Is the Chinese Stock Market Really Efficient

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Is the Chinese Stock Market Really Inefficient?

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Abstract

Groenewold et al (2004a) 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 finding 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.

Keywords: Efficient Market Hypothesis; SETAR Model; Bootstrapping; SOE reform.
JEL Classifications: C22, G10, G12.

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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 et al. (1997), Liu et al. (1997), Long et al. (1999), Xu (2000), Darrat and Zhong (2000) and Chen and Li (2006). Studies that present counter evidence include Su and Fleisher (1998), Abdel-Khalik et al. (1999), Chow et al. (1999), Mookerjee and Yu (1999), Ma (2000), Kang, et al. (2002), Groenewold et al. (2004a), Chen and Li (2006), Balsara et al. (2007) and Chen et al. (2010).

Some explanations have been offered in the literature for the ambiguity in the findings of different studies. For example, Groenewold et al. (2004a) 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 important role. Groenewold et al. (2003) find that the efficiency of the stock market tends to improve after the banks were re-admitted in 2000[2]. Another study by Wang et al. (2009) investigates the change of weak form efficiency brought by reform on the range of

[2] 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).

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.[3]

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 et al., 2005; Tian et al., 2002). In this paper, we focus on the Shanghai Composite Index and the Shenzhen Composite Index, which have received relatively little attention

[3] There has been a growing interest in the performance of nonlinear trading rules in recent years. For example, Fernández-Rodríguez et al. (2003) show that the nearest-neighbour (NN) forecast outperforms the MA rule. Andrada-Félix et al. (2003) show that the NN prediction is better than the ARIMA forecast and the buy-and-hold (B-H) rule. Nam et al. (2005) show that the nonlinear autoregressive model based trading rule is able to generate abnormal returns. Pérez-Rodríguez et al. (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.

in the literature. To avert the data snooping problem (Sullivan et al., 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.[4] 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 18238 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.[5] The Shenzhen Composite (SZC) Index is a market-capitalization weighted index of stocks in the Shenzhen Stock Exchange which tracks the daily price movements of all the shares in the exchange. The index began on April 3, 1991, with a base price of 100. The sample contains 4808 daily observations from the SHC (Jan 1991 to Aug 2010) and 4717 daily observations from the SZC (April 1991 to Aug 2010) taken from DataStream.

In the first decade of the establishment of the two stock exchanges, most of the listed firms in China were restructured SOEs. In April 2005, the China Securities Regulatory Commission launched a state share reform, aiming at converting the non-tradable state shares to tradable shares. As part of the SOE reform, shares of a typical firm are split into state shares, legal-entity shares and tradable shares.[6] Since the reform, the market has undergone another phase of rapid development. During 2005 to 2007, the market indices

[4] 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.
[5] 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.
[6] Further details about the microstructure of the Chinese stock market are provided in Xu (2000).

kept soaring. The stock market capitalization in China surpassed its GDP, and the number of investors has burgeoned to over 0.1 billion.

In view of the structural changes, we divide the whole series into four subsamples at the criterion of the date of the SOE reform and the recent financial crisis. The first sub-sample starts at the beginning of the sample to the end of March 2005, which represents the stage before the SOE reform. Before April 2005, companies listed on the Chinese stock market had a split-share structure with roughly 1/3 freely traded public stocks (TS) and 2/3 nontradable state-owned shares (NTS). The second sub-sample covers the period from April 2005 to Nov 30 2006. In April 2005, the China Securities Regulatory Commission launched a state share reform, aiming at converting the NTS state to TS. According to the latest report in Nov 2006, 90% of Chinese firms had complied with the orders to reform their share structure[7]. The third sub-sample starts with the onset of the recent financial crisis at the end of 2006 and lasts until the end of March 2009 which marks the trough of the crisis. This sub-sample is characterized by market panic and extreme volatility. The last sub-sample covers the period after the trough of the financial crisis. It extends from April 2009 to the end of the whole sample in Aug 2010.[8] Table 1 provides the summary statistics of the one-day returns in the sub-samples.

<u>INSERT TABLE 1 Here</u>

Returns are calculated as the log difference of the stock index level. "JB stat" represents the Jarque-Bera test for normality. ρ(i) refers to the estimated autocorrelation at lag i. Q(5) denotes the Ljung-Box Q statistics at lag 5. "Bar std." refers to the Bartlett asymptotic standard error band for autocorrelations. Autocorrelations marked with ([a]) are greater than twice the Bartlett asymptotic standard error band. Numbers marked with * and ** are significant at the 5% and 1% level respectively. From the values of the skewness, kurtosis and Jarque-Bera (JB) statistics, it is found that the returns are leptokurtic, skewed and non-normal. We further calculate the autocorrelations and the Ljung-Box Q statistics.

[7] Huang et al. (2008) provide more details of the reform.
[8] To cross check the locations of the break points, we also use Chong (2001b)'s sample splitting method to estimate the break points. The results are broadly consistent with the break points employed in our analysis.

For the Shanghai Composite Index (SHC), the Ljung-Box Q statistic at the fifth lag is statistically significant only in the first sub-sample prior to the SOE reform, which suggests the presence of autocorrelation in this period. For the Shenzhen Composite Index (SZC), the Ljung-Box Q statistic is significant at the 1% level in the first sub-sample and at the 5% level in the third sub-sample during the financial crisis. No significant autocorrelation is evident in the other sub-samples.

3. Trading Strategies

Voluminous studies in the literature have examined the usefulness of technical trading rules in generating abnormal profits. Some popular technical trading strategies in use today include those based on supports and resistances, filter rules, moving averages and relative strengths. Previous studies, including those of Fama (1965, 1970) and Jensen and Benington (1970), find that historical prices cannot be used to predict future prices. Similarly, Hudson et al. (1996) demonstrate that the moving averages (MA) and trading range breakout (TRB) rules cannot beat the buy-and-hold strategy in a costly trading environment. Allen and Karjalainen (1999) also argue that technical rules cannot outperform the buy-and-hold strategy. Coutts and Cheung (2000) investigate the profitability of the MA and TRB trading rules in the Hong Kong stock market and show that they fail to generate abnormal returns. In contrast, Ferguson and Treynor (1985) find that when nonprice information is taken into consideration, technical trading rules can yield abnormal returns. Brock et al. (1992) and Bessembinder and Chan (1995) show that the MA and TRB rules outpace the buy-and-hold strategy for the Dow Jones Industrial Average. Mills (1997) obtain a similar result for the FT30 index. Chong and Lam (2010) show that nonlinear trading rules are profitable in the U.S. stock market.

Most of the aforementioned studies focus on developed markets. Recently, there has been a growing interest in the performance of technical trading rules in emerging markets. Bessembinder and Chan (1995) conclude that the technical trading strategies are profitable in the stock markets of Malaysia, Thailand and Taiwan. Ratner and Leal (1999) and Gunasekarage and Power (2001) also report significant trading-rule profits in the Latin American and South Asian stock markets. More recently, Chong and Ip (2009) find that momentum trading rules generate impressive returns in emerging currency markets.

In this section, 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.

3.1 Self-exciting Threshold Autoregressive (SETAR) Model

The following self-exciting threshold autoregressive model (Tong, 1978; Chong et al., 2008) is estimated for the stock-index returns:

$$\Delta Y_t = (\alpha_0 + \alpha_1 \Delta Y_{t-1}) I[\Delta Y_{t-d} \geq \gamma] + (\beta_0 + \beta_1 \Delta Y_{t-1}) I[\Delta Y_{t-d} < \gamma] + \varepsilon_t, \quad (1)$$

where Y_t denotes the natural logarithm of the stock index at day t, ΔY_t is the continuously compounded return on day t, d is the lagged parameter, and γ is the threshold value. $I[A]$ is an indicator function which equals one if condition A is satisfied, and equals zero otherwise.[9] The error term is assumed to be a white noise.

The SETAR trading strategy is as follows:

$$\text{Buy if } \Delta \hat{Y}_{t+1}^{w} > 0, \quad (2)$$

$$\text{Sell if } \Delta \hat{Y}_{t+1}^{w} < 0, \quad (3)$$

where w stands for the length of the observation window and $\Delta \hat{Y}_{t+1}^{w}$ refers to the predicted

[9] The model is similar in spirit to the model of Chong (2001a). Bai et al (2011) extend the TAR model to allow for two threshold variables.

return that is based upon information from the most recent w observations. In short, if the predicted price of the next trading day is higher than the price of today, we buy the Composite Index, otherwise we sell it.

3.2 Autoregressive and Moving Average Rules

The AR(1) model is a special case of SETAR(1) model. It can be written as:

$$\Delta Y_t = \lambda_0 + \lambda_1 \Delta Y_{t-1} + \varepsilon_t \ . \tag{4}$$

Similar to the SETAR trading rule, we employ the recursive technique and define the AR trading strategy as follows:

Buy if $\Delta \hat{Y}_{t+1}^{w} > 0$, (5)

Sell if $\Delta \hat{Y}_{t+1}^{w} < 0$, (6)

If the predicted price of the next trading day is higher than the price today, we buy the Composite Index, otherwise we sell it.

The moving average method has also been widely studied. A moving average with a window size of w is defined as:

$MA_t(w)=(P_t+P_{t-1}+\ldots+P_{t-w+1})/w$, (7)

where P_t is the stock price at day t.

The trading rule is as follows:

Buy if $MA_t(S) > MA_t(L)$, (7)

Sell if $MA_t(S) < MA_t(L)$, (8)

where $MA_t(S)$ and $MA_t(L)$ represent the short-term MA and the long-term MA respectively. If the short-term moving average is higher than the long-term moving average, we hold a long the Composite Index. Otherwise, we hold a short position.

