(A,t)} \text{ happens to be standard deviation.}$$

Additionally, we also use the Sharpe-ratio as a measure of the risk adjusted return. Sharpe ratio is a measure of the reward relative to variability and measures the total return of the portfolio in relation to its total risk, where total risk of the portfolio is measured by the standard deviation of the portfolio returns. It is computed by dividing the portfolio's risk premium by its standard deviation. Thus, Sharpe ratio can be said to be a measure of the portfolio's risk premium per unit of exposure to portfolio risk. The Sharpe ratio is calculated as follows:

$$S_p = \frac{[\text{AR}]_{p-r_f}}{\sigma_p}; \text{ Where the various inputs are:}$$

R_t is the monthly portfolio return
 R_f is the risk-free rate of return
 σ_p is the portfolio standard deviation

We use the Sharpe ratio as a measure of portfolio performance in agreement with previous studies (Haugen 2002). As demonstrated by Haugen, a portfolio having a Sharpe ratio which is higher than that of the broader market indicates that the portfolio has outperformed the benchmark market index. The use of the Sharpe ratio for the purpose of this study is in conformity with the work of Maheshwari & Dhankar (2015), who had studied momentum profitability in the Indian stock market in the backdrop of the global financial crisis of 2007. The stationarity of the variables being studied was also tested using the Dickey-Fuller (ADF) and non-parametric Phillips-Perron (PP) test.

The Journey of the Six Years from 2014-2020

To say that the Indian economy has experienced an interesting series of events during the time period mentioned above would be an understatement; and we continue to be in some confounding times, with the world trapped in the throes of the corona virus pandemic that is not showing any signs of relenting. However, let us not get too ahead of ourselves. In order to evaluate the profitability of momentum strategies, we have divided the six-year period, from 2014-2020, into two sub-periods: the Hopeful years and the Slowdown period.

The Hopeful Years

For the purpose of our study, the period from April 2014 to December 2016 is considered as the period of hopeful years. The starting point of the study is chosen as the year 2014, since this is when a new political party was voted to power on the back of a strong mandate and much fanfare. There was widespread optimism towards the overall prospects of the economy, as noted in an extensive study conducted by the Principal Financial along with its research partner Nielsen¹. This renewed confidence also manifested itself in form of strong growth of the Indian stock market. Even though corporate profits as a percentage of GDP had still not attained the same level as before the global financial crisis of 2007, the general outlook was still hopeful. Moreover, the amount of Foreign Direct Investment also started seeing a gradual uptrend, thus reinforcing investor confidence.

The Slowdown Period

It seems that the days marked by hope were numbered, as the Indian economy received a big jolt in the form of the Demonetization exercise, which forced almost every citizen to stand in long queues for hours at end just so that he can withdraw a mere portion of his hard-earned money. As India stood in line outside banks to exchange old notes for new, economic activity got hard hit, with the small and medium-sized enterprises bearing the hardest brunt of this abrupt announcement that came as a bolt out of the blue for many. Numerous eminent economists forecasted that this exercise would have a severe impact on the economy, with one former prime minister and economist forecasting a fall of at least 200 basis points in the GDP². The aforementioned estimate did more than just manifest itself, in the form of consecutive decline in quarterly GDP figures, from a peak of 9.67 in quarter 2 of FY 2016-17 to a low 5.78 in quarter 1 of FY 2017-18. Thereafter, conditions did look up for some time as we registered growth in GDP for 3 consecutive quarters starting from Q2 of FY 2017-18, bringing some respite to the policy makers of the country.

However, conditions took a turn for the worse as GDP numbers, on account of consistent decline in industrial production, have been on a decline for consecutive quarters since Q1 of FY 2018-19 (see figures 4 & 5). This is a cause for increased alarm and rightly so. A decline in earnings among companies that fall under the mid cap and small cap categories was also reflected in a steep decline in the BSE Midcap and the BSE Small-cap index, while the NIFTY index continued on its upward trajectory towards new all-time highs during the same period (see figures 1, 2 & 3). Needless to say, this movement indicates strong outflows from the Midcap and Small-cap segments and consistent inflows into the Large-cap companies. The aforementioned phenomena is evidence of the increased risk aversion that both financial institutions and retail investors, who look to avoid high risk investment plays during times of economic uncertainty, tend to display by pulling money out of riskier investment avenues like small and medium sized listed companies and parking funds into the more stable large companies. It is in this backdrop that we look to reexamine the persistence of momentum profitability during the boom period as well during the lean one.

