Comparative Analysis of Investment based on the Gold Sector

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Abstract. Since January 26, 2018 to August 7, 2019, under the issue that the Shanghai Composite Index has fallen sharply, the RSI expert system still recorded positive returns in the gold sector. Compared with the W&R expert system, its winning percentage, annual return, and net profit margin are 1.23, 13.96, 13.96 and 1.60, 3.22, and 3.23 times respectively to the latter. The corresponding results are obtained when MACD and RSI is compared with MA. The obtained data shows that the same reversed trending system RSI is better than W&R, and the trending system MACD is better than MA. the reversing intent RSI has a clear advantage when comparing with the trending system MA. Choosing RSI system is the best decision.

Keywords: Anti-Trend System; Trend System; Golden Plate; Comparative Analysis.

1. Introduction

On August 7, 2019, the international gold price rose above $1,500 mark per ounce, creating another new high in six years, this is mainly due to the Fed's interest rate cut and Sino-US trade friction. The exchange rate of the RMB against the US dollar has depreciated, the economic and trade frictions have intensified, and risk aversion has further heated up. A series of questions have raised concerns about the economic recession and the thinking of the economic crisis, and the important value of gold has been further highlighted.

According to the World Gold Council's updated March Global Gold ETF data, the gold ETF increased by 47.3 tons in the first quarter of 2018. The total gold ETF holdings in March increased by 22.5 tons to 2,415 tons ($102.8 billion). Among them, the United States and China led the global gold ETF inflows in the first quarter. By the end of July, China's gold reserves increased by 9.95 tons reaches to 1936.5 tons, achieving a gold reserve for eight consecutive months since December 2018.

From the perspective of the A-share market in China's securities market, the gold sector index is in a long position, while the Shanghai Composite Index is short-selling.
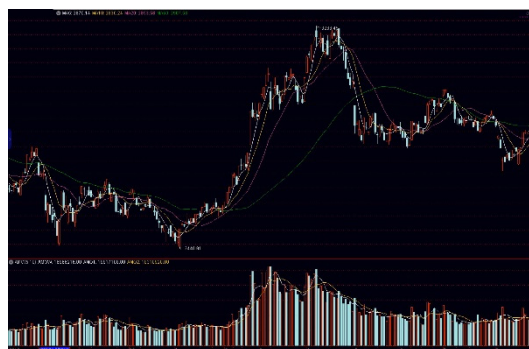

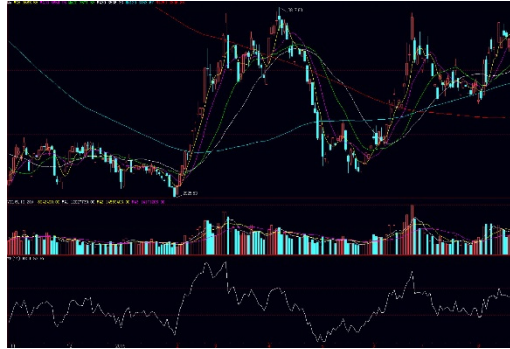Figure 1. China's Shanghai Composite Index with short positions.

Figure 2. Gold sector index with long positions

Zhiheng Lin etc. (2017) [1] empirically analyzed the four indicators of RSI, W%R, MA and MACD of the expert system. The results show that in terms of success rate, annual profit rate and net profit margin, the reversing expert system RSI is better than W%R, and the expert system MA is better than MACD. The calculation results of the reversing expert system are generally better than the trending expert system, the success rate, annual rate of return and net profit margin of the reversing expert RSI system is 1.19, 1.40 and 1.401 times that of the intent MACD expert system.

Yun Li et al. (2018) [4] empirically analyzed the practicability of RSI and MA Expert System in the banking block based on the banking block of the securities market. The results show that the success rate of RSI Expert System is 1.47 times that of MA Expert System. The annual return rate and net profit rate of RSI Expert System are 2.13 times that of MA Expert System. The annual transaction volume of RSI Expert System is 0.87 times that of MA Expert System. Therefore, RSI expert system is obviously superior to MA Expert System.

Hui Ma et al. (2018) [5] analyzed the practicability of RSI and MA Expert Systems in the software block of the securities market with the management objectives of winning rate, annual return rate and net profit rate. The results show that RSI Expert System is superior to MA Expert System. Considering the low annual return rate and net profit rate of RSI Expert System, compared with the banking block, the selection of industry block is more important than that of Expert System.