4. Empirical Results

On each trading day, a position of buy, sell, or neutral is taken based on the trading signals. The one-day conditional mean and variance of buy (sell) returns can be written as follows:

$$\pi_{b(s)} = \frac{1}{N_{b(s)}} \sum_{t=1}^{N} \Delta Y_{t+1} I_t^{b(s)} \qquad (9)$$

and

$$\sigma_{b(s)}^2 = \frac{1}{N_{b(s)}} \sum_{t=1}^{N} (\Delta Y_{t+1} - \pi_{b(s)})^2 I_t^{b(s)} , \qquad (10)$$

where $\pi_{b(s)}$ stands for the mean return of the buy (sell) periods, $\sigma_{b(s)}^2$ refers to the conditional variance of the buy (sell) signals, $N_{b(s)}$ denotes the number of buy (sell) days, N represents the number of observations, ΔY_{t+1} refers to the one-day holding period return, and $I_t^{b(s)}$ is an indicator function which equals one if a buy (sell) signal is observed at time t, and zero otherwise. Following Brock et al. (1992), the null and alternative hypotheses and the conventional t-ratio for the mean buy (sell) return are given respectively as follows:

$$H_0 : \quad \pi_{b(s)} = \overline{\pi} \qquad (11)$$

$$H_1 : \quad \pi_{b(s)} \neq \overline{\pi} \qquad (12)$$

and

$$t_{b(s)} = \frac{\pi_{b(s)} - \bar{\pi}}{\left(\frac{\sigma^2}{N_{b(s)}} + \frac{\sigma^2}{N} \right)^{\frac{1}{2}}}, \tag{13}$$

where $\bar{\pi}$ is the unconditional one-day mean and σ^2 is the unconditional variance.

The trading rules are evaluated by comparing the average returns for the buy and sell periods. A good trading rule should be one for which the returns during buy periods significantly exceed returns during sell periods. The following analysis tests for the equality of means between the returns of the buy period and the sell period. The null and alternative hypotheses and the t-statistic on the buy-sell spread can be expressed respectively as follows:

$$H_0: \quad \pi_b - \pi_s = 0 \tag{14}$$

$$H_1: \quad \pi_b - \pi_s \neq 0 \tag{15}$$

and

$$t_{(b-s)} = \frac{\pi_b - \pi_s}{\left(\frac{\sigma^2}{N_b} + \frac{\sigma^2}{N_s} \right)^{\frac{1}{2}}}. \tag{16}$$

The SETAR and AR models are estimated by the OLS method. The maximum lag is set to five. We select the threshold and the lagged values by minimizing the residual sum of squares. The numbers in parentheses are t-statistics testing whether the estimates are statistically different from zero. "P-value" refers to the bootstrap p-value based on 500 simulations for testing the null hypothesis of no threshold effect[10]. The bootstrap procedure is similar to that of Hansen (1997) under the assumption of homoscedastic errors. Panel A of Table 2 contains the estimation results of Equation (1) using different sub-samples. It is worthwhile noting that, during the first sub-sample --- the period before the SOE reform, the AR coefficients are significant at the 1% level in both regimes and

[10] Since non-normality is evident in stock returns, statistical tests are based on the bootstrapped p-values.

evidence of threshold effect is found in both composite indices. The predictability in terms of threshold effect and serial correlation is much weaker in the sub-samples after the SOE reform. Some degree of serial correlation is evident in the Shanghai Composite Index in the regime with selling signals ($I\left[\Delta Y_{t-1} < -0.029335\right]$) during the post-crisis period (the 4th sub-sample) but not in the other regime. Panel B of Table 2 provides the estimation results of the linear AR(1) model. Again, the AR coefficient is significant only in the first sub-sample but not in the other sub-samples. This is consistent with increasing efficiency in the market.

INSERT TABLE 2

Tables 3a and 3b report the profitability of various trading rules.

INSERT TABLE 3a(i)-3a(iv)

INSERT TABLE 3b(i)-3b(iv)

The trading period starts from day 250 onwards. The SETAR and the AR rules are denoted by SETAR(w) and AR(w) respectively, where w represents the length of the observation window. The MA rules are denoted as MA(S,L), where S refers to the short-term MA and L refers to the long-term MA. The rules under study are MA(1,50), MA(1,150), MA(1,200), MA(5,150) and MA(2,200). Columns 2 and 3 labeled "N(Buy)" and "N(Sell)" report the number of buy and sell signals respectively. Columns 6, 7 and 10 show the one-day conditional mean for buy, sell and buy-sell returns respectively. Columns 8 and 9 are, respectively, the fractions of buy and sell signals that produce correct positive returns. The numbers in parentheses are the t-statistics for testing the null hypotheses of (12) and (15). For the SHC sample, the returns are reported in Table 3a. Our results suggest that most rules fail to produce significant returns, except for the SETAR(200) and MA(1,50) models during the pre-SOE reform period (1st sub-sample). These two models generate a buy-sell difference in returns of 0.2154% and 0.2211% respectively in the Shanghai Stock Exchange sample. Nevertheless, such returns can easily be eroded by the presence of transaction cost. Assuming a transaction cost of 0.5

percent[11], it will be difficult for investors to profit from these trading strategies.

5. Bootstrap Analysis

As the conventional t-test assumes a normal, stationary and independent error distribution, the test results will be biased if the error terms are leptokurtic, serially correlated or conditional heteroskedastic. In this section, we adopt the bootstrap method of Efron (1979) to evaluate the significance of the trading-rule returns. The bootstrap technique simulates the empirical distributions of the trading-rule returns under various null models and hence provides critical values for gauging the significance of the trading-rule returns. The null models examined in this paper include a random walk model with a drift and a GARCH-M model. The bootstrap procedure consists of several steps. First, the null model is estimated using the actual data and the residuals are obtained. Second, residuals are drawn with replacement to generate the bootstrap return series using the estimated coefficients of the null model. Third, the buy-returns and sell-returns using the bootstrap sample under various trading rules are calculated. The mean, the standard deviation and the t-statistics of various trading rules are then recorded accordingly. The procedure is replicated 500 times (Efron and Tibshirani, 1986). The proportion of simulation results which is larger than those from the actual series is the bootstrap p-value. We reject the null hypothesis of zero buy-sell spreads at the 5 percent significance level if the buy-sell returns derived from the actual series are larger than the 5 percent cutoff points of the artificial buy-sell spreads generated from null models. In this study, stock prices are simulated from two commonly used time series models. The first model is the random-walk model with a drift:

$$\Delta Y_t = \text{constant} + \varepsilon_t \ . \tag{17}$$

The random-walk specification is consistent with the EMH, which suggests that stock

[11] As estimated by Balsara et al. (2007), the trade commission is around 0.4 percent for both class A and B shares traded in the Shanghai and Shenzhen exchanges according to the information provided on the websites of the Shanghai and Shenzhen stock exchanges. Besides, there is a 0.1 percent stamp tax charged for all purchases and sales.

prices are not predictable. As a result, the random-walk simulations allow us to construct the confidence intervals for trading-rule returns under the null hypothesis.

The second model is the generalized autoregressive conditional heteroskedasticity in mean (GARCH-M) model, which can be written as:

$$\Delta Y_t = \tau_0 + \tau_1 \varepsilon_{t-1} + \tau_2 h_t + \varepsilon_t \ , \quad (18)$$

$$h_t = \eta_0 + \eta_1 \varepsilon_{t-1}^2 + \eta_2 h_{t-1} \ , \quad (19)$$

$$\varepsilon_t = \sqrt{h_t}\, z_t \ , \quad (20)$$

where $z_t \sim N(0,1)$ and h_t refers to the conditional variance, which depends on the lagged squared residuals and conditional variance. The GARCH-M specification is also consistent with the EMH in that a higher ex ante expected return is associated with a higher volatility. Table 4 contains the estimation results of the GARCH-M model.

INSERT TABLE 4

The GARCH-M model is estimated using the maximum likelihood method. ΔY_t is the continuously compounded return and h_t is the conditional variance. In the conditional variance equation, all η_1 and η_2 estimates are significantly different from zero during the pre-SOE reform period (the 1^{st} sub-sample) in both Stock Exchanges. In the mean equation, the τ_2 estimate, which captures the risk-return association, suggests different risk-return stochastic properties. The SZC series has a positive τ_2 estimate during the same sub-sample, which suggests that the ex ante returns are related to market volatility before the SOE reform.

The bootstrap simulation results of the random-walk process are reported in Table 5a. "Fra>" refer to the fractions of simulated means, standard deviations and t-statistics that are larger than those of the actual series. The results are consistent with those from the conventional t-tests. Some trading rules are found to be profitable in the SHC and SZC markets. They include the SETAR(50), the SETAR(200) and the MA(1,50) rules in the SHC series, and the SETAR(150) and SETAR(200) rules in the SZC series.

INSERT TABLE 5a(i)-5a(iv)

Table 5b reports the results of the GARCH-M simulations. With the notable exceptions of the SETAR(50), SETAR(200) and MA(1,50) rules in the SHC market and the SETAR(200) rule in the SZC market, all simulated buy-sell returns and t-ratios are higher than those derived from the original series in general, indicating that the null hypothesis of zero buy-sell spread cannot be rejected. Among all rules, the SETAR(200) rule is most robust in generating significant positive profits.

INSERT TABLE 5b(i)-5b(iv)

6. Conclusion

An underlying principle of technical analysis is that historical movement of equity prices helps to predict future movement. If technical trading rules can consistently generate abnormal profits for investors, then the Efficient Market Hypothesis (EMH) of Fama (1970) is questionable. In this paper, the efficiency problem of the Chinese stock market is revisited. The Chinese stock market is of interest due to her rising role in the world financial market. While most of the earlier studies focus on the A and B shares, in this paper, we concentrate on the Shanghai and Shenzhen Composite indices. The performances of eleven trading rules derived from the SETAR, AR and MA time series models are evaluated. By dividing the data into four sub-samples (the pre-SOE reform period, the post-SOE reform period prior to the recent financial crisis, the crisis period and the post-crisis period), we find that significant positive profits are most common in the pre-SOE reform period but not in the post-reform period, which suggests that the SOE reform played an important role in improving efficiency in both Stock Exchanges. Nevertheless, if a transaction cost of around 0.5 percent is taken into account, these models do not warrant profitable trading opportunities. This finding is consistent with that of Balara et al. (2007) and Wong et al. (2009).

