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Is the Chinese stock market really inefficient?☆

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ABSTRACT

Groenewold et al. (2004) documented that the Chinese stock market is inefficient. In this paper, we revisit the efficiency problem of the Chinese stock market using time-series model based trading rules. Our paper distinguishes itself from previous studies in several aspects. First, while previous studies concentrate on the viability of linear forecasting techniques, we evaluate the profitability of the forecasts of the self-exciting threshold autoregressive model (SETAR), and compare it with the conventional linear AR and MA trading rules. Second, the findings of market inefficiency in earlier studies mainly rest on the statistical significance of the autocorrelation or regression coefficients. In contrast, this paper directly examines the profitability of various trading rules. Third, our sample covers an extensive period of 1991–2010. Sub-sample analysis shows that positive returns mainly concentrate in the pre-SOE reform period, suggesting that China's stock market has become more efficient after the reform.

1. Introduction

Given the rising importance of the Chinese stock market, it is natural to ask whether profitable trading strategies exist in the Chinese stock exchanges. If one can predict returns consistently using past information, we would have a violation of the efficient market hypothesis (EMH). However, the issue of stock market efficiency is probably one of the areas with the largest discord between academic literature and public media. While technical analysis is widely used by investors to formulate trading strategies, the concept of stock market efficiency in the academic literature suggests that current asset prices should fully reflect all past information at any point of time and hence no market players should be able to profit from using technical trading rules.

A series of studies have contributed to this debate in the past. Studies that provide supporting evidence for the EMH include Bailey (1994), Cai, Laurence, and Qian (1997), Liu, Song, and Romilly (1997), Long, Payne, and Feng (1999), Xu (2000), Darrat and Zhong (2000) and Chen and Li (2006). Studies that present counter evidence include Su and Fleisher (1998), Abdel-Khalik, Wong, and Wu (1999), Chow, Fan, and Hu (1999), Mookerjee and Yu (1999), Ma (2004), Kang, Liu, and Ni (2002), Groenewold, Wu, Tang, and Fan (2004), Chen and Li (2006), Balsara, Chen, and Zheng (2007) and Chen, Chong, and Li (2010).

Some explanations have been offered in the literature for the ambiguity in the findings of different studies. For example, Groenewold, Wu, et al. (2004) point out that the difference can be attributed to the properties of the sample periods used in various studies. Xu (2000), for instance, reports the absence of significant autocorrelations in the Shanghai Composite Index after omitting the early turbulent years of Mookerjee and Yu (1999)'s sample and extending the sample to 1995. The effects of reforms are also found to play an

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important role. Groenewold, Tang, and Wu (2003) find that the efficiency of the stock market tends to improve after the banks were re-admitted in 2000.[1] Another study by Wang, Liu, and Gu (2009) investigates the change of weak form efficiency brought by reform on the range of price variations. Using rolling window estimation on the daily closing price of the Shenzhen Component Index during 3 April 1991 and 15 December 2008, they conclude that the reform improved market efficiency substantially in the long run but the influence in the short run is small.

In this paper, we revisit the efficiency problem of the Chinese stock market by examining the profitability of trading rules based on time series models. Following Chong and Lam (2010), we study the performance of the self-exciting threshold autoregressive (SETAR) model, the autoregressive (AR) model and the moving average (MA) model in generating profitable trading rules for the Composite Indices of the Chinese stock market. Our paper distinguishes itself from previous studies in four aspects. First, while previous studies concentrate on the viability of linear forecasting techniques, we evaluate the profitability of the SETAR forecast, and compare it with the conventional linear AR and MA trading rules.[2]

Second, the studies cited earlier generally apply efficiency tests (like autocorrelation coefficient tests, run tests and variance ratio tests) or linear regressions (like VAR and ARIMA models) in their analysis. Their conclusion on inefficiency mainly rests on the statistical significance of the autocorrelation coefficients or regression coefficients but not on the actual profitability of the predictive models. This paper provides an alternative to the standard EMH tests and address the question of whether the predictability found in weak EMH tests implies profitability.

