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Do Technical Analysts Outperform Novice Traders: Experimental Evidence

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Abstract

Previous studies on technical analysis mostly report the profitability of specific trading rules for a given set of historical data. In this paper, we use the human trader experiment approach to compare the performance of experienced and novice traders. It is found that traders who are more knowledgeable on technical analysis significantly outperform those who are less knowledgeable.

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1. Introduction

Technical analysis is a methodology for forecasting the price movements of financial securities through the study of historical price and volume data (Kirkpatrick and Dahlquist, 2006). Extensive empirical works have been conducted to examine the profitability of technical analysis in various markets, e.g., candlestick patterns in the Japanese (Marshall et al., 2008) and US markets (Caginalp and Laurent, 1998), moving averages in the New York Stock Exchange (Van Horne and Parker, 1967; LeBaron, 2000), MACD and RSI in FT30 (Chong and Ng, 2008), Bollinger Bands in DJIA and NASDAQ (Lento *et al.*, 2007), RSI in the currency market (Abbey and Doukas, 2012), Point and Figure charting in the S&P 500 futures market (Anderson and Faff, 2008) and a combined signal approach in the currency market (Lento and Gradojevic, 2007). The evidence for the effectiveness of technical trading rules is mixed (Park and Irwin, 2007). Some studies find that these trading rules are not profitable (Marshall *et al.*, 2006, 2008), while others show good performance of the trading rules (Caginalp and Constantine, 1995; Chong and Ip, 2009; Chong and Lam, 2010, Chong *et al.*, 2012), which is against the weak-form market efficiency (Fama, 1970). Most of the aforementioned studies simply compute the profitability of specific technical trading rules for a given set of historical data. Little research is done using human trader experiments. In this paper, we use an experimental approach to assess how well a trader may perform based on visual inspection of the price charts of a stock. A control experiment was conducted. Our experimental subjects are classified into the groups of experienced and novice traders (the control group) based on their knowledge of candlestick patterns. The two groups of traders are invited to conduct a trading simulation. The number of correct trading decisions for each trader is recorded. The result reveals that the group with more knowledge on candlestick patterns significantly outperforms the other group. Our work provides experimental evidence for the effectiveness of technical analysis. The rest of this paper is organized as follows. Section 2 introduces the trading simulation in the experiment and describes the experimental procedures. Section 3 reports the results.

2. Trading Assessment System and the Experiment

Our trading system has Java and Android versions. The Java version is available to the public¹. The historical price data of China's stocks are extracted from Yahoo. The stocks used in the experiment included 50 components of CSI 300 from 2005 to 2010. Figure 1 shows screenshots of the system. After clicking the "start" button (the left of Figure 1), the system randomly picks an asset and selects a period of 60 days. The system will display the price chart. The price values and months are not shown on the chart to prevent traders from figuring out the stock code and its historical trend.

¹ <http://google.comp.polyu.edu.hk/jnlp/kssystem.htm>



Figure 1: Screenshots of the trading assessment program (Java and Android versions)

The traders have 50 attempts to make trading decisions. In each attempt, the trader has four options: up (i.e. rise by 5% in the next ten days), down (i.e. fall by 5% in the next ten days), pig (i.e. swing within $\pm 5\%$ in the next ten days), and skip a current round. The skipped round is not counted towards the total number of attempts. The performance of each trader is defined as the number of successful attempts divided by the total number of attempts.

Forty volunteers with different backgrounds² are invited to serve as the subjects of the experiment by the students of the course “Financial Computing for Master of Science in Information Systems” offered by the Xi'an Tongli International College in 2013 in Xi'an, China. The experiment has three steps.

Step 1: Pre-assessment

The subjects filled in questionnaires which would be used to group into either the experienced (E) or the novice traders (N). The questions include (a) recognition of candlestick patterns, (b) past trading decisions based on candlestick patterns, (c)

² The subjects are coming from 12 different background categories, including information technology, finance, accounting, civil service, engineering, banking, self-employed, entrepreneur, farming, driver, technician and retired.

satisfaction of historical trading performance, (d) years of trading experience and (e) educational background. Questions (b) and (c) are subjective, while questions (a), (d) and (e) are objective. The values of attributes in (a), (b), (c) and (d) are normalized to a scale of 1 to 5. The classification formula is defined as

$$f = w_1 \times (a) + w_2 \times (b) + w_3 \times (c) + w_4 \times (d) + w_5 \times (e),$$

where

$$w_1, w_2, w_3 = 1, w_4 = 0.5 \text{ and } w_5 = 0.3.$$

The weights were suggested by two fund managers with around five years of experience from Yintai Securities Company Ltd., Shenzhen, China.

Step 2: Assessment

After being demonstrated the operations of the system, each subject performed the exercises on the Internet separately. To tell if an individual with more knowledge of technical analysis and trading experience will outperform those with less, we test the following null hypothesis:

H0a. There is no difference in performance between the experienced and the novice traders.

Step 3: Post-assessment

After the assessments were conducted, the subjects were asked if the assessment could reflect their performance. The answer is yes (1), no (-1) or neutral (0). We test the following hypothesis:

H0b: There is no correlation between the performance and satisfaction among each group.

The raw data of our sample are provided in the Appendix.

