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WHEN DOES TECHNICAL ANALYSIS WORK ...AND WHEN DOESN'T IT?

by Kian-Ping Lim

In the financial academic literature, one of the most enduring questions concerns the predictability of stock prices. Much research has been devoted to forecasting stock prices in order to "beat the market". The general consensus drawn from earlier empirical work is that stock prices move in a random fashion, suggesting that analysis of past prices to forecast future price movement is meaningless because patterns observed in the past occurred purely by chance. This finding poses a direct challenge to technical analysts, to the extent of implying their work is of no real value to stock market investors. However, this hardly makes sense given the wide usage of technical analysis in the investment world.

From the literature survey, it was found that those earlier academic studies tested whether stock prices follow a random walk by using statistical tests that are in fact designed to uncover linear patterns in stocks prices. However, the lack of linear dependencies does not necessarily imply the series are random as there might be other more complex forms of dependencies that cannot be detected by these standard linear methodologies. Even Fama (1965) admitted that linear modeling techniques have limitations as they are not sophisticated enough to capture complicated patterns that the chartist sees in stock prices.

One of the possible hidden patterns that went undetected in earlier studies is that of non-linear dependency. After the first evidence of non-linearity reported by Hinich and Patterson (1985), more and more evidence has emerged to suggest non-linearity is a universal phenomenon. This new feature of the data supports the idea of stock market predictability. In this regard, Lim and Liew (2004) argued that non-linearity favours non-linear technical analysis techniques, and their view is further supported by the empirical work of Andrada-Félix et al. (2003) who demonstrated the profitability of non-linear trading rules. Given the mounting empirical evidence of predictability, the pendulum has swung in favour of professional analysts, and Cochrane (1999) has even labeled stock market predictability as a 'new fact in finance'.

Though the issue of stock market predictability is still hotly debated, there is a possible win-win solution for both groups. The repeated demonstrations by Schachter et al. (1985) and Hood et al. (1985) via sub-period analysis strongly highlights the fact that there are times when market movement is random, while at other times, the market moves in a significantly non-random and dependent pattern. Another recent work by Ammermann and Patterson (2003) also found that the stock and index returns of the Taiwan Stock Exchange follow a random walk for long periods of time, only to be interspersed with brief periods of strong linear and/or non-linear dependency structures. These findings, on the one hand, suggest that stock market predictability is mainly a short-horizon phenomenon, while at the practical level, highlight the relevance of market-timing strategies.

The main objective of this study is to utilize recent statistical advances, the windowed testing procedure, to provide further empirical support to the conjecture of Schachter et al. (1985) and Hood et al. (1985) that that there are times when market movement is random and times when it is not. To conserve space, this article only provides a brief discussion of the methodology. Interested readers can refer to Hinich and Patterson (1995) and Hinich (1996) for a full theoretical derivation of the test statistics involved. The present methodology is robust for at least three reasons: First, the portmanteau correlation (denoted as C) and bicorrelation (denoted as H) test statistics employed in this windowed testing procedure are designed to detect linear and non-linear dependency structures in the data respectively; Second, it permits a closer examination of the precise time periods when markets moves randomly and those periods when it does not. Third, both the C and H test statistics have good sample properties over short horizons of data.

This study looked at daily closing prices for three South Asian stock market indices: Colombo SE All Share (Sri Lanka), India BSE National (India) and Karachi SE 100 (Pakistan). These indices were collected from Datastream and are denominated in their respective local currency units for the sample period 1/1/1990 to 31/12/2003. From this