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Table 1: Summary Statistics for Daily Returns

	Shanghai Composite Index (SHC)				Shenzhen Composite Index (SZC)			
	sub-sample 1	sub-sample 2	sub-sample 3	sub-sample 4	sub-sample 1	sub-sample 2	sub-sample 3	sub-sample 4
Obs.	3497	406	566	339	3406	406	566	339
Mean	0.0006	0.0014	0.0002	0.0003	0.0003	0.0013	0.0008	0.0011
Std.	0.0277	0.0133	0.0254	0.0167	0.0250	0.0145	0.0268	0.0188
Skew	6.0432**	0.1785**	-0.2782**	-0.7185**	0.9502**	-0.1605	-0.5596**	-0.8498**
Kurtosis	142.7696**	3.7600**	1.0969**	1.7248**	17.0675**	2.6471**	0.8538**	1.6412**
JB stat	2991282**	240.723**	35.6137**	70.976**	41852.82**	120.283**	46.733**	78.843**
ρ(1)	0.0548 [a]	0.0288	-0.0059	0.0180	0.0338 [a]	0.0576	0.0696	0.0729
ρ(2)	0.0516 [a]	-0.0117	-0.0295	0.0121	0.0421 [a]	-0.0127	-0.0340	0.0172
ρ(3)	0.0418 [a]	0.0582	0.0423	0.0444	0.0244	0.0633	0.0411	0.0767
ρ(4)	0.0251	0.0162	0.1025	-0.0313	0.0435 [a]	0.0201	0.1206	-0.0562
ρ(5)	0.0308	0.0823	-0.0014	-0.0587	0.0551 [a]	0.0969	-0.0001	-0.1064
Bar std.	0.0169	0.0497	0.0421	0.0544	0.0171	0.0496	0.0420	0.0543
Q (5)	31.47**	4.68	7.54	2.36	28.79**	7.117	12.702*	8.950

Note:

[1]"JB stat" represents the Jarque-Bera test for normality. ρ(i) refers to the estimated autocorrelation at lag i. Q(5) denotes the Ljung-Box Q statistics at lag 5. "Bar std." refers to the Bartlett asymptotic standard error band for autocorrelations. Autocorrelations marked with ([a]) are greater than twice the Bartlett asymptotic standard error band. Numbers marked with * and ** are significant at the 5% and 1% level respectively.

[2]Sub-sample 1 (period prior to the SOE reform): beginning of the whole sample to 31 March 2005.

Sub-sample 2 (Start of the SOE reform to the onset of the financial crisis): 1 April, 2005 to 30 Nov, 2006.

Sub-sample 3 (financial crisis): 1 Dec, 2006 to 31 March, 2009.

Sub-sample 4 (post-crisis period): 1 April, 2009 to 17 Aug, 2010.

Table 2: Parameter Estimates for the SETAR(1) and the AR(1) Models

Panel A: SETAR(1) Parameter Estimates

$$\Delta Y_t = (\alpha_0 + \alpha_1 \Delta Y_{t-1}) I\left[\Delta Y_{t-d} \geq \gamma\right] + (\beta_0 + \beta_1 \Delta Y_{t-1}) I\left[\Delta Y_{t-d} < \gamma\right] + \varepsilon_t$$

	Shanghai Composite Index (SHC)				Shenzhen Composite Index (SZC)			
	sub-sample 1	sub-sample 2	sub-sample 3	sub-sample 4	sub-sample 1	sub-sample 2	sub-sample 3	sub-sample 4
α_0	0.000587	0.002434	-0.001033	0.000285	0.008628	0.002314	0.003977	0.003736
	(1.2263)	(3.0290)**	(-0.9083)	(0.3007)	(-4.6507)**	(-2.7570)**	(-1.1608)	(2.6897)**
α_1	0.098725	0.017739	0.105186	0.038885	-0.233779	0.002601	0.049784	-0.023682
	(5.3708)**	(0.3008)	(1.9495)	(0.5641)	(-5.8538)**	(-0.0444)	(-0.3864)	(-0.2935)
β_0	0.001279	-0.001029	-0.014665	-0.041114	-0.000088	-0.002055	-0.004658	-0.002102
	(0.6425)	(-0.9001)	(-0.9981)	(-2.7118)**	(-0.2022)	(-1.5195)	(-2.4385)*	(-1.4193)
β_1	-0.171242	0.067269	-0.446094	-0.945189	0.089516	0.193158	-0.121026	0.140853
	(-4.1056)**	(0.7493)	(-1.6135)	(-2.6981)**	(-4.7714)**	(-2.1434)*	(-1.7103)	(1.9468)
γ	-0.030367	-0.002775	-0.036963	-0.029335	0.035005	-0.005759	0.00852	0.002301
d	3	3	1	1	5	3	1	3
P-value	0.0000**	0.4720	0.2620	0.3160	0.0000**	0.1360	0.0920	0.1320

Panel B: AR(1) Parameter Estimates

$$\Delta Y_t = \lambda_0 + \lambda_1 \Delta Y_{t-1} + \varepsilon_t$$

λ_0	0.000594	0.001292	0.000216	0.000278	0.00031	0.00111	0.00074	0.000946
	(1.2709)	(1.9551)	(0.2023)	(0.3047)	(-0.7238)	(-1.5422)	(-0.6561)	(0.9232)
λ_1	0.054765	0.030276	-0.006051	0.017396	0.033824	0.057335	0.069595	0.072446
	(3.2418)**	(0.6112)	(-0.1436)	(0.3185)	(-1.9742)*	(-1.1571)	(-1.6553)	(1.3296)

Note:

[1] Y_t denotes the natural logarithm of the stock index at day t, ΔY_t is the continuously compounded return on day t, d is the lagged parameter, and γ is the threshold value. Numbers marked with * and ** are significant at the 5% and 1% level respectively.

[2] Sub-sample 1 (period prior to the SOE reform): beginning of the whole sample to 31 March 2005.

Sub-sample 2 (Start of the SOE reform to the onset of the financial crisis): April 2005 to 30 Nov, 2006.

Sub-sample 3 (financial crisis): 1 Dec, 2006 to 31 March, 2009.

Sub-sample 4 (post-crisis period): April 2009 to Aug 2010.

Table 3a(i): Results of Implementing the Trading Strategies on the Shanghai Composite Index: Jan 1, 1991 to March 31 , 2005 (period prior to the SOE reform)

Trading Rule	N(Buy)	N(Sell)	σ(Buy)	σ(Sell)	r(Buy)	r(Sell)	Fraction with correct prediction of r(Buy)>0	Fraction with correct prediction of r(Sell)>0	r(Buy)-r(Sell)
SETAR(50)	1692	1546	0.030602	0.026322	0.000621	0.000168	0.523050	0.514877	0.000453
					(0.2101)	(- 0.3082)			(0.4497)
SETAR(150)	1712	1531	0.030758	0.026061	0.000513	0.000316	0.518692	0.510777	0.000197
					(0.0851)	(- 0.1404)			(0.1959)
SETAR(200)	1710	1535	0.032366	0.023732	0.001434	-0.00072	0.533333	0.527687	0.002154
					(1.1615)	(-1.3091)			(2.1402)*
AR(50)	1665	1583	0.030037	0.027083	0.000645	0.000213	0.524324	0.516109	0.000432
					(0.2365)	(-0.2597)			(0.4298)
AR(150)	1833	1415	0.029482	0.027498	0.000194	0.000746	0.510093	0.502473	-0.000552
					(-0.2954)	(0.3347)			(-0.5451)
AR(200)	1797	1451	0.030034	0.026802	0.000612	0.000214	0.520312	0.514817	0.000398
					(0.2035)	(- 0.2506)			(0.3937)
MA(1,50)	1594	1654	0.030250	0.026945	0.00156	-0.000651	0.545797	0.535067	0.002211
					(1.2785)	(-1.2620)			(2.2001)*
MA(1,150)	1697	1551	0.030626	0.026286	0.000435	0.000433	0.518562	0.510638	0.000002
					(-0.0066)	(- 0.0082)			(0.0016)
MA(1,200)	1761	1487	0.030524	0.026222	0.000185	0.00073	0.516184	0.509079	-0.000545
					(- 0.3020)	(0.3223)			(-0.5403)
MA(5,150)	1699	1549	0.030545	0.026384	0.000429	0.00044	0.522072	0.514526	-0.000012
					(-0.0139)	(-0.0005)			(-0.0115)
MA(2,200)	1761	1487	0.030783	0.025864	0.000438	0.00043	0.520159	0.513786	0.000008
					(- 0.0032)	(-0.0121)			(0.0081)

Note: "N(Buy)" and "N(Sell)" report the number of buy and sell signals respectively. $\sigma^2_{b(s)}$ refers to the conditional variance of the buy (sell) signals. r(Buy), r(Sell) and r(Buy)-r(Sell) show the one-day conditional mean for buy, sell and buy-sell returns respectively. The numbers in parentheses are the t-statistics for testing the null hypotheses of $H_0: \quad \pi_{b(s)} = \overline{\pi}$ or $H_0: \quad \pi_b - \pi_s = 0$. The columns "Fraction with Buy>0" and "Fraction with Sell>0" report the fractions of buy and sell signals that produce correct positive returns. MA(S,L) denotes the moving average trading rule based on the comparison between the short-term S-day MA return and the long-term L-day MA return. The investor buys if $MA_t(S)>MA_t(L)$, and sells if $MA_t(S)<MA_t(L)$.

