



## The impact of data snooping on the testing of technical analysis: An empirical study of Asian stock markets

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### ABSTRACT

The primary aim of this study is to investigate the validity and predictability of technical analysis in eight Asian equity markets. We employ the bootstrap tests of White (2000) and Hansen (2005) to determine whether any superior trading rule is found to exist amongst the 'universe' of technical trading rules identified by Sullivan et al. (1999). We use these powerful bootstrap tests to ascertain the profitability of technical analysis, along with two institutional adjustments for non-synchronous trading and transaction costs. The empirical results indicate that these three elements, data snooping, non-synchronous trading and transaction costs, have significant impact on the overall performance of technical analysis; indeed, the results for these eight Asian stock markets support the efficient market hypothesis, demonstrating that the generation of economic profits through the use of technical analysis is extremely unlikely with these particular markets.

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### 1. Introduction

In very simple terms, technical analysis is a well-established method of forecasting future market movements by generating buy or sell signals based on specific information gained from previous prices. There are several schools of thought on technical analysis, amongst which, the 'chartists' argue that price patterns reflect market buying and selling activity, and market psychology.

The continuing prevalence and application of technical analysis within stock markets has come to be widely recognized, even amongst academic scholars,<sup>1</sup> with the techniques for discovering any hidden patterns ranging from the very rudimentary analysis of moving averages, to the recognition of quite complex time-series patterns. However, the actual efficacy of such an approach remains something of a puzzle, particularly since the power of the statistical tests that are currently available for examining the efficacy of technical analysis is potentially diluted by a "data snooping" bias.

The subtleties in survivorship are demonstrated, quite convincingly, by White (2000) in a manner similar to that proposed by Jensen and Bennington (1970), where it was noted that: "given enough computer time, we are sure that we can find a mechanical trading rule which 'works' on a table of random numbers . . . provided of course that we are allowed to test the rule on the same table of numbers which we used to discover the rule". In the present study, we set out to empirically test

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<sup>1</sup> See, for example, Taylor and Allen (1992) and Cheung and Chinn (2001).

the efficacy of technical analysis within eight Asian equity markets, employing the two data snooping adjustment methods for non-synchronous trading and transaction costs proposed by White (2000) and Hansen (2005).

It was suggested, almost a decade ago, that the main reason for the obvious lack of research into the performance of technical analysis was essentially because the whole issue was too subjective and lacked any well-defined trading signals (Lo, MacKinlay, & Wang, 2000). Nowadays, although more study has been carried out into this particular area of research, we still find that the research community is unable to offer unambiguous conclusions with regard to the controversy surrounding the performance of technical analysis rules. It is, nevertheless, clear that a great deal of effort has now been spent on the study of many aspects of technical analysis.

In one of the earliest examples of such analysis, Treynor and Ferguson (1985) demonstrated that past prices, when combined with other valuable information, were able to produce abnormal profits. Netci (1991) went on to demonstrate that simple trading rules with non-linear forecasting capacity were also capable of outperforming the classical Wiener–Kolmogorov linear model. Thereafter, Blume, Easley, and O'Hara (1994) developed a dynamic model to describe the ways in which trading volume could provide useful information for market participants.

In other empirical studies, sets of simple trading rules have been applied to the stock markets of the US (Brock, Lakonishok, & Lebaron, 1992) and the UK (Hudson, Dempsey, & Keasey, 1996), with the results of these studies reporting that technical analysis was indeed capable of providing significant economic information content. More recently, Kavajecz and Odders-Whites (2004) undertook an examination into the impact of liquidity on technical analysis in terms of the dynamics of the limit order book.

Following a period of rapid and protracted economic growth in the Asian markets, practitioners and academics scholars alike are now placing greater attention on these markets, given the fact that they have been growing at almost double the pace of the global average. Furthermore, the market structures in Asia are found to differ substantially from those in the US and the UK. Given the high proportion of individual investors in most Asian equity markets, this clearly indicates that the markets of the Pacific Rim are dominated by a two-sided auction system. In contrast, both the London stock exchange and the NASDAQ are essentially quote-driven markets, with the participants in these markets comprised mainly of institutional investors. Nevertheless, even within the same region, significant diversification is still discernible between the market microstructures of the Asian economies, in terms of their clearing and settlement systems, daily price limits and margin systems. As noted by Crouhy and Galai (1992), the differences in these market structures could have significant impacts on the short-term behavior of equity returns.

In this study, we set out to test empirically the profitability of technical analysis in eight Asian countries (Hong Kong, Indonesia, South Korea, Malaysia, Singapore, Taiwan, Thailand and Japan) over the period from January 1975 to December 2006. Our empirical study highlights the practical usefulness of technical analysis amongst a range of countries characterized by highly diversified market structures. From their investigation of the predictive ability of technical analysis of the markets of the Asian economies of Taiwan, Thailand and Malaysia, Bessembinder and Chan (1995) clearly demonstrated that technical trading rules did contain useful economic information about these markets. However, despite the fact that Bessembinder and Chan (1995) were meticulous in their efforts to consider the non-synchronous bias and transaction costs associated with the technical rules under examination, the resulting statistical significance found for the trading profits in their study may still have been subject to data mining bias (Lo & MacKinlay, 1990).

In the present study, we re-examine the performance of technical rules within Asian countries by implementing the White (2000) 'reality check' and the Hansen (2005) 'superior predictive ability' test in order to fully investigate the effects that data snooping can have on trading rules. Our study extends the set of trading rules considered in Bessembinder and Chan (1995) to the 'universe' of 7846 trading spaces suggested in Sullivan, Timmermann, and White (1999).

The remainder of this paper is organized as follows. A survey of the extant literature on trading rules is provided in Section 2, followed in Section 3 by a description of the bootstrap tests and technical analysis adopted for use in this study. The penultimate section presents the analysis and discussion of our empirical results. Finally, the conclusions drawn from this study are provided in Section 5, along with some closing remarks.

## 2. Literature review

The efficient market hypothesis has dominated empirical finance, largely as a result of the work of Fama (1970). An enormous wealth of associated literature during the 1970s provided support for the weak form of this hypothesis, in which it is suggested that changes in past share prices cannot be used to forecast future share returns.<sup>2</sup> However, in the majority of studies on technical analysis that have examined whether any patterns that may be present in past price information can be used to predict future price changes, the results have been largely contradictory (Alexander, 1964).

Notwithstanding the disappointing results of the earlier studies, there has been continuing debate on the potential for technical analysis within some of the more recent studies, including theories on 'noisy rational expectations' (Grossman & Stiglitz, 1980; Treynor & Ferguson, 1985), 'noise trader and feedback' models (Black, 1986; DeLong, Shleifer, Summers, & Waldmann, 1990) and 'statistical testing bias' (Lo & MacKinlay, 1990).

<sup>2</sup> Examples include Fama and Blume (1966), Van Horne and Parker (1967, 1968), Jemes (1968), Jensen and Bennington (1970) and Fama and French (1993).

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