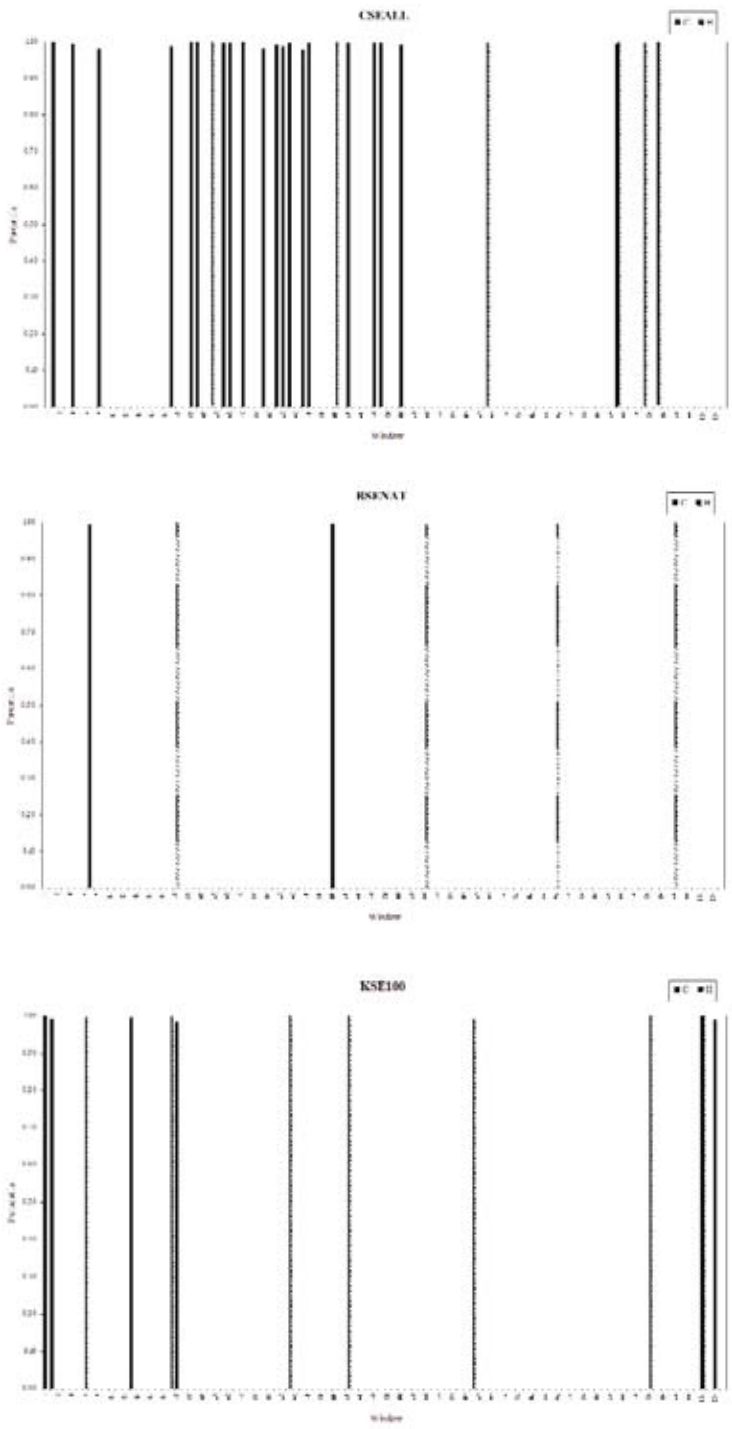

Figure 1: Significant C and H Windows for South Asian Stock Returns Series

data, the percentage daily returns are computed based on the price move from the close of one trading day to the next. In the windowed testing procedure, the data is split into sets of non-overlapping windows of 35 observations in length, approximately seven trading weeks.

Evidence of random and non-random walk movement

The results of the window testing are reported in Table 1. The fourth row shows the number of windows where the proposition of pure noise is rejected by the C statistic (indicating the presence of linear dependency structures), with the corresponding percentage in parenthesis. The statistics for significant H windows (indicating the presence of non-linear dependency structures) are also displayed in the same table. Since both significant C and H statistics indicate departure from a random walk, the final row of Table 1 provides the total number of windows or sub-periods in which the returns series are non-random. A common finding is that all three South Asian stock return series do not follow a random walk all the time. For instance, in the case of BSENAT, 6 out of a total 104 sub-periods (equivalent to 5.77%) move in a significantly non-random and dependent pattern, while for the remaining majority of sub-periods the market moves along at a close approximation to a random walk. This corroborates the findings of Ammermann and Patterson (2003), and provides additional empirical evidence to support the conjecture of Schachter et al. (1985) and Hood et al. (1985). In particular, these three South Asian stock markets join the list of exchanges that at times move randomly and at other times do not. →

Graphical Illustration

A graphical depiction of the results could provide a closer examination of the precise time periods during which the series deviate from a random walk. The histograms in Figure 1 show those windows (sub-periods) in which the series are non-random, either due to a significant C or H statistic, or both. Since the windowed testing procedure breaks the full sample into equal-length and non-overlapped windows, it is possible to identify the exact dates when the series under study departs from a random walk movement. For instance, in the case of BSENAT, there are 6 windows or sub-periods that the series move in a significantly non-random and dependent pattern. In particular, this occurs in window-8 (11/12/90-28/1/91), window-21 (8/9/92-26/10/92), window-45 (28/11/95-15/1/96), window-59 (14/10/97-1/12/97), window-79 (20/6/00-7/8/00) and window-97 (19/11/02-6/1/03). As a whole, Figure 1 clearly demonstrates that all three South Asian stock return series follow a random walk for long periods of time, only to be interspersed with brief periods of strong linear and/or non-linear dependency structures.

Implications for technical analysis

The present study throws some interesting light on the ongoing debate of stock market predictability. Though the returns for the South Asian stock market indices follow a random walk for long periods of time, there were times when it does not, suggesting the potential of profitability for technical trading rules. In particular, during those periods when the markets move in a significantly non-random and dependent pattern, it is possible for investors to devise a trading rule to exploit those detected linear and non-linear dependencies to earn abnormal rates of returns. Furthermore, the results highlight the relevance of market-timing strategies, as the dependency structures appear only sporadically, and hence suggest that predictability is mainly a short-horizon phenomenon.

	BSENAT	CSEALL	KSE100
Total number of windows	104	104	104
Window length	35	35	35
Number of lags	4	4	4
Significant *C* windows	2 (1.92%)	20 (19.23%)	6 (5.77%)
Significant *H* windows	4 (3.85%)	6 (5.77%)	7 (6.73%)
Significant *C* and *H* windows	6 (5.77%)	25 (24.04%)	12 (11.54%)

Table 1. Windowed-Test Results for South Asian Stock Returns Series
Note: BSENAT- India BSE National; CSEALL- Colombo SE All Share; KSE100- Karachi SE 100.

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