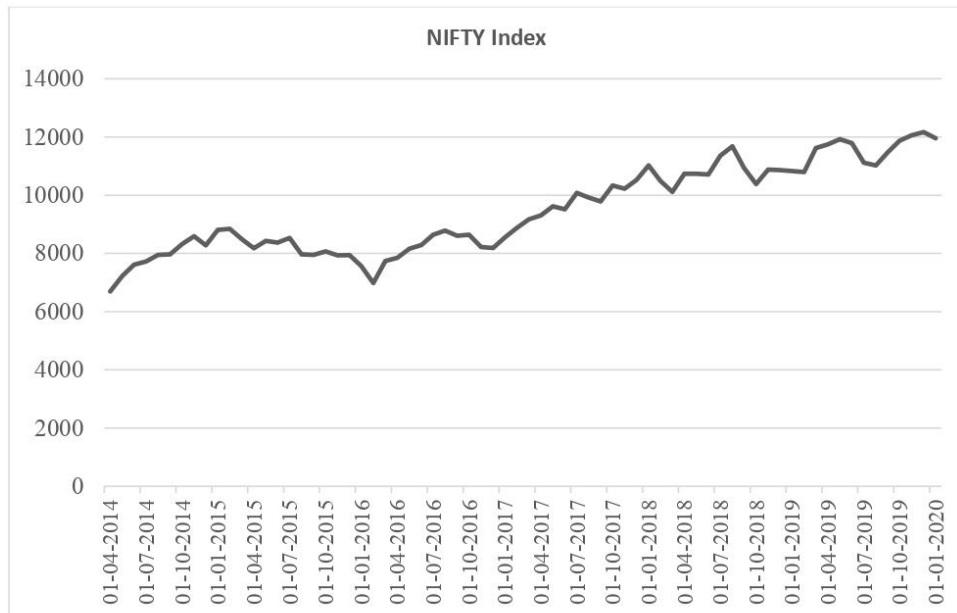


Figure 1: NIFTY index from April 2014 to December 2019; Source: Yahoo Finance

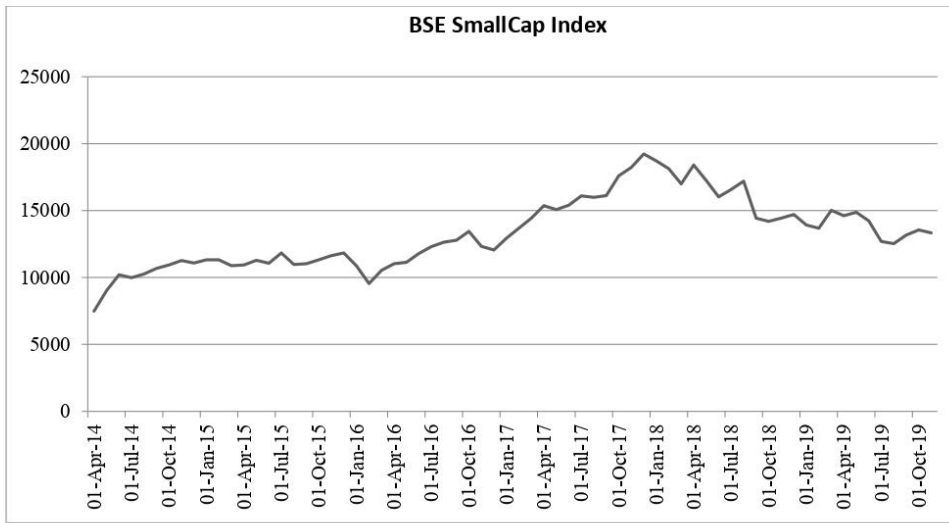


Figure 2: BSE SmallCap Index, April 2014- October 2019; Source: Yahoo Finance

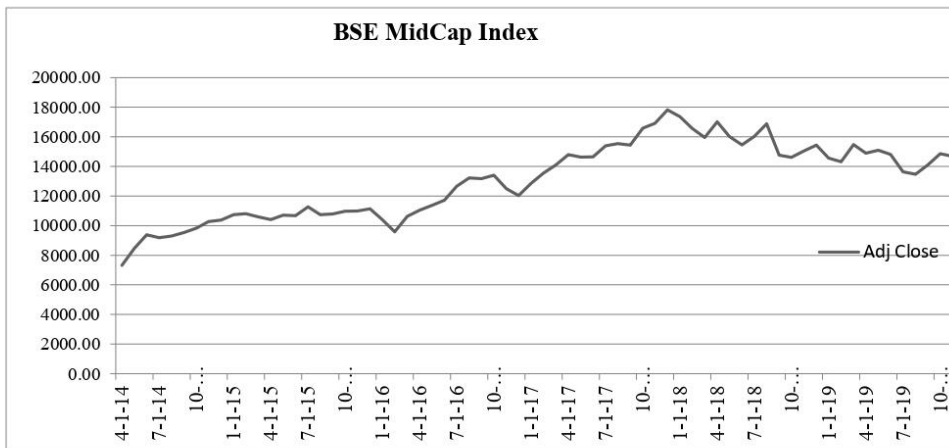