2. Model and Experiment

Williams %R (Williams Overbought/Oversold, WMS%R) W%R mathematical formula [4]:

$$\%R = \frac{high_{Ndays} - close_{today}}{high_{Ndays} - low_{Ndays}} \times (-100\%) \tag{1}$$

$$\begin{aligned}(close_{today} - low_{Ndays}) - (close_{today} - high_{Ndays}) \\ = high_{Ndays} - low_{Ndays}\end{aligned} \tag{2}$$

$$W\%R = \frac{C_n - H_n}{H_n - L_n} \times 100\% \tag{3}$$

Where, n is the transaction cycle set by the trader; C_n is the closing price in n days; L_n is the lowest price in n days; H_n is the highest price in n days.

Source Code of W%R Expert System
```
N   2.00 100.00 14.00
LL 0.00 100.00 20.00
LH 0.00 100.00 80.00
WR:=100*(HHV(HIGH,N)-CLOSE)/(HHV(HIGH,N)-LLV(LOW,N));
ENTERLONG:CROSS(WR,LH);
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EXITLONG:CROSS(WR,LL);

Table 1. W&R expert system test results

system test setting

Test Method: Stock Selection Formula - W&R Buy
Test time: 2018-1-25 — 2019-1-2   Excluding forced closing
Test stock: a total of 24 stocks   Initial investment: 10,000.00 yuan
Buying conditions:
  One of the following groups is established:
  1. The following conditions are simultaneously established
  1.1 Stock selection formula: W&R buy (14,80) [daily]
        When the conditions are met: buy by using the full amount of fund at the middle
              price: the closing price
        When a continuous signal appears: no longer buy
Selling conditions: no selling conditions
Closing conditions: (closed at the closing price)

System test report

Number of shares tested: 24   Net profit: -23,272.23 yuan
Net profit margin: -9.70%   Total profit: 30,765.68 yuan
Totalloss: -53,687.30yuan   Number of transactions: 109
Winning rate: 58.72%
Average number of transactions per year:109.00
Profit/loss transactions: 64/45
Total transaction amount: 1,020,682.69 yuan Transaction fee: 935.41 yuan
Maximum single profit: 1,354.93yuan   Maximum single loss: -5,057.87 yuan
Average profit: 282.25 yuan   Average loss:-492.54 yuan
Average profit:-213.51 yuanaverage   profit / average loss:-57.31
Maximum consecutive profit:7   Maximum consecutive losses:5
Average number of transactions: 24.17   Average period of profitable trades:14.48
Average period of loss trading: 37.93   Earnings coefficient: -0.27
Maximum floating profit: 229,881.73 yuan   Maximum floating loss:0.00 yuan
Maximum floating profit and loss: 229,881.73 yuan
Total investment: 240,000.00 yuan
-------------------------Buy signal statistics ------------------------
(Statistics of all buy signal points, regardless of signal deletion caused by funds and strategies in the transaction test)
Success rate:56.52%   Number of signals:130
Annual average number of signals: 130.00