Table 3a(ii): Results of Implementing the Trading Strategies on the Shanghai Composite Index: April 1, 2005 to Nov 30, 2006 (from the start of the SOE reform to the onset of the financial crisis)

Trading Rule	N(Buy)	N(Sell)	σ(Buy)	σ(Sell)	r(Buy)	r(Sell)	Fraction with correct prediction of r(Buy)>0	Fraction with correct prediction of r(Sell)>0	r(Buy)-r(Sell)
SETAR(50)	145	10	0.063963	0.019145	0.008956	-0.005263	0.731034	0.400000	0.014219
					(0.0981)	(-0.6698)			(0.7028)
SETAR(150)	148	8	0.063291	0.020462	0.009054	-0.009563	0.736486	0.500000	0.018617
					(0.1123)	(-0.7944)			(0.8288)
SETAR(200)	147	9	0.063354	0.030654	0.008692	-0.001581	0.734694	0.444444	0.010273
					(0.0612)	(-0.4638)			(0.4835)
AR(50)	133	23	0.014263	0.012652	0.002828	0.002518	0.624060	0.347826	0.00031
					(0.1188)	(-0.0369)			(0.0986)
AR(150)	154	2	0.014014	0.009100	0.002639	0.013781	0.623377	0	-0.011142
					(0.0041)	(1.1255)			(-1.1247)
AR(200)	155	1	0.014042	0.000000	0.002763	0.005682	0.625806	0	-0.002919
					(0.0828)	(0.2184)			(-0.2090)
MA(1,50)	135	21	0.014321	0.011969	0.00295	0.001703	0.637037	0.428571	0.001247
					(0.1939)	(- 0.2875)			(0.3820)
MA(1,150)	156	0	0.013999	NA[2]	NA	NA	0.628210	NA	NA
					(NA)	(NA)			(NA)
MA(5,150)	156	0	0.013999	NA	NA	NA	0.628210	NA	NA
					(NA)	(NA)			(NA)

Note:

[1] "N(Buy)" and "N(Sell)" report the number of buy and sell signals respectively. $\sigma^2_{b(s)}$ refers to the conditional variance of the buy (sell) signals. r(Buy), r(Sell) and r(Buy)-r(Sell) show the one-day conditional mean for buy, sell and buy-sell returns respectively. The numbers in parentheses are the t-statistics for testing the null hypotheses of $H_0: \quad \pi_{b(s)} = \overline{\pi}$ or $H_0: \quad \pi_b - \pi_s = 0$. The columns "Fraction with Buy>0" and "Fraction with Sell>0" report the fractions of buy and sell signals that produce correct positive returns. MA(S,L) denotes the moving average trading rule based on the comparison between the short-term S-day MA return and the long-term L-day MA return. The investor buys if $MA_t(S)>MA_t(L)$, and sells if $MA_t(S)<MA_t(L)$.

[2]No "selling" signal is issued by the MA(1,150), MA(5,150) trading strategies in this subsample.

[3]Since there are less than 200 observations in this subsample, the MA(1,200) and MA(2,200) trading strategies are not implemented.

Table 3a(iii): Results of Implementing the Trading Strategies on the Shanghai Composite Index: Dec 1, 2006 to Mar 31, 2009 (financial crisis period)

Trading Rule	N(Buy)	N(Sell)	σ(Buy)	σ(Sell)	r(Buy)	r(Sell)	Fraction with correct prediction of r(Buy)>0	Fraction with correct prediction of r(Sell)>0	r(Buy)-r(Sell)
SETAR(50)	83	233	0.024464	0.027992	0.002262	-0.004152	0.530120	0.553648	0.006413
					(1.4124)	(-0.7116)			(1.8435)
SETAR(150)	70	246	0.027373	0.027221	-0.001238	-0.002817	0.528571	0.548780	0.001579
					(0.3453)	(-0.1459)			(0.4283)
SETAR(200)	76	240	0.027040	0.027228	0.001206	-0.00363	0.565789	0.562500	0.004837
					(1.0600)	(-0.4940)			(1.3503)
AR(50)	63	253	0.021987	0.028389	-0.000479	-0.002962	0.507937	0.541502	0.002483
					(-0.5326)	(-0.2102)			(0.6479)
AR(150)	49	267	0.020721	0.028257	-0.004995	-0.002003	0.489796	0.535581	-0.002992
					(-0.6020)	(0.2105)			(-0.7073)
AR(200)	62	254	0.025008	0.027751	-0.004717	-0.001918	0.451613	0.527559	-0.002799
					(-0.5919)	(0.2448)			(-0.7260)
MA(1,50)	82	234	0.022284	0.028768	-0.000776	-0.00306	0.548780	0.559829	0.002284
					(0.5050)	(-0.2473)			(0.6539)
MA(1,150)	59	257	0.020190	0.028601	-0.000384	-0.002945	0.593220	0.560311	0.002561
					(0.5429)	(-0.2038)			(0.6519)
MA(1,200)	36	280	0.024235	0.027605	-0.004767	-0.002171	0.583333	0.546429	-0.002596
					(-0.4779)	(0.1379)			(-0.5387)
MA(5,150)	61	255	0.022373	0.028292	-0.001916	-0.002599	0.573770	0.556863	0.000683
					(0.1480)	(-0.0522)			(0.1760)
MA(2,200)	36	280	0.024855	0.027542	-0.004165	-0.002249	0.583333	0.546429	-0.001916
					(-0.3521)	(0.1032)			(-0.3977)

Note: "N(Buy)" and "N(Sell)" report the number of buy and sell signals respectively. $\sigma^2_{b(s)}$ refers to the conditional variance of the buy (sell) signals. r(Buy), r(Sell) and r(Buy)-r(Sell) show the one-day conditional mean for buy, sell and buy-sell returns respectively. The numbers in parentheses are the t-statistics for testing the null hypotheses of $H_0: \quad \pi_{b(s)} = \overline{\pi}$ or $H_0: \quad \pi_b - \pi_s = 0$. The columns "Fraction with Buy>0" and "Fraction with Sell>0" report the fractions of buy and sell signals that produce correct positive returns. MA(S,L) denotes the moving average trading rule based on the comparison between the short-term S-day MA return and the long-term L-day MA return. The investor buys if $MA_t(S)>MA_t(L)$, and sells if $MA_t(S)<MA_t(L)$.

Table 3a(iv): Results of Implementing the Trading Strategies on the Shanghai Composite Index: April 1, 2009 to Aug 17, 2010 (post-crisis period)

Trading Rule	N(Buy)	N(Sell)	σ(Buy)	σ(Sell)	r(Buy)	r(Sell)	Fraction with correct prediction of r(Buy)>0	Fraction with correct prediction of r(Sell)>0	r(Buy)-r(Sell)
SETAR(50)	11	78	0.032240	0.027893	0.007561	-0.00578	0.636364	0.512821	0.01334
					(1.4768)	(-0.1631)			(1.5440)
SETAR(150)	41	48	0.025390	0.031332	-0.003028	-0.005073	0.536585	0.520833	0.002045
					(0.4094)	(0.0058)			(0.3584)
SETAR(200)	46	43	0.028178	0.028227	0.001315	-0.009957	0.608696	0.604651	0.011272
					(0.4613)	(-0.0882)			(0.5022)
AR(50)	17	72	0.016707	0.015828	-0.005786	-0.000802	0.411765	0.500000	-0.004984
					(-0.9187)	(0.4265)			(-1.1525)
AR(150)	14	75	0.015418	0.016044	-0.006990	-0.000776	0.214286	0.466667	-0.006214
					(-1.1069)	(0.4414)			(-1.3308)
AR(200)	10	79	0.018381	0.015814	-0.003776	-0.001498	0.500000	0.518987	-0.002278
					(-0.3533)	(0.1566)			(-0.4232)
MA(1,50)	25	64	0.015483	0.016309	-0.000201	-0.002361	0.600000	0.562500	0.002160
					(0.4642)	(-0.1805)			(0.5709)
MA(1,150)	7	82	0.020178	0.015706	-0.006485	-0.001350	0.428571	0.512195	-0.005135
					(-0.7305)	(0.2184)			(-0.8131)
MA(1,200)	7	82	0.020178	0.015706	-0.006485	-0.001350	0.428571	0.512195	-0.005135
					(-0.7305)	(0.2184)			(-0.8131)
MA(5,150)	8	81	0.018811	0.015804	-0.005707	-0.001364	0.375000	0.506173	-0.004343
					(-0.6454)	(0.2122)			(-0.7307)
MA(2,200)	7	82	0.020178	0.015706	-0.006485	-0.001350	0.428571	0.512195	-0.005135
					(-0.7305)	(0.2184)			(-0.8131)

Note: "N(Buy)" and "N(Sell)" report the number of buy and sell signals respectively. $\sigma^2_{b(s)}$ refers to the conditional variance of the buy (sell) signals. r(Buy), r(Sell) and r(Buy)-r(Sell) show the one-day conditional mean for buy, sell and buy-sell returns respectively. The numbers in parentheses are the t-statistics for testing the null hypotheses of $H_0: \quad \pi_{b(s)} = \overline{\pi}$ or $H_0: \quad \pi_b - \pi_s = 0$. The columns "Fraction with Buy>0" and "Fraction with Sell>0" report the fractions of buy and sell signals that produce correct positive returns. MA(S,L) denotes the moving average trading rule based on the comparison between the short-term S-day MA return and the long-term L-day MA return. The investor buys if $MA_t(S)>MA_t(L)$, and sells if $MA_t(S)<MA_t(L)$.