Figure 3: BSE Midcap Index, April 2014-October 2019; Source: Yahoo Finance

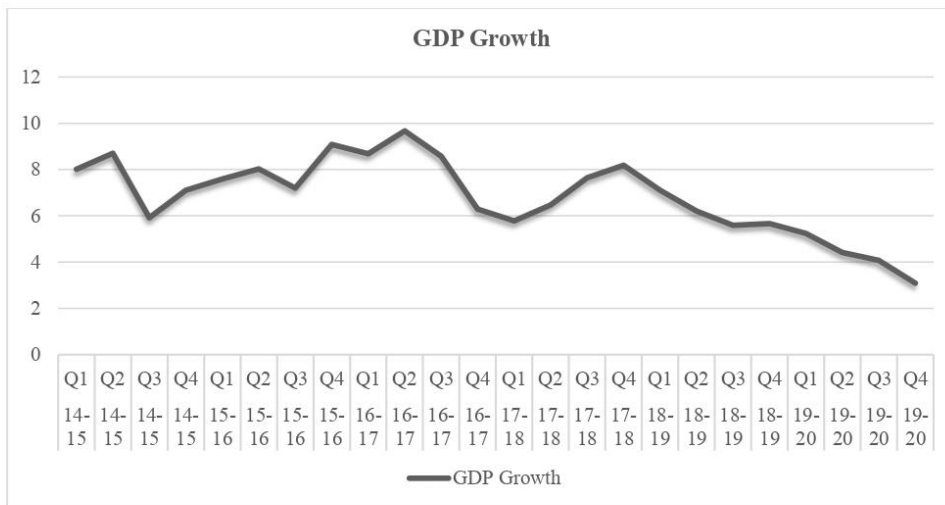


Figure 4: Quarterly GDP growth numbers, 2014-2020; Source: statistics.com

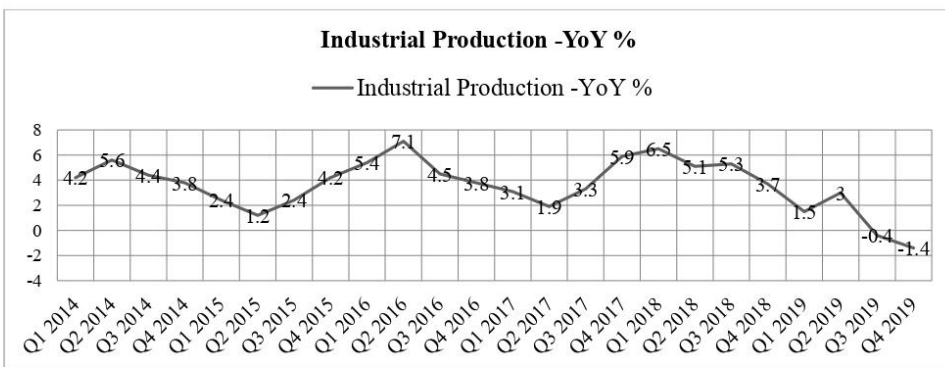


Figure 5. Industrial Production index, Year-on-year (2014-2019); Sources: Indiamacroadvisors.com

