

Are extreme negative returns priced in the Indian stock market?

Tariq Aziz*, Valeed Ahmad Ansari

Department of Business Administration, Aligarh Muslim University, Aligarh, 202002, India

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Abstract

Given some recent empirical evidence showing the predictive ability of maximum daily returns (MAX) in the cross-section of stock returns, we examine the relationship between minimum daily returns (MIN) and subsequent monthly returns in the emerging stock market of India during the period 1999–2014. Our findings suggest that stocks with higher MIN in a month yield higher returns in the subsequent month with some caveats. This MIN effect is present primarily among stocks with lower market capitalization, higher illiquidity, and stocks with low institutional holdings. Furthermore, the application of quantile regression reveals that the relation between MIN and future stock returns is dynamic and quantile dependent.

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1. Introduction

Bali, Cakici, and Whitelaw (2011) uncovered an interesting new anomaly “the MAX effect”. They found for the US stock market that portfolios based on maximum daily return (MAX) in a month yield anomalously negative returns in the following month while a symmetrically opposite relation exists between minimum daily return (MIN) and subsequent portfolio returns. This finding is anomalous in the mean-variance framework of Sharpe (1964) and Lintner (1965) where only systematic risk is priced but consistent with investors' preference for lottery-like stocks as shown by Kumar (2009). As per Kumar (2009), a higher demand for lottery-like stocks (for which MAX is a proxy) may lead to higher prices and lower expected returns on these stocks. This is particularly a possible scenario given that individual investors hold under-diversified portfolios (Goetzmann & Kumar, 2008; Odean, 1999) and MAX is

an idiosyncratic risk. Their results are also compatible with the cumulative prospect theory (Tversky & Kahneman, 1992) as modeled by Barberis and Huang (2008). Under cumulative prospect theory, investors overestimate the probability of extreme events and thus they cause high MAX stocks to be overvalued and high MIN stocks to be undervalued.

Subsequent studies of Annaert, De Ceuster, and Versteegen (2013) and Walkshausl (2014) extend the methodology of Bali et al. (2011) for the European markets while Nartea, Wu, and Liu (2014), and Aboulamer and Kryzanowski (2016) analyse the MAX effect in the South Korean and the Canadian markets respectively. On the other hand, Fong and Toh (2014) show that the MAX effect is dependent upon investor sentiment which highlights the behavioral underpinnings of the MAX effect. Cheon and Lee (2014) investigate the MAX effect at a global level in 44 markets and report a negative risk premium for MAX in 26 out of 44 markets.

As for the minimum daily return (MIN), some theoretical literature predicts that the effect of MIN should be symmetric to the MAX effect. For example, under the cumulative prospect theory of Barberis and Huang (2008), small probability events are over-weighted, and thus, stocks with high MIN are

* Corresponding author.

E-mail addresses: taziz.ba@amu.ac.in (T. Aziz), valeedin@yahoo.com (V.A. Ansari).

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avoided by investors pushing their prices low and expected returns high. Alternatively, investors seek a discount for high MIN stocks which causes these stocks to become undervalued and hence the high return.

In this paper, we extend the findings of [Bali et al. \(2011\)](#) for the Indian stock market with a focus on the extreme negative returns (MIN). It is pertinent to underscore that all of the studies in the literature have examined extreme positive returns (MAX) and its impact on the cross-section of stock returns. There has been given only a cursory attention to the extreme negative returns in two studies ([Annaert et al., 2013](#); [Bali et al., 2011](#)). This is quite surprising because exploiting MAX based strategy requires a short position while a long position is needed to exploit the MIN effect that is easier. As highlighted by [Lamont and Stein \(2004\)](#), among others, that shorting some stocks may be difficult at times. Moreover, some stocks may be expensive to short which further dents upon the profitability of the short-leg based strategy ([Drechsler & Drechsler, 2014](#)).