Table 3b(i): Results of Implementing the Trading Strategies on the Shenzhen Composite Index: Jan 1, 1991 to March 31, 2005 (period prior to the SOE reform)

Trading Rule	N(Buy)	N(Sell)	σ(Buy)	σ(Sell)	r(Buy)	r(Sell)	Fraction with correct prediction of r(Buy)>0	Fraction with correct prediction of r(Sell)>0	r(Buy)-r(Sell)
SETAR(50)	1519	1627	0.023232	0.024468	0.000122	0.000411	0.510862	0.502766	-0.000289
					(-0.1447)	(0.2490)			(-0.3396)
SETAR(150)	1545	1608	0.023495	0.024227	0.000548	-0.000063	0.515858	0.508706	0.000611
					(0.4293)	(-0.4006)			(0.7187)
SETAR(200)	1580	1574	0.023759	0.023981	0.000652	-0.000164	0.522152	0.515883	0.000816
					(0.5744)	(-0.5353)			(0.9608)
AR(50)	1556	1601	0.024002	0.023733	0.00029	0.000178	0.517995	0.51218	0.000112
					(0.0816)	(-0.0699)			(0.1313)
AR(150)	1606	1551	0.023766	0.023969	0.000188	0.000281	0.511831	0.50677	-0.000093
					(-0.0572)	(0.0688)			(-0.1091)
AR(200)	1622	1535	0.024338	0.023345	0.000735	-0.000296	0.527127	0.523127	0.001031
					(0.6930)	(-0.7085)			(1.2137)
MA(1,50)	1477	1680	0.024296	0.023455	0.001094	-0.000523	0.535545	0.526786	0.001617
					(1.1491)	(-1.0448)			(1.9002)
MA(1,150)	1395	1762	0.025436	0.022538	0.000722	-0.000154	0.526165	0.515891	0.000876
					(0.6423)	(-0.5403)			(1.0246)
MA(1,200)	1371	1786	0.025007	0.022943	0.000772	-0.00018	0.533917	0.520717	0.000952
					(0.7026)	(-0.5798)			(1.1111)
MA(5,150)	1393	1764	0.024969	0.022953	0.000598	-0.000055	0.52692	0.51644	0.000653
					(0.4805)	(-0.4011)			(0.7638)
MA(2,200)	1373	1784	0.024947	0.022994	0.000654	-0.00009	0.534596	0.5213	0.000745
					(0.5504)	(-0.4529)			(0.8693)

Note: "N(Buy)" and "N(Sell)" report the number of buy and sell signals respectively. $\sigma^2_{b(s)}$ refers to the conditional variance of the buy (sell) signals. r(Buy), r(Sell) and r(Buy)-r(Sell) show the one-day conditional mean for buy, sell and buy-sell returns respectively. The numbers in parentheses are the t-statistics for testing the null hypotheses of $H_0: \quad \pi_{b(s)} = \overline{\pi}$ or $H_0: \quad \pi_b - \pi_s = 0$. The columns "Fraction with Buy>0" and "Fraction with Sell>0" report the fractions of buy and sell signals that produce correct positive returns. MA(S,L) denotes the moving average trading rule based on the comparison between the short-term S-day MA return and the long-term L-day MA return. The investor buys if $MA_t(S)>MA_t(L)$, and sells if $MA_t(S)<MA_t(L)$.

Table 3b(ii): Results of Implementing the Trading Strategies on the Shenzhen Composite Index: April 1, 2005 to Nov 30, 2006 (from the start of the SOE reform to the onset of the financial crisis)

Trading Rule	N(Buy)	N(Sell)	σ(Buy)	σ(Sell)	r(Buy)	r(Sell)	Fraction with correct prediction of r(Buy)>0	Fraction with correct prediction of r(Sell)>0	r(Buy)-r(Sell)
SETAR(50)	115	41	0.032818	0.028541	0.002241	0.002531	0.634783	0.341463	-0.00029
					(0.0633)	(0.1530)			(-0.1049)
SETAR(150)	135	21	0.030415	0.036854	0.002651	0.000173	0.659259	0.47619	0.002478
					(0.2957)	(-0.5523)			(0.6955)
SETAR(200)	141	15	0.029911	0.037160	0.002577	-0.000123	0.638298	0.333333	0.002699
					(0.2572)	(-0.5469)			(0.6544)
AR(50)	123	33	0.015454	0.014797	0.00268	0.000966	0.642276	0.363636	0.001713
					(0.3040)	(-0.3974)			(0.5754)
AR(150)	147	9	0.015288	0.015234	0.002009	0.00735	0.639456	0.333333	-0.005341
					(-0.0652)	(1.0040)			(-1.0242)
AR(200)	146	10	0.015346	0.014405	0.002015	0.006728	0.636986	0.300000	-0.004713
					(-0.0616)	(0.9295)			(-0.9493)
MA(1,50)	132	24	0.015553	0.014039	0.002311	0.002351	0.651515	0.416667	-0.00004
					(0.1048)	(0.0685)			(-0.0118)
MA(1,150)	156	0	0.002317	NA[2]	NA	NA	0.641026	NA	NA
					(NA)	(NA)			(NA)
MA(5,150)	156	0	0.002317	NA	NA	NA	0.641026	NA	NA
					(NA)	(NA)			(NA)

Note:

[1] "N(Buy)" and "N(Sell)" report the number of buy and sell signals respectively. $\sigma^2_{b(s)}$ refers to the conditional variance of the buy (sell) signals. r(Buy), r(Sell) and r(Buy)-r(Sell) show the one-day conditional mean for buy, sell and buy-sell returns respectively. The numbers in parentheses are the t-statistics for testing the null hypotheses of $H_0: \quad \pi_{b(s)} = \overline{\pi}$ or $H_0: \quad \pi_b - \pi_s = 0$. The columns "Fraction with Buy>0" and "Fraction with Sell>0" report the fractions of buy and sell signals that produce correct positive returns. MA(S,L) denotes the moving average trading rule based on the comparison between the short-term S-day MA return and the long-term L-day MA return. The investor buys if $MA_t(S)>MA_t(L)$, and sells if $MA_t(S)<MA_t(L)$.

[2]No "selling" signal is issued by the MA(1,150), MA(5,150) trading strategies in this subsample.

[3]Since there are less than 200 observations in this subsample, the MA(1,200) and MA(2,200) trading strategies are not implemented.

Table 3b(iii): Results of Implementing the Trading Strategies on the Shenzhen Composite Index: Dec 1, 2006 to Mar 31, 2009 (financial crisis period)

Trading Rule	N(Buy)	N(Sell)	σ(Buy)	σ(Sell)	r(Buy)	r(Sell)	Fraction with correct prediction of r(Buy)>0	Fraction with correct prediction of r(Sell)>0	r(Buy)-r(Sell)
SETAR(50)	124	192	0.028418	0.029592	-0.000476	-0.002549	0.540323	0.526042	0.002073
					(0.4139)	(-0.2991)			(0.6182)
SETAR(150)	128	188	0.029849	0.028530	0.000948	-0.003563	0.546875	0.531915	0.004511
					(0.8857)	(-0.6753)			(1.3526)
SETAR(200)	135	181	0.029806	0.028621	-0.000407	-0.002727	0.533333	0.524862	0.00232
					(0.4498)	(-0.3592)			(0.7011)
AR(50)	113	203	0.026772	0.030362	-0.000194	-0.002594	0.539823	0.522167	0.0024
					(0.4886)	(-0.3214)			(0.7026)
AR(150)	91	225	0.025495	0.030500	-0.001266	-0.001926	0.538462	0.515556	0.000661
					(0.1407)	(-0.0683)			(0.1827)
AR(200)	78	238	0.025972	0.030089	0.000214	-0.002375	0.564103	0.521008	0.002589
					(0.5345)	(-0.2491)			(0.6818)
MA(1,50)	118	198	0.025718	0.030905	0.000959	-0.003342	0.584746	0.550505	0.004301
					(0.8637)	(-0.6025)			(1.2708)
MA(1,150)	81	235	0.025887	0.030135	0.000973	-0.002669	0.604938	0.53617	0.003642
					(0.7519)	(-0.3656)			(0.9712)
MA(1,200)	82	234	0.024519	0.030602	-0.001523	-0.00181	0.560976	0.521368	0.000287
					(0.0636)	(-0.0229)			(0.0768)
MA(5,150)	79	237	0.026240	0.029999	0.001046	-0.002663	0.620253	0.540084	0.003709
					(0.7644)	(-0.3640)			(0.9808)
MA(2,200)	84	232	0.024514	0.030651	-0.002049	-0.001623	0.559524	0.521552	-0.000426
					(-0.0829)	(0.0518)			(-0.1151)

Note: "N(Buy)" and "N(Sell)" report the number of buy and sell signals respectively. $\sigma^2_{b(s)}$ refers to the conditional variance of the buy (sell) signals. r(Buy), r(Sell) and r(Buy)-r(Sell) show the one-day conditional mean for buy, sell and buy-sell returns respectively. The numbers in parentheses are the t-statistics for testing the null hypotheses of $H_0: \quad \pi_{b(s)} = \overline{\pi}$ or $H_0: \quad \pi_b - \pi_s = 0$. The columns "Fraction with Buy>0" and "Fraction with Sell>0" report the fractions of buy and sell signals that produce correct positive returns. MA(S,L) denotes the moving average trading rule based on the comparison between the short-term S-day MA return and the long-term L-day MA return. The investor buys if $MA_t(S)>MA_t(L)$, and sells if $MA_t(S)<MA_t(L)$.

