

Empirical Analysis of RSI Based on Vocational Education Sector of Listed Companies

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Abstract: The paper tests the RSI expert system of securities trading software based on the real and open data from securities vocational education sector through the statistical empirical analysis. It makes empirical analysis of RSI anti trend index with annual net profit rate, rate of return and win rate as the management objective and the theory of mathematical statistics as the research basis, and obtains the result that the annual rate of return and net profit margin of RSI expert system were 44.4% and 44.3% of Shanghai Composite Index. 100% win rate and 4.76 times annual rate of return of annual interest rate on bank deposits provide a safe investment plan for investors. This result is obviously acceptable.

Introduction

In the global financial transactions, technical analysis is an important and more popular method. The software expert system often used in technical analysis method is necessary. Huang et al. studied average line expert system MA and anti trend expert system RSI [1] and concluded that besides annual transaction times, RSI expert system was overall superior to MA expert system in the win rate, annual rate of return and net profit rate. They also studied anti trend expert system RSI, BIAS, KDJ and W&R [2-3] and concluded RSI expert system was the best in the annual rate of return and net profit margin based on test results and W&R was the worst. RSI net profit margin and annual rate of return were approximately 5 times better than W&R. And BIAS expert system reached up to 98.54% in the success rate and W&R reached up to 7,658.40 in annual transaction times. Now we make empirical analysis with annual net profit rate, rate of return and success rate as the management objective, the vocational educational sector of listed companies as the sample, and RSI expert system as the analytical tool.

RSI (Relative Strength Index) transaction index was mentioned and given the corresponding formula by American J. Welles Wilder JR in the book *New Concepts in Technical Trading System* in 1978. Later, RSI index was widely applied to trade in commodities, futures and securities.

RSI (Relative Strength Index) mathematical formula [4]:

$$RSI = \frac{100 \times RS}{1 + RS} \quad (1)$$

$$RS = \frac{\text{Average Rise Point in } i \text{ days}}{\text{Average Dropped Point in } i \text{ days}} \quad (i = 1, 2, \dots, n) \quad (2)$$



Figure 1 Shanghai Composite Index



Figure 2 RSI Expert System

Empirical Analysis Based on RSI expert system (shown in figure 2)

Experiment and Results

(1) Experimental procedures

Expert system RSI is formulated based on the rule by Welles Wilder. The buying and selling rule is: buying when RSI (14) varies from 0 to 20 or from 50 to 80, selling RSI (14) varies from 80 to 100, and waiting and seeing when RSI (14) varies from 20 to 50

Source code of RSI expert system

```
N1 1 100 14
LL 0 40 20
LH 60 100 80
LC: = REF (CLOSE, 1);
RSI:SMA(MAX(CLOSE-LC,0),N1,1)/SMA(ABS(CLOSE-LC),N1,1)*100,colorwhite;
ENTERLONG: CROSS (RSI, LL);
EXITLONG: CROSS (LH, RSI)
```

- (2) Experimental platform: great wisdom securities information platform V5.99 version
- (3) Experimental parameters: to open a position once or close all positions when conditions are met. Transaction costs take 0.5%.
- (4) Experimental sample: daily data of vocational education sector (March 2016 through April 2017)
- (5) Experimental process, time and results:

Table 1 Test Results Based on RSI Expert System

System Test Settings	
Test method: technical index – RSI (14)	
Test time: March 1 st , 2016 to April 11 th , 2017, excluding forced liquidation	
Tested shares: 25 in total	Initial inputs: 4, 000 Yuan
Buying terms:	
One of the following groups is met:	
1. The following conditions are simultaneously met	
1.1 Technical index: RSI (14) index line RSI crossing the lower bound (daily line)	
When conditions are met: buy with all funds at the closing price based on the central price	
When signals occur constantly: refuse to continue to buy	
Selling terms: no selling conditions	
Liquidation terms: (close a position according to the closing price)	
Index selection: technical index: RSI (14) index line RSI breaking the upper bound (daily line)	
System Testing Summary	
System testing summary	
Number of tested shares:	25
Annual rate of return:	8.33%
Annual transaction times:	8.31

