ORIGINAL RESEARCH PAPER

Finance

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MEMORY OF STOCK RETURNS: EVIDENCE FORM NATIONAL STOCK EXCHANGE OF INDIA

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ABSTRACT

Researchers have used different methods to detect the long-term dependence so cold "long memory" in stock market returns. The conducted study we investigate the behaviors of long-range dependence phenomena of Indian stock by employment of Rescaled Range Analysis (R/S). In this study we find that all of the examined stock time series long memory was detected

Introduction.

The memory of financial returns has been for long time in the discourse in academia and by business professionals and traders. Financial time series memory implies that patters from the past can help predict the future. From that statement there is a short way to rationale for using trading rules based on historical data for profit. On the other hand one of most prominent theory in modern finance Efficient Market Hypothesis proposed by Fama (1970) states that prices move in random manner and there is now way of predicting those changes. Therefore profiting from historical data is impossible to acquire.

Objective of the Study

The purpose of this study is examination of existence of long memory in randomly picked stock that are listed on National Stock Exchange of India.

Literature revue.

There is large research concerted on short memory of financial series in form of finding of autocorrelation. Most well know are studies Campbell et al. (1996) and by Lo and MacKinlay (1990, 1996)

Long memory was introduced first by hydrologist Harold Hurst (1951) in form of Rescaled Ranged Analysis (R/S) to analyze Nil river floods. Hurst exponent is used for long memory identification. Theoretical foundation for exponent where provide by Mandelbrot with his publication Mandelbrot, Wallis (1969) and Mandelbrot and Taqqu (1979). Then this particular type of analysis was popularized probably by E. Peters (1991, 1994) and Lo (1999). Peters research showed that market can't be by Gaussian process and long memory is present in stock returns. Most studies that aim. That Fung et. al. (1994) used three different methods to find long memory of time series.

In case of Indian markets there is not many publication on this subject. Nevertheless Mukherjee et. al. (2011) found long memory in SENSEX index

Data

For purpose of this study we use weekly data of stock prizes listed on National Stock Exchange of India. Our sample has length of ten years that equals to 575 observation for each stock time series. For this paper purpose we gather sample of 30 stock. To avoid selection bias stock were picked in random manner by employment of pseudorandom generator with algorithm stated below.

1. We picked stock listed on National Stock Exchange of India.
2. Every stock is assign to a number creating list from 1 to n alphabetically.
3. Ten stock are acquired by generating 30 by pseudorandom generator from threshold from 1 to n. If a number once drown is drawn again procedure is repeated until there are no duplicates.
4. If there are missing observation in data we go again to point 3

The random sample of 30 stock listed on National Stock Exchange of India should be sufficient for generalization for population as properties central limit theorem. As was stated by Corder, and Foreman (2009) random sample consisting between 20-30 observation have high parameter convergence to whole population in case detection of some phenomenon.

Methodology

To conduct empirical analysis R was employed for model estimation and other calculation. R is open source software used commonly by statisticians and other members of the academia.

For this study we use classic rescaled range analysis developed (R/S) by Hurst and perfected by Mandelbrot. This method employ chaos theory and fractal demission to test long memory of the distribution. Procedures designate for this purpose are listed below.

We start with standard formula for rescaled range.

$$(R \div S)_n = c \times n^H$$

Where:
R- stands for maximum from time series n
S- is standard deviation
c- is constant
n- number of observation
H- Hurst Exponent

The equation can be changed to linear form thanks to logarithms proprieties.

$$ln(R \div S)_n = lnc + Hlnn$$

From there we can use regression to estimate Hurst exponent as was proposed by Weron and Weron (1998). As was pointed by Weron (2002) no asymptotic distribution t has been derived for most of the Hurst exponent estimators so far, but an approximate functional forms provided by Anis-Lloyd can be used to correct R/S estimate. Crating confidence interval we can be sure that our estimation is statically significant as was proposed by Anis and Lloyd (1976) .

The 95% confidence internal for significance where created by using formulas below

$$LL=0.5-\exp(4.21-7.33\times\ln(\ln(M))) \quad 3)$$
$$UL=0.5+\exp(4.77-3.10\times\ln(\ln(M))) \quad 4)$$

Where M=log2(N) (N is number is equal to sample seize)

Results

Table 1. Results of Hurst exponent

NR	Stock name	Ticker	Hurst Exponent	95% Significance
1	AGC Networks Ltd	AGCNET	0,749	Yes
2	Bannari Amman Spinning Mills Ltd	BASML	0,867	Yes
3	Blue Dart Express Limited	BLUEDART	0,87	Yes
4	Celebrity Fashions Limited	CELEBRITY	0,809	Yes

5	Corporation Bank Ltd	CORPBANK	0,848	Yes
6	Electrotherm (India) Ltd	ELECTHERM	0,854	Yes
7	Federal Bank	FEDERALBNK	0,867	Yes
8	Federal Bank Ltd	GAEL	0,841	Yes
9	Ginni Filaments Limited	GINNIFILA	0,842	Yes
10	Gujarat Alkalies & Chemicals Limited	GUJALKALI	0,845	Yes
11	HEG Limited	HEG	0,813	Yes
12	Hotel Rugby Ltd	HOTELRUGBY	0,797	Yes
13	HSIL Ltd	HSIL	0,874	Yes
14	Kalpataru Power Transmission Limited	KALPATPOWR	0,855	Yes
15	Khaitan Electricals Ltd	KHAITANELE	0,844	Yes
16	KPIT Technologies Limited	KPIT	0,849	Yes
17	Lakshmi Vilas Bank Ltd	LAKSHVILAS	0,846	Yes
18	Lakshmi Machine Works Ltd	LAXMIMACH	0,857	Yes
19	Obserwuj	MOTHERSUMI	0,873	Yes
20	Motherson Sumi Systems Ltd	PAEL	0,839	Yes
21	Pioneer Embroideries Limited	PIONEEREMB	0,811	Yes
22	Precot Meridian Ltd	PRECOT	0,772	Yes
23	Ramco Systems Ltd	RAMCOSYS	0,866	Yes
24	Shah Alloys Ltd	SHAHALLOYS	0,849	Yes
25	Swaraj Engines Limited	SWARAJENG	0,86	Yes
26	Tata Chemicals Limited	TATACHEM	0,854	Yes
27	Thomas Cook India Ltd	THOMASCOOK	0,88	Yes
28	Unichem Laboratories Limited	UNICHEMLAB	0,85	Yes
29	VLS Finance Ltd	VLSFINANCE	0,865	Yes
30	Wipro Technologies Ltd	WIPRO	0,867	Yes

Conclusions

The results obtain in this paper seem to support the existence of long memory in time series of stock listed National Stock Exchange of India. All tested stock time series consists of long memory. All results were statistically significant. It can be pointed out that all stock had positive long range dependence and there were no observation with negative dependence. This seem consistent with believe that most of emerging market stock are dominated by trends. This study can lead to further research for creation trading strategies that can be use by professionals.

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