Table 3b(iv): Results of Implementing the Trading Strategies on the Shenzhen Composite Index: April 1, 2009 to Aug 17, 2010 (post-crisis period)

Trading Rule	N(Buy)	N(Sell)	σ(Buy)	σ(Sell)	r(Buy)	r(Sell)	Fraction with correct prediction of r(Buy)>0	Fraction with correct prediction of r(Sell)>0	r(Buy)-r(Sell)
SETAR(50)	46	43	0.027092	0.034394	0.000058	-0.001966	0.521739	0.511628	0.002023
					(0.3214)	(-0.2494)			(0.4935)
SETAR(150)	48	41	0.025168	0.037139	0.001702	-0.00399	0.604167	0.609756	0.005692
					(0.8010)	(-0.8002)			(1.3848)
SETAR(200)	45	44	0.025472	0.039327	0.002794	-0.004719	0.622222	0.613636	0.007513
					(1.0932)	(-1.0242)			(1.8335)
AR(50)	32	57	0.017432	0.020414	-0.002576	0.00001	0.500000	0.491228	-0.002585
					(-0.3778)	(0.3294)			(-0.6055)
AR(150)	39	50	0.020842	0.018210	-0.002339	0.000187	0.512821	0.500000	-0.002526
					(-0.3418)	(0.3682)			(-0.6118)
AR(200)	51	38	0.017032	0.022279	-0.000456	-0.001543	0.509804	0.500000	0.001087
					(0.1811)	(-0.1262)			(0.2625)
MA(1,50)	33	56	0.016078	0.021012	0.001629	-0.002422	0.606061	0.553571	0.004051
					(0.6852)	(-0.4099)			(0.9550)
MA(1,150)	17	72	0.017943	0.019528	-0.006553	0.00041	0.411765	0.472222	-0.006963
					(-1.0716)	(0.4833)			(-1.3360)
MA(1,200)	19	70	0.018431	0.019150	-0.008734	0.001201	0.368421	0.457143	-0.009935
					(-1.5690)	(0.7357)			(-1.9872)
MA(5,150)	17	72	0.016557	0.019814	-0.006419	0.000379	0.352941	0.458333	-0.006798
					(-1.0455)	(0.4730)			(-1.3043)
MA(2,200)	17	72	0.016557	0.019814	-0.006419	0.000379	0.352941	0.458333	-0.006798
					(-1.0455)	(0.4730)			(-1.3043)

Note: "N(Buy)" and "N(Sell)" report the number of buy and sell signals respectively. $\sigma^2_{b(s)}$ refers to the conditional variance of the buy (sell) signals. r(Buy), r(Sell) and r(Buy)-r(Sell) show the one-day conditional mean for buy, sell and buy-sell returns respectively. The numbers in parentheses are the t-statistics for testing the null hypotheses of $H_0: \quad \pi_{b(s)} = \overline{\pi}$ or $H_0: \quad \pi_b - \pi_s = 0$. The columns "Fraction with Buy>0" and "Fraction with Sell>0" report the fractions of buy and sell signals that produce correct positive returns. MA(S,L) denotes the moving average trading rule based on the comparison between the short-term S-day MA return and the long-term L-day MA return. The investor buys if $MA_t(S)>MA_t(L)$, and sells if $MA_t(S)<MA_t(L)$.

Table 4: Parameter Estimates for the GARCH-M model

$$\Delta Y_t = \tau_0 + \tau_1 \varepsilon_{t-1} + \tau_2 h_t + \varepsilon_t$$
$$h_t = \eta_0 + \eta_1 \varepsilon_{t-1}^2 + \eta_2 h_{t-1}$$
$$\varepsilon_t = \sqrt{h_t}\, z_t$$
$$z_t \sim N(0,1)$$

	Shanghai Composite Index (SHC)				Shenzhen Composite Index (SZC)			
	sub-sample 1	sub-sample 2	sub-sample 3	sub-sample 4	sub-sample 1	sub-sample 2	sub-sample 3	sub-sample 4
τ_0	-0.000095	0.004639	-0.035209	-0.00111	-0.000625	0.005272	-0.02351	-0.000971
	(-0.3675)	(2.5384)*	(-1.3857)	(-0.307)	(1.6799)	(1.8246)	(1.6673)	(0.2879)
τ_1	0.017764	0.010429	0.043007	0.031306	0.03238	0.059458	0.141157	0.094537
	(0.9273)	(0.1990)	(1.0098)	(0.5652)	(1.4710)	(1.1041)	(2.9695)**	(1.5484)
τ_2	-0.349275	-18.829098	56.261114	6.485686	1.436688	-19.961188	34.863638	7.538775
	(-1.1721)	(-1.6431)	(1.3671)	(0.4750)	(2.0620)*	(-1.3991)	(1.7135)	(0.7428)
η_0	0.000007	0.000003	0.000906	0.000013	0.000012	0.000003	0.000798	0.000026
	(5.7185)**	(1.6072)	(7.9936)**	(1.7873)	(4.6824)**	(1.7171)	(4.3538)**	(1.6745)
η_1	0.387012	0.046224	0.052467	0.049742	0.151852	0.036543	0.089234	0.091322
	(13.6508)**	(2.8726)**	(1.4726)	(2.6310)*	(9.9243)**	(3.2036)**	(1.9516)	(2.3558)*
η_2	0.738527	0.936681	-0.496214	0.899943	0.848933	0.944136	-0.225615	0.835121
	(50.5666)**	(50.914)**	(-3.4032)**	(23.9857)**	(54.7937)**	(57.6699)**	(0.9838)	(12.0771)**

Note:
Sub-sample 1 (period prior to the SOE reform): beginning of the whole sample to 31 March 2005.
Sub-sample 2 (Start of the SOE reform to the onset of the financial crisis): April 2005 to 30 Nov, 2006.
Sub-sample 3 (financial crisis): 1 Dec, 2006 to 31 March, 2009.
Sub-sample 4 (post-crisis period): April 2009 to Aug 2010.

Table 5a(i): Random-Walk Bootstrap Simulation Tests based on 500 Replications, Jan 1, 1991 to March 31, 2005 (period prior to the SOE reform)

Panel A: Shanghai Composite Index (Fra>SHC)

Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.5080	0.2000	0.3640	0.7440	0.4960	0.6760	0.3400	0.3520
SETAR(150)	0.5160	0.1660	0.3640	0.7080	0.4820	0.6500	0.3560	0.3600
SETAR(200)	0.0780	0.1240	0.0060	0.9940	0.8540	1.0000	0.0020	0.0000**
AR(50)	0.4500	0.2300	0.2880	0.7080	0.3780	0.7020	0.2920	0.2960
AR(150)	0.7140	0.2580	0.6800	0.4220	0.3480	0.3480	0.6720	0.6680
AR(200)	0.4860	0.2200	0.2960	0.7380	0.3820	0.6900	0.3020	0.3040
MA(1,50)	0.0660	0.2260	0.0160	0.9680	0.4140	0.9780	0.0180	0.0200*
MA(1,150)	0.6180	0.1820	0.4900	0.5860	0.4500	0.5300	0.4720	0.4720
MA(1,200)	0.7320	0.2120	0.6600	0.4480	0.4680	0.3540	0.6560	0.6440
MA(5,150)	0.5800	0.1860	0.4380	0.6020	0.4640	0.5840	0.4260	0.4260
MA(2,200)	0.6060	0.1740	0.4280	0.6280	0.5260	0.5900	0.4180	0.4180

Panel B: Shenzhen Composite Index (Fra>SZC)

Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.6260	0.9020	0.5560	0.4820	0.6480	0.3660	0.5800	0.6000
SETAR(150)	0.3520	0.8560	0.1740	0.7600	0.6920	0.7780	0.2120	0.1980
SETAR(200)	0.2860	0.8180	0.1120	0.8000	0.7320	0.8360	0.1540	0.1400
AR(50)	0.4900	0.7480	0.4140	0.5840	0.7800	0.5680	0.4320	0.4300
AR(150)	0.5720	0.8380	0.4940	0.5400	0.7640	0.5100	0.4880	0.4900
AR(200)	0.2180	0.6720	0.0640	0.8400	0.8640	0.9140	0.0840	0.0760
MA(1,50)	0.0800	0.6900	0.0240	0.9080	0.8540	0.9680	0.0280	0.0240
MA(1,150)	0.2060	0.3580	0.0800	0.7760	0.9760	0.8820	0.1220	0.1120
MA(1,200)	0.2120	0.4320	0.0680	0.8100	0.9020	0.8880	0.1020	0.0880
MA(5,150)	0.3120	0.4840	0.1540	0.7620	0.9200	0.7980	0.1880	0.1740
MA(2,200)	0.2440	0.4920	0.1240	0.7640	0.9000	0.8300	0.1580	0.1460

Note: "Fra>" refer to the fractions of simulated means, standard deviations and t-statistics that are larger than those of the actual series. "t-stat(Buy)" and "t-stat(Buy)" are for testing the null hypotheses $H_0: \quad \pi_{b(s)} = \bar{\pi}$, and t-stat(Buy-Sell) is for testing $H_0: \quad \pi_b - \pi_s = 0$.

Table 5a(ii): Random-Walk Bootstrap Simulation Tests based on 500 Replications, April 1, 2005 to Nov 30, 2006
(from the start of the SOE reform to the onset of the financial crisis)

Panel A: Shanghai Composite Index (Fra>SHC)

Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.1420	0.1420	0.4000	0.2240	0.7020	0.4860	0.4700	0.4680
SETAR(150)	0.1140	0.1240	0.4160	0.2180	0.9000	0.4040	0.5700	0.5640
SETAR(200)	0.1560	0.2700	0.5560	0.0880	0.2880	0.1720	0.8560	0.7860
AR(50)	0.1080	0.1920	0.2460	0.3400	0.4800	0.6500	0.3200	0.3360
AR(150)	0.0960	0.2400	0.3900	0.0460	0.7920	0.1440	0.9500	0.8040
AR(200)	0.0840	0.2580	0.2620	0.2480	0.9120	0.5260	0.6580	0.4460
MA(1,50)	0.0680	0.1900	0.1680	0.5320	0.5660	0.7980	0.1680	0.2000
MA(1,150)	0.0480	0.2720	0.1260	NA[2]	NA	NA	NA	NA
MA(5,150)	0.0440	0.2860	0.1520	NA	NA	NA	NA	NA

Panel B: Shenzhen Composite Index (Fra>SZC)

Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.2240	0.0920	0.3520	0.3180	0.9040	0.5380	0.4360	0.4300
SETAR(150)	0.1520	0.2200	0.1360	0.7480	0.4120	0.8360	0.1500	0.1660
SETAR(200)	0.1360	0.1780	0.1540	0.7880	0.7660	0.8520	0.1140	0.1600
AR(50)	0.1160	0.2260	0.1160	0.6080	0.3220	0.8400	0.1280	0.1460
AR(150)	0.2240	0.2340	0.4900	0.1040	0.2600	0.1640	0.8720	0.7700
AR(200)	0.2400	0.2400	0.5080	0.1480	0.4040	0.2200	0.8000	0.7420
MA(1,50)	0.1840	0.2320	0.2860	0.3700	0.4340	0.6080	0.3620	0.3580
MA(1,150)	0.1040	0.2700	0.1280	NA	NA	NA	NA	NA
MA(5,150)	0.0980	0.2620	0. 1480	NA	NA	NA	NA	NA

Note:
[1]"Fra>" refer to the fractions of simulated means, standard deviations and t-statistics that are larger than those of the actual series. "t-stat(Buy)" and "t-stat(Buy)" are for testing the null hypotheses $H_0: \quad \pi_{b(s)} = \bar{\pi}$, and t-stat(Buy-Sell) is for testing $H_0: \quad \pi_b - \pi_s = 0$.
[2]No "selling" signal is issued by the MA(1,150), MA(5,150) trading strategies in this subsample.
[3]Since there are less than 200 observations in this subsample, the MA(1,200) and MA(2,200) trading strategies are not implemented.