Table 1: Results for best performing momentum strategies 2014-16 (Winner)

Portfolio	Winner		NIFTY		Sharpe Ratio	
	Returns	Std. Dev.	Returns	Std. Dev.	Winners	NIFTY
J12K9	2.508*	17.441	.52	9.919	1.294	0.472
J9K12	2.45*	21.189	0.541	12.917	0.503	0.276
J6K12	2.296*	18.866	0.414	12.945	1.46	0.383
J12K6	2.161*	13.681	0.223	9.766	0.948	0.137
J9K9	2.04*	15.904	0.306	10.635	1.156	0.259
J6K9	2.026*	15.633	0.206	10.422	1.166	0.178
J3K12	1.959*	20.232	0.381	12.416	1.162	0.368
J9K6	1.885*	14.571	0.01	9.791	0.776	0.006
J3K9	1.823*	17.607	0.22	9.876	0.93	0.2
J6K6	1.816*	13.682	-0.127	9.812	0.796	-0.077
J12K3	1.796*	9.819	-0.364	7.347	0.549	-0.148
J3K6	1.721*	13.853	0.083	9.201	0.745	0.054
J6K3	1.419*	9.593	-0.503	6.841	0.443	-0.22
J3K3	1.224*	10.296	-0.326	6.7	0.356	-0.146
J9K3	1.147*	10.545	-0.61	7.187	0.326	-0.254

* Statistically significant at 5% confidence interval

** Statistically significant at 10% confidence interval

Table 2: Returns for best performing momentum strategies 2014-16 (loser)

Portfolio	Loser		NIFTY		Sharpe Ratio	
	Returns	Std. Dev.	Returns	Std. Dev.	Loser	NIFTY
J12K9	2.272*	28.809	0.52	9.919	0.71	0.472
J9K12	1.784*	32.188	0.541	12.917	0.665	0.276
J12K6	1.783*	9.766	0.223	9.766	0.452	0.137
J6K12	1.507*	28.588	0.414	12.945	0.632	0.383
J9K9	1.336**	28.483	0.306	10.635	0.422	0.259
J3K12	1.114*	25.491	0.381	12.416	0.524	0.368

J6K9	1.044*	23.911	0.206	10.422	0.393	0.178
J3K9	0.859*	20.977	0.22	9.876	0.368	0.2
J3K6	0.673*	16.007	0.083	9.201	0.252	0.054
J6K6	0.648**	19.958	-0.127	9.812	0.194	-0.077
J3K3	0.211**	<u>8.492</u>	-0.326	<u>6.7</u>	0.074	-0.146

* Statistically significant at 5% confidence interval

** Statistically significant at 10% confidence interval

Table 3: Returns for best performing momentum strategies 2017-19 (winner)

Portfolio	Winner		NIFTY		Sharpe Ratio	
	Returns	Std. Dev.	Returns	Std. Dev.	Winner	NIFTY
J6K6	1.059*	10.566	0.487	5.436	0.601	0.537
J6K12	1.024*	13.022	0.613	7.366	0.944	0.999
J9K6	0.9699*	10.684	0.487	5.436	0.544	0.537
J6K3	0.885*	7.819	0.187	5.416	0.339	0.103
J9K3	0.884*	8.005	0.187	5.416	0.331	0.103
J6K9	0.879**	13.052	0.544	6.232	0.606	0.786

* Statistically significant at 5 % confidence interval

** Statistically significant at 10 % confidence interval

Table 4: Returns for best performing momentum strategies 2017-19 (arbitrage portfolio)