Win rate:	100.00%	Success rate:	100.00%
Average profit:	10,026.22 Yuan	Average annual signal quantity:	29.54 times
Maximum single profit:	22,972.81 Yuan	Maximum single loss:	0.00 Yuan
Transaction times:	9	Profitable transaction times:	9 (accounting for 100.00%)
Net profits:	90,236.00 Yuan	Net profit margin:	9.02%
Net profits of simple holdings:	203,985.03 Yuan	Net profit margin of simple holdings:	20.40%
Ideal model net profits:			9,325,434,880.00 Yuan
Ideal model net profit margin:			932,543.50%

System Testing Report

Number of tested shares:	25		
Net profits:	90,236.00 Yuan	Net profit margin:	9.02%
Total earnings:	92,801.50 Yuan	Total losses:	0.00 Yuan
Transaction times:	9	Win rate:	100.00%
Average annual transaction times:	8.31	Profit/loss transaction times:	9/0
Total turnover:	866,169.75 Yuan	Transaction fees:	754.02 Yuan
Maximum single profit:	22,972.81 Yuan	Maximum single loss:	0.00 Yuan
Average profit:	10,311.28 Yuan	Average loss:	0.00 Yuan
Average profit:	10,026.22 Yuan	Average profits/losses:	0.00
Maximum continuous profit times:	9	Maximum continuous loss times:	0
Average transaction cycle:	57		
Average profit transaction cycle:	57	Average loss transaction cycle:	0.00
Profit coefficient:	1.00		
Maximum floating profits:	1,054,166.25 Yuan	Maximum floating losses:	0.00 Yuan
Maximum floating profit and loss difference:	1,054,166.25 Yuan		
Total inputs:	1,000,000.00 Yuan		

Buying signal statistics
(summarize the situation of all buying signal points, regardless of signal deletion caused by funds and strategies in transaction testing)

Success rate:	100.00%
Signal quantity:	23
Average annual signal quantity:	21.23

Analysis of Results

Table2 Comparative Analysis Sheet

	Win Rate	Annual Rate of Return	Net Profit Margin	Annual Transaction Times
RSI Expert System	100	8.33	9.02	29.54
Shanghai Composite Index		18.76	20.33	
Ratio of RSI Results and Shanghai Composite Index Results		44.4%	44.3%	

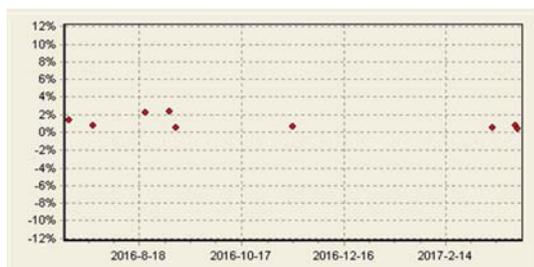


Figure 3 Annual Transaction Times

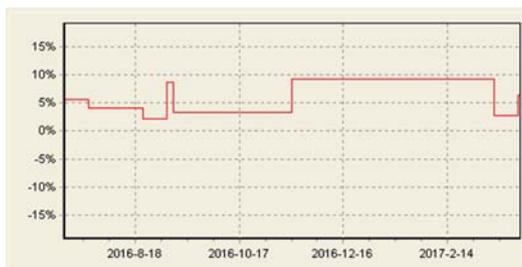


Figure 4 RSI Yield Curve

Conclusion

The paper analyzes the practicability of RSI expert system with the win rate, annual rate of return and net profit rate that investors pay the most attention to as the management objective [6]. The result that the annual rate of return and net profit margin of RSI expert system were 44.4% and 44.3% of Shanghai Composite Index shows that the investment in vocational education sector under the guidance of RSI expert system cannot outperform the market index. And RSI expert system with 100% win rate provides a safe investment plan for investors. The investment plan is obviously popular with the investors who hate risks. The result that 8.33% annual rate of return is 4.76 times annual interest rate on bank deposits is obviously considerable. To sum up, it is a risk-free plan that the investment in vocational education sector is guided through RSI expert system. According to the image indicator of RSI expert system shown in figure 1 and 2, the long-term holdings are a magic weapon to outperform the market index.

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