Table 5a(iii): Random-Walk Bootstrap Simulation Tests based on 500 Replications, Dec 1, 2006 to Mar 31, 2009 (financial crisis period)

Panel A: Shanghai Composite Index (Fra>SHC)

Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.1280	0.6820	0.0060	0.9900	0.0760	0.9260	0.0120	0.0220*
SETAR(150)	0.6800	0.1440	0.1600	0.9560	0.1420	0.7220	0.2000	0.2260
SETAR(200)	0.2580	0.1600	0.0240	0.9820	0.1360	0.8680	0.0340	0.0380*
AR(50)	0.6320	0.9780	0.1240	0.9640	0.0400	0.6800	0.1700	0.2340
AR(150)	0.9400	0.9940	0.7500	0.9200	0.0460	0.5380	0.6780	0.5940
AR(200)	0.9460	0.6180	0.7820	0.8860	0.1040	0.4520	0.6980	0.6580
MA(1,50)	0.6600	0.9700	0.1140	0.9680	0.0320	0.7620	0.1340	0.1660
MA(1,150)	0.5340	0.9840	0.0540	0.9840	0.0620	0.8420	0.0740	0.1040
MA(1,200)	0.9000	0.7560	0.6640	0.9380	0.1360	0.6200	0.5680	0.4940
MA(5,150)	0.7640	0.9400	0.2460	0.9360	0.0540	0.6900	0.2680	0.2800
MA(2,200)	0.8800	0.5960	0.6020	0.9500	0.1160	0.6480	0.4940	0.4340

Panel B: Shenzhen Composite Index (Fra>SZC)

Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.7100	0.1920	0.1720	0.9420	0.0820	0.7560	0.1980	0.2100
SETAR(150)	0.4560	0.0480	0.0360	0.9760	0.1440	0.9180	0.0460	0.0500*
SETAR(200)	0.6980	0.0520	0.1500	0.9380	0.1760	0.7580	0.2220	0.2120
AR(50)	0.6600	0.5240	0.1140	0.9540	0.0380	0.7900	0.1540	0.1680
AR(150)	0.7800	0.7920	0.2140	0.9280	0.0400	0.7120	0.2640	0.2700
AR(200)	0.5120	0.7080	0.0500	0.9220	0.0720	0.7960	0.1200	0.1340
MA(1,50)	0.4500	0.7320	0.0420	0.9780	0.0160	0.8820	0.0580	0.0700
MA(1,150)	0.3820	0.7280	0.0240	0.9740	0.0500	0.8940	0.0360	0.0640
MA(1,200)	0.7720	0.9280	0.2020	0.9300	0.0340	0.7680	0.2100	0.2100
MA(5,150)	0.3940	0.6780	0.0240	0.9800	0.0460	0.8820	0.0420	0.0580
MA(2,200)	0.8220	0.9480	0.3360	0.9220	0.0540	0.7100	0.2920	0.2900

Note: "Fra>" refer to the fractions of simulated means, standard deviations and t-statistics that are larger than those of the actual series. "t-stat(Buy)" and "t-stat(Buy)" are for testing the null hypotheses $H_0: \pi_{b(s)} = \bar{\pi}$, and t-stat(Buy-Sell) is for testing $H_0: \pi_b - \pi_s = 0$.

Table 5a(iv): Random-Walk Bootstrap Simulation Tests based on 500 Replications, April 1, 2009 to Aug 17, 2010 (post-crisis period)

Panel A: Shanghai Composite Index (Fra>SHC)

Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.9040	0.3740	0.7640	0.7780	0.5140	0.4520	0.6440	0.6220
SETAR(150)	0.9320	0.3480	0.8400	0.7420	0.5140	0.3980	0.7360	0.7080
SETAR(200)	0.5180	0.9560	0.1420	0.8120	0.4060	0.6200	0.2460	0.2720
AR(50)	0.9300	0.4920	0.8840	0.7220	0.5580	0.3680	0.7700	0.7600
AR(150)	0.9640	0.6440	0.9400	0.7180	0.4800	0.3680	0.8180	0.8300
AR(200)	0.8560	0.1980	0.7120	0.7360	0.4860	0.5040	0.5680	0.5320
MA(1,50)	0.4880	0.6800	0.0660	0.9080	0.4580	0.8420	0.1080	0.1100
MA(1,150)	0.9080	0.1220	0.7520	0.8460	0.5240	0.6360	0.6580	0.5080
MA(1,200)	0.8780	0.1500	0.7180	0.8960	0.5040	0.6820	0.5940	0.4480
MA(5,150)	0.8720	0.2140	0.6940	0.8720	0.5080	0.6900	0.5200	0.4260
MA(2,200)	0.8920	0.1220	0.7500	0.8960	0.5160	0.6620	0.6040	0.4980

Panel B: Shenzhen Composite Index (Fra>SZC)

Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.6220	0.6340	0.1820	0.8760	0.1780	0.7400	0.2420	0.2280
SETAR(150)	0.3360	0.8840	0.0220	0.9300	0.0840	0.9060	0.0860	0.0500*
SETAR(200)	0.2200	0.8340	0.0120	0.9400	0.1800	0.9460	0.0560	0.0220*
AR(50)	0.8700	0.7100	0.6960	0.7100	0.2200	0.4640	0.5560	0.5720
AR(150)	0.8520	0.2000	0.7400	0.6580	0.4300	0.4040	0.5300	0.6120
AR(200)	0.6820	0.7960	0.1820	0.8000	0.1480	0.7220	0.2880	0.2480
MA(1,50)	0.3380	0.8800	0.0300	0.9480	0.1680	0.8800	0.0680	0.0600
MA(1,150)	0.9020	0.7000	0.8800	0.7780	0.3000	0.5160	0.6640	0.7300
MA(1,200)	0.9360	0.6100	0.9620	0.6580	0.3100	0.3380	0.8220	0.9140
MA(5,150)	0.8980	0.8560	0.8760	0.7760	0.2660	0.5120	0.6320	0.6860
MA(2,200)	0.9060	0.8640	0.8880	0.7960	0.2440	0.5380	0.6500	0.7000

Note: "Fra>" refer to the fractions of simulated means, standard deviations and t-statistics that are larger than those of the actual series. "t-stat(Buy)" and "t-stat(Buy)" are for testing the null hypotheses $H_0: \quad \pi_{b(s)} = \bar{\pi}$, and t-stat(Buy-Sell) is for testing $H_0: \quad \pi_b - \pi_s = 0$.

Table 5b(i): GARCH-M Bootstrap Simulation Tests based on 500 Replications, Jan 1, 1991 to March 31, 2005 (period prior to the SOE reform)

Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
Panel A: Shanghai Composite Index (Fra>SHC)								
SETAR(50)	0.4680	0.1940	0.3400	0.7500	0.4560	0.7100	0.3040	0.3120
SETAR(150)	0.5220	0.1660	0.3640	0.6880	0.4900	0.6640	0.3440	0.3480
SETAR(200)	0.0620	0.1100	0.0080	0.9740	0.8620	0.9840	0.0120	0.0140*
AR(50)	0.4460	0.2660	0.2520	0.7800	0.3920	0.7400	0.2460	0.2520
AR(150)	0.7460	0.2960	0.6560	0.5160	0.3760	0.3820	0.6340	0.6320
AR(200)	0.4460	0.2120	0.2480	0.7700	0.4080	0.7400	0.2580	0.2620
MA(1,50)	0.0640	0.2440	0.0080	0.9820	0.4220	0.9840	0.0060	0.0100**
MA(1,150)	0.5660	0.1720	0.4140	0.6240	0.4500	0.5920	0.4080	0.4080
MA(1,200)	0.7260	0.2080	0.6480	0.5140	0.4800	0.4080	0.6060	0.6120
MA(5,150)	0.5660	0.1860	0.3800	0.6900	0.4620	0.6320	0.3820	0.3820
MA(2,200)	0.5920	0.1740	0.4040	0.6660	0.4980	0.6100	0.3960	0.3960
Panel B: Shenzhen Composite Index (Fra>SZC)								
Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.6940	0.9140	0.6840	0.3620	0.6060	0.2540	0.7060	0.7080
SETAR(150)	0.4040	0.8540	0.2640	0.6620	0.6960	0.6920	0.3000	0.2820
SETAR(200)	0.3620	0.7840	0.2060	0.7040	0.7860	0.7660	0.2340	0.2180
AR(50)	0.5940	0.7700	0.5280	0.5240	0.8200	0.4540	0.5440	0.5400
AR(150)	0.5780	0.8200	0.6000	0.4200	0.7700	0.3960	0.5960	0.5980
AR(200)	0.3260	0.7100	0.1500	0.7600	0.9020	0.8160	0.1920	0.1660
MA(1,50)	0.1700	0.6880	0.0520	0.8660	0.8640	0.9300	0.0740	0.0640
MA(1,150)	0.2900	0.3700	0.1480	0.7480	0.9680	0.7900	0.1940	0.1800
MA(1,200)	0.2720	0.4820	0.1200	0.7260	0.9340	0.7920	0.1740	0.1560
MA(5,150)	0.3740	0.4940	0.2100	0.7180	0.9380	0.7420	0.2420	0.2300
MA(2,200)	0.3220	0.5400	0.1820	0.6700	0.9400	0.7620	0.2340	0.2240

Note: "Fra>" refer to the fractions of simulated means, standard deviations and t-statistics that are larger than those of the actual series. "t-stat(Buy)" and "t-stat(Buy)" are for testing the null hypotheses $H_0: \quad \pi_{b(s)} = \bar{\pi}$, and t-stat(Buy-Sell) is for testing $H_0: \quad \pi_b - \pi_s = 0$.