Moving Average Convergence and Divergence MACD mathematical formula[5]:

$$MACD=12\text{-}daysEMA\text{-}26\text{-}daysEMA \tag{4}$$

Exponential Moving Average EMA mathematical formula:

$$EMA_{today} = \frac{p_1 + (1-\alpha)p_2 + (1-\alpha)^2 p_3 + (1-\alpha)^3 p_4 + \cdots}{1 + (1-\alpha) + (1-\alpha)^2 + (1-\alpha)^3 + \cdots} \tag{5}$$

$\alpha = \dfrac{2}{N+1}$ N is the periodicity

In which $p_i (i = 1, 2, \cdots n)$ is the closing price of Day i, n is the Moving Average Periodicity

Source Code of MACD Expert System
LONG 10 200 26
SHORT 2 200 12
M   2 200 9
DIFF:=EMA(CLOSE,SHORT) - EMA(CLOSE,LONG);
DEA   := EMA(DIFF,M);
MACD := 2*(DIFF-DEA);
ENTERLONG:CROSS(MACD,0);
EXITLONG:CROSS(0,MACD);

Table 2. MACD expert system test results

| **system test setting** |
| --- |
| Test Method: Stock Selection Formula - MACD Buy |
| Test time: 2019-4-18 — 2019-8-7   Excluding forced closing |
| Test stock: a total of 24   Initial investment: 10,000.00 yuan |
| Buying conditions: |
| One of the following groups is established: |
| 1. The following conditions are simultaneously established |
| 1.1 Stock selection formula: MACD buy (26,12,9) [daily] |
| When the conditions are met: Use the full amount of fund to buy at the middle |
| price: the closing price |
| When a continuous signal appears: no longer buy |
| Selling conditions: no selling conditions |
| Closing conditions: (closed at the closing price) |
| Indicator stock picking: stock selection formula: MACD sells (12, 26, 9) [daily] |
| |
| **System Test Report** |
| Number of shares tested: 24   Net profit:586.39 yuan |
| Net profit margin: 0.24%   Total profit:10,038.17 yuan |
| Total loss: -9,083.07yuan |
| Number of transactions:26 |
| Win rate: 53.85%   Average number of transactions per year: 78.00 |
| Profit/loss transactions:14/12   Total transaction amount: 360,160.19 yuan |
| Transaction fee: 299.48 yuan   Maximum single profit: 2,130.81 yuan |
| Maximum single loss: -3,114.12 yuan   Average profit: 386.08 yuan |
| Average loss: -349.35 yuan   Average profit: 22.55 yuan |
| average profit / average loss:-110.52   Maximum consecutive profit: 4 |
| Maximum consecutive losses: 4   Average number of transactions: 20.31 |
| Average period of profitable trades: 26.00 Average period of loss trading:13.67 |
| Profit coefficient: 0.05   Maximum floating profit: 230,595.75 yuan |
| Maximum floating loss: 0.00 yuan   Maximum floating profit and loss: 230,595.75 yuan |
| Total investment: 240,000.00 yuan |
| ---------------------------Buy signal statistics --------------------------- |
| (Statistics of all buy signal points, regardless of signal deletion caused by funds and strategies in the transaction test) |