[Bali et al. \(2011\)](#) have reported a significant positive coefficient of MIN in the univariate cross-section regression while after controlling for a host of variables the average slope on MIN turns insignificant. On the other hand, [Annaert et al. \(2013\)](#) have reported a negative and insignificant coefficient of MIN for the European in a model with numerous control variables. We find the relation between MIN and subsequent returns in the Indian stock market to be positive one that is sensitive to some robustness tests. Using bivariate sorted portfolios to control for the effects of size, value, momentum, reversal, and illiquidity, we find that the return on the hedge portfolio that is long high MIN stocks and short low MIN stocks is consistently positive and significant. This MIN effect is particularly present among stocks with low market capitalization, high illiquidity, and low institutional holdings. Furthermore, using quantile regressions, we show that the relation between MIN and subsequent stock returns is quantile dependent which is negative significant at the lower quantile and positive significant at the upper quantile of the response variable.

Thus, this paper makes three contributions to the literature related to MIN and the cross-section of stock returns. First is to use the sample of an emerging stock market (India) to test if the negative relation between MIN and future stock returns found by [Bali et al. \(2011\)](#) in the US stock market thrives once one moves from the US stock market to the Indian stock market. Although Indian stock market is one of the leading emerging markets, research in the Indian stock market is sparse. Bombay Stock Exchange (BSE) claims to be the oldest stock exchange in Asia. The BSE is the world's 11th largest stock exchange with an overall market capitalization of \$1.94 Trillion as of April 2017.¹ By the number of listed companies, it ranks at number one. As of June 6, 2015, the number of

listed scripts was 5,749.² The top 500 stocks (BSE-500) represent around 95 percent of the total market capitalization of listed universe at BSE³ and the rest of the market is thinly traded. Research in the emerging market of India has assumed significance in recent times owing to increased market size and liquidity, international portfolio flows, and high economic growth. Moreover, often stylized patterns identified in the developed market are nonexistent in the emerging markets due to their peculiar characteristics. Hence, country specific verification of anomalies initially discovered in developed markets is important as it may add a new twist to the story." In addition, the empirical literature on the role of MIN in the cross-section of stock returns is scanty thus by providing detailed results of MIN, this study attempts to fill this void. Our findings are in consonance with the theoretical prediction ([Brunnermeier, Parker, & Gollier, 2007](#), and others) of a positive relation between MIN and future stock returns.

Our second contribution relates to the use of quantile regression ([Koenker & Bassett, 1978](#)) in examining the MIN-return relation which highlights that the relationship is not similar across lower and upper quantiles of the conditional distribution. In particular, the relation is of the opposite signs at the extreme quantiles that renders the average slope of MIN in the least square regression insignificant. Furthermore, the results from quantile regression provide new insights when combined with the idea of the prospect theory developed by [Kahneman and Tversky \(1979\)](#) which predicts a non-uniform relation at opposite quantiles. The application of quantile regression in the asset pricing context is a relatively new phenomenon ([Aziz & Ansari, 2016](#); [Nath & Brooks, 2015](#); [Wang, 2012](#)) and thus, this constitutes the second contribution of the study.

Our third contribution is to show that the MIN effect is confined to stocks with limited arbitrage (proxied by size and illiquidity) and short sale constraint (as proxied by institutional holdings). This is in conformity with the theoretical prediction ([Shleifer & Vishny, 1997](#); [Miller, 1977](#)) that states that anomalies are more likely to persist among stocks with limited arbitrage and short sale constraint.

The remainder of the paper is organized as follows: Section 2 outlines the sample and methodology employed. Section 3 reports the results of the time-series and cross-sectional tests on the relation between MIN and future stock returns. Section 4 concludes the paper.

2. Data and methodology

The data used herein is primarily drawn from Prowess, a database maintained by the Center for Monitoring Indian Economy (CMIE) for the period April 1999 to June 2014. The constituent stocks of S&P BSE-500 index form the sample for this study. It is worth noting that BSE-500 stocks account for

¹ http://www.bseindia.com/markets/keystatics/Keystat_maktcap.aspx?expandable=0 (Accessed on 18th July, 2017) and <http://stockstotrade.com/major-stock-exchanges-in-the-world-infographic/> (Accessed on 18th July, 2017).

² <http://stockstotrade.com/major-stock-exchanges-in-the-world-infographic/> (Accessed on 18th July, 2017).

³ S & P BSE 500 Index factsheet. <http://www.asiaindex.co.in/indices/equity/sp-bse-500> (Accessed on 18th July, 2017).

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