Table 5b(ii): GARCH-M Bootstrap Simulation Tests based on 500 Replications, April 1, 2005 to Nov 30, 2006
(from the start of the SOE reform to the onset of the financial crisis)

Panel A: Shanghai Composite Index (Fra>SHC)

Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.1620	0.1480	0.4600	0.1900	0.6840	0.4360	0.5360	0.5320
SETAR(150)	0.1660	0.1420	0.4840	0.2360	0.8740	0.3460	0.5980	0.6040
SETAR(200)	0.1520	0.2320	0.6020	0.0780	0.2680	0.1400	0.8880	0.8200
AR(50)	0.1140	0.1980	0.2600	0.3720	0.4420	0.6480	0.3200	0.3300
AR(150)	0.1240	0.2740	0.3720	0.0320	0.7340	0.1240	0.9600	0.8300
AR(200)	0.0940	0.2760	0.2600	0.1820	0.8980	0.4760	0.6900	0.5000
MA(1,50)	0.0660	0.2240	0.1940	0.5080	0.5980	0.7720	0.2020	0.2360
MA(1,150)	0.0420	0.3140	0.1480	NA[2]	NA	NA	NA	NA
MA(5,150)	0.1060	0.2800	0.1220	NA	NA	NA	NA	NA

Panel B: Shenzhen Composite Index (Fra>SZC)

Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.2420	0.0860	0.4120	0.2820	0.8980	0.4940	0.4760	0.4760
SETAR(150)	0.1900	0.2300	0.2060	0.6540	0.4340	0.7720	0.1880	0.2340
SETAR(200)	0.1680	0.1860	0.2400	0.6860	0.8180	0.7540	0.1900	0.2680
AR(50)	0.1460	0.2340	0.1660	0.5720	0.3720	0.7460	0.2160	0.2280
AR(150)	0.3060	0.2140	0.5220	0.1020	0.2800	0.1340	0.8780	0.8040
AR(200)	0.2800	0.2500	0.5920	0.0800	0.3800	0.1380	0.8720	0.8060
MA(1,50)	0.2160	0.1920	0.3080	0.3680	0.4340	0.5860	0.3940	0.3940
MA(1,150)	0.2080	0.3100	0.1260	NA	NA	NA	NA	NA
MA(5,150)	0.1900	0.2480	0.1000	NA	NA	NA	NA	NA

Note:
[1]"Fra>" refer to the fractions of simulated means, standard deviations and t-statistics that are larger than those of the actual series. "t-stat(Buy)" and "t-stat(Buy)" are for testing the null hypotheses $H_0: \quad \pi_{b(s)} = \pi$, and t-stat(Buy-Sell) is for testing $H_0: \quad \pi_b - \pi_s = 0$.
[2]No "selling" signal is issued by the MA(1,150), MA(5,150) trading strategies in this subsample.
[3]Since there are less than 200 observations in this subsample, the MA(1,200) and MA(2,200) trading strategies are not implemented.

Table 5b(iii): GARCH-M Bootstrap Simulation Tests based on 500 Replications, Dec 1, 2006 to Mar 31, 2009 (financial crisis period)

Panel A: Shanghai Composite Index (Fra>SHC)								
Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.1400	0.7020	0.0120	0.9880	0.0720	0.9140	0.0140	0.0340*
SETAR(150)	0.8140	0.2200	0.3480	0.8960	0.1420	0.5380	0.3660	0.4100
SETAR(200)	0.4180	0.2080	0.1360	0.9420	0.1260	0.7520	0.1540	0.1780
AR(50)	0.5960	0.9760	0.1280	0.9560	0.0740	0.7220	0.1440	0.1920
AR(150)	0.9800	0.9900	0.7740	0.8680	0.0620	0.4880	0.6980	0.6220
AR(200)	0.9600	0.5900	0.8060	0.8640	0.0920	0.4780	0.6800	0.6160
MA(1,50)	0.6300	0.9420	0.1380	0.9740	0.0420	0.7440	0.1460	0.1980
MA(1,150)	0.5260	0.9900	0.0660	0.9840	0.0660	0.8200	0.0860	0.1180
MA(1,200)	0.9020	0.7020	0.6660	0.9220	0.1160	0.5900	0.5740	0.5000
MA(5,150)	0.7420	0.9280	0.2260	0.9400	0.0620	0.7160	0.2420	0.2580
MA(2,200)	0.8840	0.5840	0.6140	0.9340	0.1360	0.6240	0.5380	0.4340
Panel B: Shenzhen Composite Index (Fra>SZC)								
Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.8460	0.1840	0.3840	0.8720	0.0700	0.5160	0.4260	0.4440
SETAR(150)	0.7280	0.0580	0.3040	0.9100	0.1340	0.6220	0.3240	0.3460
SETAR(200)	0.8840	0.0880	0.5420	0.8120	0.1180	0.4040	0.5600	0.5720
AR(50)	0.7040	0.5140	0.2260	0.9180	0.0300	0.6360	0.2760	0.2980
AR(150)	0.8820	0.8100	0.4840	0.7800	0.0380	0.4200	0.5360	0.5400
AR(200)	0.7040	0.7200	0.2660	0.8040	0.0660	0.5240	0.3680	0.4020
MA(1,50)	0.4880	0.7520	0.0500	0.9720	0.0380	0.8440	0.0800	0.1040
MA(1,150)	0.4120	0.7480	0.0540	0.9380	0.0660	0.8320	0.0820	0.0900
MA(1,200)	0.8000	0.9340	0.2480	0.9200	0.0580	0.7100	0.2720	0.2720
MA(5,150)	0.4080	0.6720	0.0380	0.9220	0.0720	0.8320	0.0840	0.1020
MA(2,200)	0.8140	0.9260	0.3520	0.9060	0.0620	0.6860	0.3200	0.3200

Note: "Fra>" refer to the fractions of simulated means, standard deviations and t-statistics that are larger than those of the actual series. "t-stat(Buy)" and "t-stat(Buy)" are for testing the null hypotheses $H_0: \quad \pi_{b(s)} = \bar{\pi}$, and t-stat(Buy-Sell) is for testing $H_0: \quad \pi_b - \pi_s = 0$.

Table 5b(iv): GARCH-M Bootstrap Simulation Tests based on 500 Replications, April 1, 2009 to Aug 17, 2010 (post-crisis period)

Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
Panel A: Shanghai Composite Index (Fra>SHC)								
SETAR(50)	0.8780	0.3720	0.7400	0.7240	0.5840	0.4640	0.6260	0.6140
SETAR(150)	0.9400	0.3620	0.8520	0.7180	0.5780	0.4320	0.7300	0.6980
SETAR(200)	0.4900	0.9620	0.1420	0.8060	0.3860	0.6360	0.2460	0.2480
AR(50)	0.9320	0.5000	0.8800	0.7440	0.5180	0.3720	0.7680	0.7540
AR(150)	0.9500	0.6640	0.9260	0.7100	0.4680	0.3700	0.8060	0.8300
AR(200)	0.8720	0.2560	0.7040	0.7560	0.5240	0.5060	0.5640	0.5380
MA(1,50)	0.5060	0.6340	0.0620	0.9200	0.4740	0.8080	0.1260	0.1280
MA(1,150)	0.8740	0.1420	0.7680	0.8520	0.5220	0.6740	0.5780	0.5080
MA(1,200)	0.8740	0.1120	0.7560	0.8680	0.5340	0.6180	0.6100	0.5240
MA(5,150)	0.8840	0.2260	0.6900	0.8780	0.5180	0.6480	0.5620	0.4500
MA(2,200)	0.8600	0.1120	0.7300	0.8320	0.5420	0.6520	0.5960	0.4820
Panel B: Shenzhen Composite Index (Fra>SZC)								
Trading rule	r(Buy)	σ(Buy)	t-stat(Buy)	r(Sell)	σ(Sell)	t-stat(Sell)	r(Buy)-r(Sell)	t-stat(Buy-Sell)
SETAR(50)	0.6620	0.6540	0.1920	0.8580	0.1940	0.7060	0.2460	0.2400
SETAR(150)	0.4280	0.8900	0.0580	0.8980	0.1400	0.8600	0.1260	0.0940
SETAR(200)	0.3000	0.8400	0.0180	0.9140	0.1700	0.9180	0.0740	0.0420*
AR(50)	0.8800	0.6980	0.7420	0.6360	0.2480	0.4080	0.6080	0.6320
AR(150)	0.8980	0.1920	0.8340	0.5400	0.4620	0.3040	0.6740	0.7360
AR(200)	0.7540	0.7400	0.3440	0.6900	0.1540	0.5380	0.4480	0.4220
MA(1,50)	0.3080	0.8640	0.0320	0.9360	0.1640	0.9040	0.0660	0.0540
MA(1,150)	0.8980	0.6700	0.8860	0.7540	0.3100	0.4540	0.6640	0.7660
MA(1,200)	0.9340	0.6260	0.9680	0.6700	0.3300	0.3040	0.8360	0.9320
MA(5,150)	0.9100	0.8280	0.8800	0.7760	0.2560	0.5280	0.6580	0.6840
MA(2,200)	0.8820	0.8040	0.8720	0.7340	0.2780	0.5080	0.6160	0.6780

Note: "Fra>" refer to the fractions of simulated means, standard deviations and t-statistics that are larger than those of the actual series. "t-stat(Buy)" and "t-stat(Buy)" are for testing the null hypotheses $H_0: \pi_{b(s)} = \bar{\pi}$, and t-stat(Buy-Sell) is for testing $H_0: \pi_b - \pi_s = 0$.