| Success rate: 53.85% |
| Number of signals:40   average number of signals:120.00 |
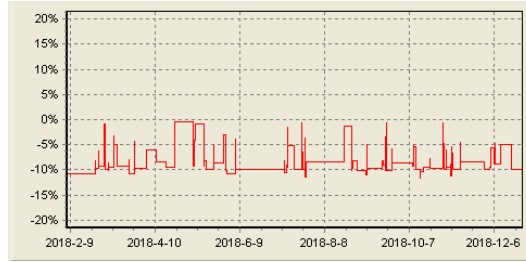
Figure 3. 01/25/2018-01/02/2019 W&R income curve
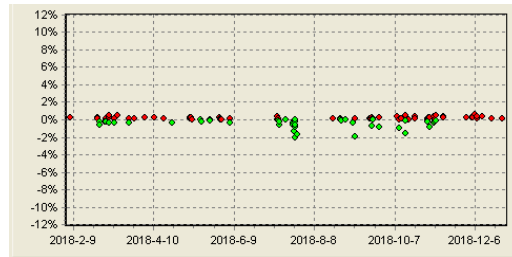

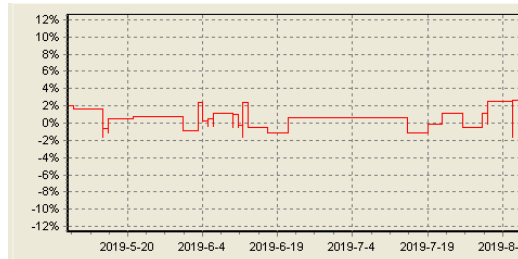Figure 4. 01/25/2018-01/02/2019 Trading signal diagram

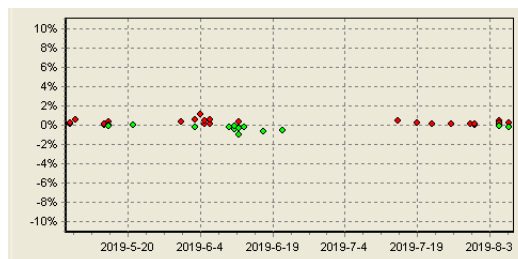Figure 5. 04/18/2019-08/07/2019 W&R income curve

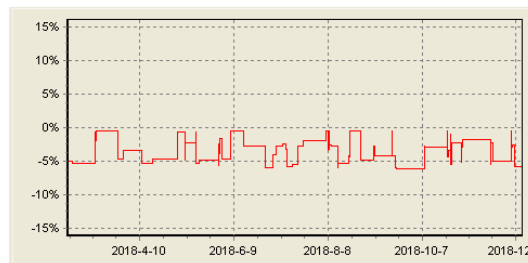Figure 6. 04/18/2019-08/07/2019 Trading signal diagram

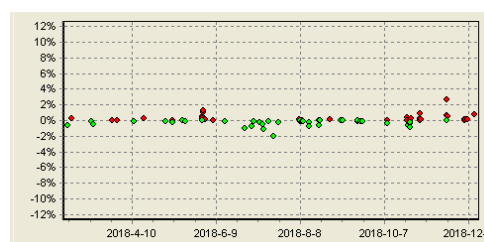Figure 7. 01/25/2018-01/02/2019 MACD income curve

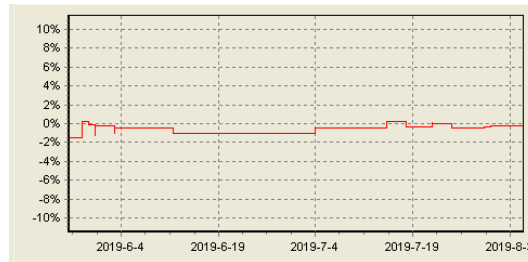Figure 8. 01/25/2018-01/02/2019 Trading signal diagram
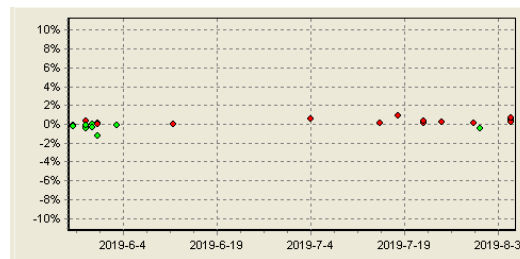
Figure 9. 04/18/2019-08/07/2019 MACD income curve

Figure 10. 04/18/2019-08/07/2019 Trading signal diagram

All experimental results (see Figure 3-10)

Table 3. Expert System Data Sheet

time	set schedule	Win rate	Annual return	Net profit rate	Annual trading times
2018.01— 2019.01	W&R expert system	58.72	-9.70	-9.70	109
2018.01— 2019.01	RSI expert system 1	54.55	2.56	2.56	11
2018.01— 2019.01	RSI expert system 2	72.22	4.26	4.26	18
2018.01— 2019.01	MA expert system	36.25	-15.16	-15.16	80
2018.01— 2019.01	MACD expert system	44.87	-2.51	-2.51	78
2019.04— 2019.08	W&R expert system	62.22	7.42	2.47	135
2019.04— 2019.08	RSI expert system schedule 1	100	23.92	7.97	24
2019.04— 2019.08	RSI expert system schedule 2	93.33	27.31	9.10	45
2019.04— 2019.08	MA expert system	40.00	3.05	1.02	75
2019.04— 2019.08	MACD expert system	53.82	0.73	0.24	78

3. Conclusion

From January 26, 2018 to January 2, 2019, the Shanghai Composite Index of China rose by -30.71%; from April 18, 2019 to August 7, 2019, the Shanghai Composite Index of China rose by -14.82%. No matter to the gold sector, the RSI expert system recorded positive returns. Compared with the W&R expert system, its winning percentage, annual return, and net profit margin is 1.23, 13.96, 13.96, and 1.60, 3.22, and 3.23 times respectively. Compared with the MA expert system, the MACD expert system has 1.23, 6.03, 6.03, and 1.34, 0.24, and 0.24 times to the winning rate, annual

return rate, and net profit margin of respectively. Compared with the MA expert system, the RSI expert system has 1.99, 19.42, 19.42, and 2.33, 8.95 and 8.92 times to the winning rate, annual return rate, and net profit margin respectively. The above data shows that as the same trending system RSI is better than W&R, and the trending system MACD is better than MA. Compared with the trending system MA, the RSI has a clear advantage. Choosing an RSI system is the best decision.

Acknowledgements

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