Portfolio	Winners-Losers		NIFTY		Sharpe Ratio	
	Returns	Std. Dev.	Returns	Std. Dev.	Winner-Loser	NIFTY
J6K6	1.226*	8.898	0.487	5.436	0.827	0.537
J6K12	1.128*	12.407	0.613	7.366	1.09	0.999
J6K9	1.001**	12.661	0.544	6.232	0.711	0.786

* Statistically significant at 5 % confidence interval

** Statistically significant at 10 % confidence interval

RESULTS

Tables 1, 2, 3 and 4 provide an overview of the average returns an investor would have earned for those momentum strategies that have yielded significant results and the accompanying risk for the

same. The tables also provide details as to the outcomes had the investor adopted a passive investment approach by buying into the NIFTY index and holding it for the period as specified by the momentum strategy. Complete tables have been shown in the appendix at the end. Tables 1 and 2 provide a summary of the average returns and the accompanying risks that portfolios comprised solely of winners and portfolios comprised exclusively of losers would have generated for the same time horizon during the holding periods as dictated by the momentum strategies. It is interesting to note that the benchmark NIFTY index gave better returns during the period marked by a slowdown, from 2017-19, in comparison to the period from 2014-16, accompanied with lower risk as is evident from the lower measures of standard deviation. On the other hand, we observe that the performance of the winner portfolios, as measured by the Average Returns for each of the momentum strategy, declined significantly during the slowdown years. Even though volatility for the statistically significant momentum strategies was higher than volatility observed for the broader index during the latter period of the study, it was much lower than the volatility observed for successful momentum strategies during the period from 2014-2016. Tables 3 and 4 provide details of the returns for successful momentum strategies for portfolios comprising solely of winners and for the arbitrage portfolio from 2017 to 2019. The observations, as explained below, are in stark contrast to the existing literature which has generally observed that during a crisis, momentum returns tend to suffer, even crash altogether and volatility tends to increase (Maheshwari & Dhankar, 2017).

Momentum Returns in the Indian Market During the Boom Years

We tested for momentum profitability amongst the hundred largest listed companies on the Indian bourses by way of market capitalization. Our study yielded results that confirm the observations of previous studies on momentum returns in the Indian stock market. Upon viewing the performance results of all the 16 momentum strategies for the period from April 2014 to December 2016, it was found that 15 of the momentum strategies for a portfolio consisting solely of Winners produced economically significant returns. Thus, it can be said that during the boom years, 15 out of the 16 momentum strategies for the Winner portfolio outperformed the benchmark NIFTY index both economically as well as statistically. The most profitable strategy, the J12K9, delivered an average return of approximately 2.508 per cent per month. Surprisingly, even the Loser portfolios performed better than the benchmark NIFTY index for most of the momentum strategies. A total of 11 momentum strategies produced economically significant returns, with eight momentum strategies producing statistically significant returns in the five per cent confidence interval, while three strategies produced statistically significant returns within the ten per cent confidence interval. The best performing momentum strategy for the Loser portfolio also happens to be the J12K9, which delivered an average return of approximately 2.27 per cent per month. However, the Arbitrage portfolio, created by selling the losers and buying the winners, didn't produce any statistically significant results.

Momentum Returns During the Slowdown

In contrast to previous literature that found momentum returns to completely vanish during a crisis (Maheshwari & Dhankar 2017), our study has found that certain momentum strategies still manage to outperform the benchmark index from the period of 2017 till 2019. For the Winner portfolios, even though 14 out of the 16 momentum strategies managed to generate returns that were higher than the benchmark index, only six of them generated statistically significant returns. It must be

noted that unlike the previous three-year period, from 2014-2016, that was marked by broader optimism about the future prospects of the nation and that saw all but two of the momentum strategies deliver both economically and statistically significant returns, the subsequent three-year period saw a considerable drop in average returns among all the momentum strategies. The most successful strategy, the J6K6, gave an average return of 1.059 per cent per month. Unlike the so-called boom years, the Loser portfolios gave negative returns for all sixteen of the momentum strategies. However, the arbitrage portfolio did give statistically significant results for three momentum strategies, namely the J6K6, J6K9 and the J6K12 strategy.