3. Results

Panel (a) of Table 1 presents the t-test for the performance of the experienced versus the novice traders. The null hypothesis, H0a, is rejected, with a p-value=0.0002. Therefore, our experiment shows that traders who are more knowledgeable on technical analysis significantly outperform those who are less knowledgeable. From Panel (b) of Table 1, there is no performance bias in our experiment as we cannot reject H0b that there is no correlation between performance and satisfaction. Our experimental results provide

supplementary evidence supporting the effectiveness of technical analysis. An extension of the current study to a larger scale experiment that includes more subjects and more sophisticated patterns and indicators of technical analysis would be an interesting future research direction.

Table 1: Results of the Experiment

| | |
|---|-------------------|
| (a) t-test output for H0a | |
| t | 4.2565 |
| df | 27.725 |
| p-value | 0.000214 |
| 95 percent confidence interval | (8.8152, 25.1858) |
| sample estimates (mean of x, mean of y) | (40.75, 23.75) |
| (b) Pearson's product-moment correlation between performance and satisfaction for H0b | |
| t | 0.8812 |
| df | 38 |
| p-value | 0.3838 |
| 95 percent confidence interval | (-0.1778, 0.4339) |
| sample estimates (correction) | 0.1415 |

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Appendix: Sample Data

| # | Knowledge of the most common candlesticks (1-5) | Trading decision based on candlestick analysis (1-5) | Historical trading performance (1-5) | Number of years' experience | Education background (1-5) | Experienced (E) /Novice (N) | Performance (%) | Satisfaction (1,0,-1) |
|----|---|--|--------------------------------------|-----------------------------|----------------------------|-----------------------------|-----------------|-----------------------|
| 1 | 1.00 | 1 | 1 | 2 | 2 | N | 32 | -1 |
| 2 | 1.00 | 1 | 1 | 1 | 2 | N | 23 | 1 |
| 3 | 1.57 | 2 | 2 | 2 | 3 | N | 25 | 1 |
| 4 | 1.00 | 1 | 1 | 2 | 2 | N | 27 | 1 |
| 5 | 1.57 | 1 | 1 | 2 | 2 | N | 30 | 1 |
| 6 | 5.00 | 4 | 4 | 3 | 5 | E | 43 | 0 |
| 7 | 5.00 | 3 | 3 | 2 | 3 | E | 38 | 0 |
| 8 | 5.00 | 5 | 2 | 3 | 3 | E | 58 | -1 |
| 9 | 5.00 | 3 | 3 | 2 | 3 | E | 73 | 1 |
| 10 | 5.00 | 5 | 2 | 3 | 3 | E | 70 | 1 |
| 11 | 1.57 | 2 | 2 | 2 | 3 | N | 22 | 0 |
| 12 | 2.14 | 1 | 1 | 3 | 3 | N | 26 | 0 |
| 13 | 2.14 | 3 | 3 | 7 | 1 | N | 34 | 1 |
| 14 | 1.00 | 4 | 4 | 5 | 1 | N | 28 | 0 |
| 15 | 1.57 | 1 | 3 | 1 | 3 | N | 16 | 0 |
| 16 | 2.14 | 3 | 4 | 1 | 3 | N | 34 | 1 |
| 17 | 1.00 | 3 | 2 | 2 | 1 | N | 18 | 1 |
| 18 | 1.57 | 3 | 2 | 9 | 3 | N | 14 | 0 |
| 19 | 1.00 | 2 | 2 | 1 | 3 | N | 8 | 0 |
| 20 | 1.57 | 3 | 2 | 1 | 5 | N | 28 | 0 |
| 21 | 2.71 | 3 | 4 | 2 | 5 | E | 62 | 1 |
| 22 | 1.57 | 4 | 5 | 3 | 3 | E | 38 | 1 |
| 23 | 3.86 | 2 | 2 | 7 | 3 | E | 28 | 0 |
| 24 | 3.29 | 3 | 1 | 7 | 5 | E | 26 | 1 |
| 25 | 2.71 | 4 | 3 | 2 | 5 | E | 30 | 1 |
| 26 | 4.43 | 3 | 4 | 1 | 5 | E | 42 | 0 |
| 27 | 3.29 | 3 | 5 | 2 | 5 | E | 22 | 1 |
| 28 | 3.86 | 5 | 2 | 3 | 5 | E | 30 | 1 |
| 29 | 3.29 | 3 | 3 | 5 | 5 | E | 12 | 0 |
| 30 | 3.86 | 5 | 2 | 1 | 5 | E | 58 | 1 |
| 31 | 3.86 | 3 | 3 | 5 | 3 | E | 42 | 1 |
| 32 | 4.43 | 2 | 4 | 3 | 1 | E | 37 | 1 |
| 33 | 1.57 | 5 | 1 | 2 | 5 | E | 32 | 0 |
| 34 | 2.71 | 5 | 2 | 3 | 5 | E | 38 | -1 |

| | | | | | | | | |
|----|------|---|---|---|---|---|----|----|
| 35 | 2.71 | 3 | 3 | 3 | 3 | E | 36 | -1 |
| 36 | 1.00 | 4 | 4 | 2 | 3 | N | 32 | 0 |
| 37 | 1.00 | 3 | 3 | 6 | 1 | N | 14 | -1 |
| 38 | 1.00 | 5 | 4 | 2 | 3 | N | 26 | -1 |
| 39 | 1.57 | 3 | 2 | 2 | 3 | N | 28 | 1 |
| 40 | 1.00 | 5 | 4 | 2 | 2 | N | 10 | 1 |