Third, previous studies on the Chinese Stock market focus on the A and B share indices (Cai, Cai, & Keasey, 2005; Tian, Wan, & Guo, 2002). In this paper, we focus on the Shanghai Composite Index and the Shenzhen Composite Index, which have received relatively little attention in the literature. To avert the data snooping problem (Sullivan, Timmerman, & White, 1999), eleven different trading rules are applied to the two composite indices.

Fourth, with the exception of Balsara et al. (2007) and Chen et al. (2010), all other studies cited earlier only use data before 2002 and hence do not cover the period after major reforms like the SOE reform. Balsara et al. (2007) and Chen et al. (2010) use data up to 2005 and 2006 respectively, but still do not go much beyond the time after the SOE reform. In contrast, this paper employs data over an extensive sample period of 1991–2010. The longer sample provides us with a greater variety of information and should reflect the dramatic changes that have taken place in China's securities sector in the past decades. It also sheds light on whether the results on EMH are sensitive to the sub-periods used.

The rest of this paper is organized as follows. Section 2 describes the data. Section 3 presents the models and trading strategies. Section 4 discusses the empirical results. Section 5 conducts a bootstrap analysis, and Section 6 concludes the paper.

2. Data

2.1. Institutional background

The Chinese stock market has a relatively short history, with the Shanghai and Shenzhen Stock Exchanges launched only in the early 1990s. The Shanghai Stock Exchange was established on November 26, 1990, while the Shenzhen Stock Exchanges was opened on April 11, 1991. Two categories of shares are traded in the Chinese market, namely, the A shares and the B shares. The A-share market and the B-share market are segmented. Tradable A-shares are available exclusively for domestic citizens and institutions, while the B-shares are designated for overseas investors before the market was opened to domestic investors in February 2001.[3] Both the stock exchanges in Shanghai and Shenzhen have experienced phenomenal growth since their inception. At the outset of 2011, there were already 901 listed companies in the Shanghai Stock Exchange (SHSE) with a total market capitalization of about 18,238 billion RMB, and 1202 listed companies in the Shenzhen Stock Exchange (SZSE) with a total market capitalization of 8416 billion RMB. The combined Chinese stock market rivals the Hong Kong Stock Exchange as Asia's second-largest stock market after the Tokyo Stock Exchange.

2.2. Shanghai Composite Index and Shenzhen Composite Index

Both the Shanghai Composite (SHC) Index and the Shenzhen Composite (SZC) Index are examined in this paper. The constituents of the Shanghai Composite (SHC) Index are all stocks (A shares and B shares) listed in the Shanghai Stock Exchange. The base day for the SHC index is December 19, 1990, and the base value is 100. The index was officially launched on July 15, 1991.[4] The Shenzhen Composite (SZC) Index is a market-capitalization weighted index of stocks in the Shenzhen Stock Exchange

[1] In 1994 banks were required to quit their direct involvement in the stock market and bank stock-broking departments and subsidiaries became independent broker houses (Groenewold et al., 2003).

[2] There has been a growing interest in the performance of nonlinear trading rules in recent years. For example, Fernández-Rodríguez, Sosvilla-Rivero, and Andrada-Félix (2003) show that the nearest-neighbour (NN) forecast outperforms the MA rule. Andrada-Félix, Fernández-Rodríguez, García-Artiles, and Sosvilla-Rivero (2003) show that the NN prediction is better than the ARIMA forecast and the buy-and-hold (B-H) rule. Nam, Washer, and Chu (2005) show that the nonlinear autoregressive model based trading rule is able to generate abnormal returns. Pérez-Rodríguez, Torra, and Andrada-Félix (2005) find that the forecasts of the artificial neural network (ANN) and the smooth transition autoregressive (STAR) outperform those of the ARMA and random-walk models.

[3] Before 2001, only foreigners or foreign institutions were allowed to trade B Shares. From February 2001 onwards, local investors are also permitted to trade B shares via legal foreign currency accounts.

[4] The B shares are generally denominated in US dollars for calculation purposes. For calculation of other indices, B share stock prices are converted to RMB at the applicable exchange rate (the middle price of US dollar on the last trading day of each week) at China Foreign Exchange Trading Center.