DISCUSSION

The observations of the study, arrived at after combining the results from tables 1, 2, 3 and 4, are surprisingly in disagreement with findings from previous momentum studies in the Indian stock market, which have found momentum strategies to work extremely well except during periods of financial crisis. Such studies have suggested that stock markets tend to have phases of momentum crashes which become more pronounced during times of a financial crisis. Previous research, that studied profitability of momentum strategies in the Indian stock market through the period of the global financial crisis of 2007, found that momentum strategies gave negative returns during the global financial meltdown caused by the sub-prime lending crisis in the US (Maheshwari & Dhankar 2017). These findings were consistent with other studies like Chordia & Shivakumar (2002). Non-significant negative returns were also observed by studies conducted across eight different equity markets and asset classes, as well as during multiple time periods (Daniel et al 2013). Previous studies are of the consensus that momentum crashes can be attributed to market volatility which tends to be high during periods of economic turmoil (Daniel et al, 2012). The poor returns generated by momentum strategies during such times are ascribed to strong short-term reversal effects instead of trend continuation. Our study finds momentum strategies that involve buying past winners generate returns that are much higher than the broader markets during the boom years, as evidenced by the results as summarized in table 1. However, the higher returns can also be attributed as a premium that investors expect for taking on added risks. More interestingly, we find that the Sharpe ratios for the statistically significant momentum strategies during the Slowdown years to be comparable with those of the NIFTY Index, thereby implying that investors have a hard time guessing how prices might move based on recent action during times of economic instability, and thus stay away from picking or choosing particular stocks based on certain factors, which in this case happens to be momentum. It can also be inferred that momentum profitability cannot be completely attributed to added risks, as postulated by previous literature. This is because even though the risk involved in the successful momentum strategies tends to still be higher than the risk for the overall markets, the difference in returns is not as high as they were during the Boom years.

Our study also finds that momentum profits, at least for the Blue-Chip companies, do not completely crash during times of economic slowdowns and certain momentum strategies can still yield significantly positive returns. However, our study finds this to be true only for a portfolio comprising of previous winners. Thus, even though our results also provide significant arguments in favor of a contrarian approach while chasing momentum profits during more optimistic times, the same cannot be said for times of economic uncertainty. Moreover, momentum strategies for portfolios constructed by buying recent winners and selling previous losers do not do so well

during the boom years as the difference between the average excess returns for the two groups is not as pronounced as it is during the slowdown period. This would imply that during times of economic positivity, momentum tends to favorably influence stock returns irrespective of their recent performances. One can infer that during times of high optimism, investors are more adventurous and look for value, even if that involves buying stocks that have underperformed recently. However, the approach tends to change during times of economic uncertainty, where investors prefer to shield themselves from the vagaries of the stock market by selling past losers and buying into the winners.

PRACTICAL IMPLICATIONS OF THE RESEARCH

It is observed that the portfolio formation period for the more successful momentum strategies is similar during both the boom years as well as the slowdown years, which is found to be ranging between six months to twelve months in duration. However, an interesting trend is observed as far as the portfolio holding period is concerned. The holding periods for the Winner portfolios during the pre-crisis period happen to be above six months for all but one of the top half of the best performing momentum strategies, whereas the holding period for the Winners for four of the six strategies that beat the benchmark index is found to be between three months to six months during the slowdown years. Thus, as far as the portfolio formation period is concerned, the above observations would seem to imply that investors, irrespective of market conditions, find great value in stocks that have performed well over a relatively longer time horizon during the past one year. Additionally, one can also infer that even though momentum profits can persist even during times of economic turbulence, however, investors tend to hold portfolios based on most recent price action (momentum) for lesser of a duration than they would have during times of economic stability and growth.

As mentioned above, results from the study may lead one to conclude that during the so-called boom years, when public sentiment is mostly optimistic, momentum profits must mostly be driven by the long positions in the Winner portfolio. This can be inferred by the considerably higher returns for all the momentum strategies which outperform the benchmark NIFTY index at statistically significant levels. However, a contrarian approach cannot be written off completely, as is apparent from the fact that a majority of momentum strategies that involved holding a portfolio of past losers have also outperformed the index, both economically as well as statistically. The same cannot be said for times when the economic conditions are in turmoil, as most of the momentum strategies for winners do not produce statistically significant results and momentum strategies for the Losers underperform the benchmark, with all yielding negative results. During such times, one would be better off by selling the losers to buy into a portfolio of winners. The results of this study suggest holding the Arbitrage portfolio for a period of 6 months for optimum returns.

FUTURE SCOPE

We strongly believe that even though the findings of this study are useful, there will still be certain limitations to our work. First and foremost, we fail to account for the trading costs. Since trading would also involve brokerage, any adjustments made for transactions costs might lead to erosion of momentum profits, although it is our belief that the effect would be negligible. Second, market conditions, especially in India, have drastically changed since the financial crisis of 2007. Technological advancements have led to an increased financial literacy, resulting in more and

more people in the country to continue increasing their exposure to equity as an investment avenue. Moreover, it also seems that governments the world over appear much too eager to adopt increased measures of quantitative easing to ensure, among other things, that their stock markets do not tank. Therefore, there could be a chance that a crisis similar to the one in 2007 might not have the same effect now as it did back then. It is also important to note that systemic shocks to the economy on account of domestic policy measures (like demonetization) usually have a lagging effect which isn't evident until after some time. This is unlike the Global Financial Crisis of 2007, which, even though it was years in the making, just exploded all of a sudden and caused large scale pandemonium across the globe, leading to a lot of selling pressure and thus causing price to drop drastically. Therefore, it would be unfair to compare how momentum profits reacted during the Sub-prime lending crisis of 2007 with the results momentum strategies gave during the economic slowdown from 2017 to the end of 2019 on account of the differences in prevailing market conditions at the time. We trust our study can definitely serve as a template for implementing momentum strategies during future slowdowns. However, further research can definitely go a long way to validate the practical implications of our findings. A comparison of momentum profitability among the NIFTY 100 and NIFTY NEXT 100 during the same time duration as the one used in this paper would be of some interest since it would provide evidence as to whether or not investors place a special emphasis on companies that have a larger market cap within the broader universe of LargeCap companies listed on the NSE, especially during times of economic slowdowns. Further scope of research could also include using the aforementioned sets of companies and comparing momentum returns since the lows of the March 2020 crash to identify any trends in investor conduct during times of a market recovery. We firmly believe that such studies would go a long way in furthering our understanding and knowledge of investor behavior in India.

CONCLUSION

There have been various market anomalies that are well detailed and have been studied widely in the past. Among these, momentum is the strongest of these market anomalies and is widely used in practice by the larger investment community. Simply put, the momentum strategy is one wherein you buy the recent winners and look to profit off of the momentum effect. There are numerous studies that show evidence regarding the presence of momentum effect not only in the markets of the developed world but also in the emerging markets as well. However, previous literature also proved that momentum effect ceases to exist during market turbulence. As a matter of fact, studies conducted on the persistence of the momentum effect in the backdrop of the global financial crisis have found momentum strategies to yield negative returns. As mentioned earlier, most recent studies detailing the persistence of momentum profits use the global financial crisis of 2007 as a point of reference. However, we wanted to study whether the momentum effect showed similar behavior if the economy experienced turbulence on account of domestic policy measures, for a change; and the results throw up some interesting findings. We observe that some momentum strategies wherein you buy previous winners continue to generate results that are both economically as well as statistically significant. In addition, momentum strategies which involve portfolios created out of selling previous losers and buying previous winners also give significant returns during times of economic uncertainty. Such findings have an interesting implication for the implementation of momentum strategies and support an investment approach based on momentum even during times when economic conditions do not seem favorable, although investors would be advised to have a shorter holding period. Moreover, since we only studied the

hundred largest companies by way of market capitalization, it seems that this approach might not work outside of the Blue-Chip stocks, although that would remain a matter of conjecture until it is studied in greater detail.

REFERENCES

- [1] Ansari, A.V., & Khan, S. (2012). Momentum anomaly: Evidence from India. *Managerial Finance*, 38(2), 206–223.
- [2] Asem, E., & Tian, G.Y. (2010). Market dynamics and momentum profits. *Journal of Financial and Quantitative Analysis (JFQA)*, 45(6), 1549–1562.
- [3] Cheng, J.W., & Wu, H.F. (2010). The profitability of momentum trading strategies: Empirical evidence from Hong Kong. *International Review of Economics and Finance*, 19(4), 527–538.
- [4] Chordia, T., & Shiva Kumar, L. (2002). Momentum, business cycle, and time-varying expected returns. *The Journal of Finance*, 57(2), 985–1010.
- [5] Conrad, J., & Kaul, G. (1998). An anatomy of trading strategies. *The Review of Financial Studies*, 11(3), 489–519.
- [6] Cooper, M.J., Gutierrez, R.C., & Hameed, A. (2004). Market states and momentum. *The Journal of Finance*, 59(3), 1345–1365.
- [7] Daniel, K., Jagannathan, R., & Kim, S. (2012). Tail risk in momentum strategy returns. NBER Working Paper No.18169. Cambridge, MA: National Bureau of Economic Research. doi: 10.3386/w18169
- [8] Daniel, K., & Moskowitz, T.J. (2013). Momentum crashes. Swiss Finance Institute Research Paper No.13–61. Switzerland: Swiss Finance Institute.
- [9] Dhankar, R.S., & Maheshwari, S. (2014). A study of contrarian and momentum profits in Indian stock market. *International Journal of Financial Management*, 4(2), 40–54.
- [10] Fama, E. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance*, 25(2), 383–417
- [11] Fomer, C., & Marhuenda, J. (2003). Contrarian and momentum strategies in the Spanish stock market. *European Financial Management*, 9(1), 67–88
- [12] Griffin, Ji and Martin (2005) Global momentum strategies: A portfolio perspective. *The Journal of Portfolio Management*, 31(2), 23–39.
- [13] Haugen, R.A. (2002). *Modern investment theory* (5th ed.). NJ: Prentice-Hall, Inc.
- [14] Hurn, S., & Pavlov, V. (2003). Momentum in Australian stock returns. *Australian Journal of Management*, 28(2), 141–155
- [15] Jegadeesh, N., & Titman, S. (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. *The Journal of Finance*, 48(1), 65–91.
- [16] Jegadeesh and Titman (2001) Profitability of momentum strategies: An evaluation of alternative explanations. *The Journal of Finance*, 56(2), 699–720
- [17] Maheshwari, S. & Dhankar, R.S. (2017). The Effect of Global Crisis on Momentum-Profitability: Evidence from the Indian Stock Market. *Vision*, 21(1) 1–12
- [18] Mengoli, S. (2004). On the source of contrarian and momentum strategies in the Italian equity market. *International Review of Financial Analysis*, 13(3), 301–331.
- [19] Moskowitz, T.J., & Grinblatt, M. (1999). Do industries explain momentum? *The Journal of Finance*, 54(4), 1249–1290.

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- [20] Mun, J.C., Vasconcellos, G.M., & Kish, R. (2000). The contrarian/overreaction hypothesis: An analysis of the US and Canadian stock market. *Global Finance Journal*, 11(1–2), 53–72
- [21] Rouwenhorst, K.G. (1998). International momentum strategies. *The Journal of Finance*, 53(1), 267–284
- [22] Sehgal, S., & Balakrishnan, I. (2002). Contrarian and momentum strategies in the Indian capital market. *Vikalpa*, 27(1), 13–19.
- [23] Wu, Y. (2011). Momentum trading, mean reversal and over-reaction in Chinese stock market. *Review of Quantitative Finance and Accounting*, 37(3), 301–323.



CERTIFICATE

OF PARTICIPATION

This is to certify that

Syed Alin Ali

on the occasion of

**National Conference on Recent Trends
in Academic Research (RTAR-2021)**

For Presenting the Paper Entitled

**The Effect of Domestic Slowdown on Momentum
Profitability Evidence from the Indian Market**

on 30th & 31st August 2021

Rishabh

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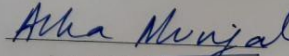
participated / presented / contributed a paper titled

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