HW4

108062213 顏浩昀

使用資料

台指期

日盤

樣本內:2022-03-13 ~ 2022-11-20(8個月)

樣本外:2022-11-13 ~ 2023-03-20(4個月)

手續費:百萬分之33

ADX

```
        ((Previous ADX14)*(14-1))+ Today's DX
ADX14 = -------------------------------------
                        14
```

```
diffDI = ABS( (-DI14) - (+DI14) )
sumDI  = (-DI14) + (+DI14)

DX14 = 100 * (diffDI / sumDI)
```

```
          -DM14
-DI14 =  --------
           TR14

(Same thing for +DI14)
```

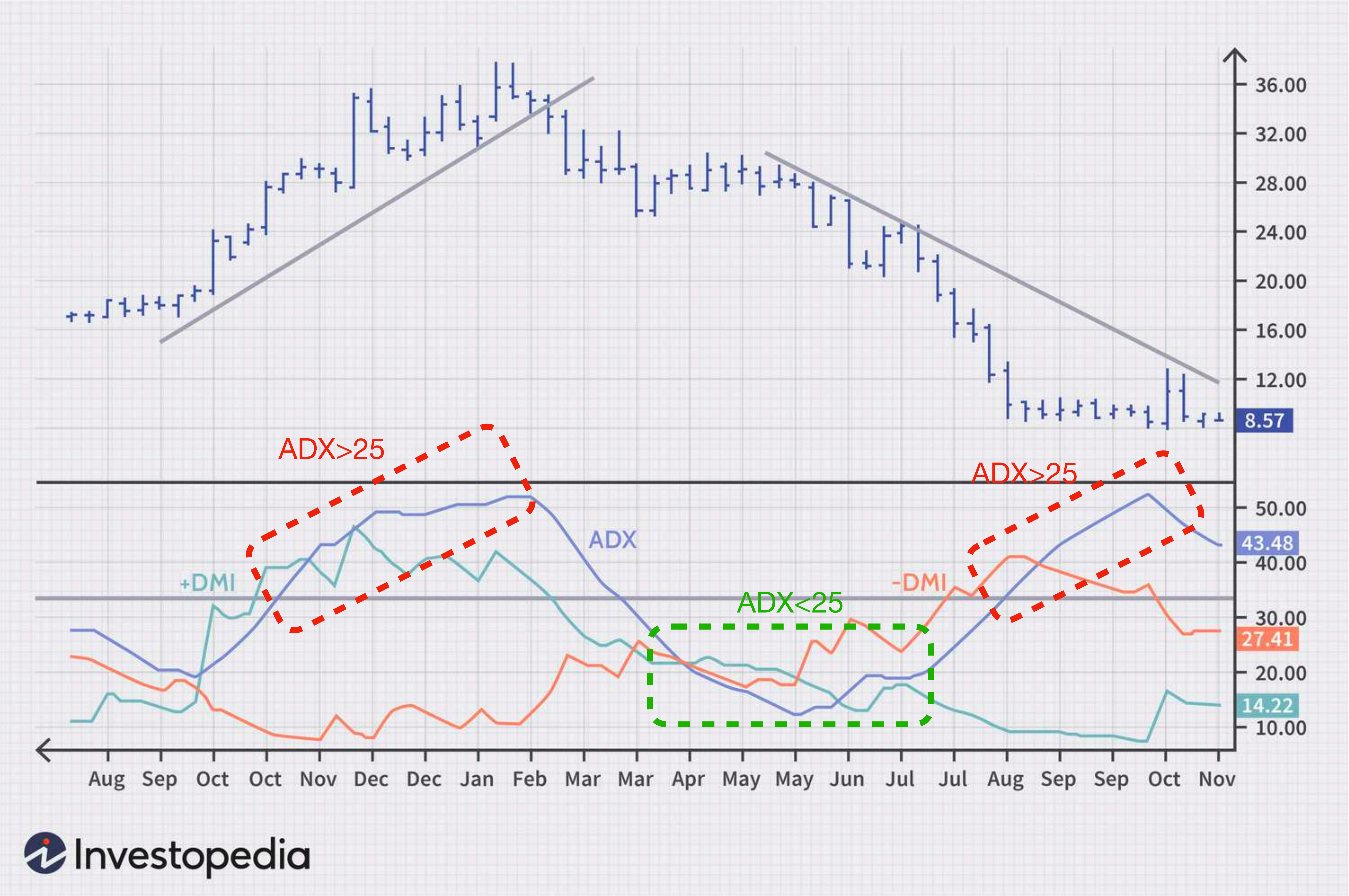
```
                                  Previous -DM14
Today's -DM14 = Previous -DM14 -  -------------- + Today's -DM1
                                        14

(Same thing for +DM14)
```

```
                                Previous TR14
Today's TR14 = Previous TR14 -  ------------- + Today's TR1
                                      14
```

```
Case 1:                     Case 2:
   C|                        A|
    |                         | C|
    | +DM1 = (C-A)           B|  | +DM1 = 0
    | -DM1 = 0                   | -DM1 = (B-D)
A|  |                           D|
 | D|
B|

Case 3:                     Case 4:
   C|                           C|
    |                        A|  |
    | +DM1 = (C-A)            |  | +DM1 = 0
    | -DM1 = 0               B|  | -DM1 = (B-D)
A|  |                            |
 |  |                           D|
B|  |
   D|

Case 5:                     Case 6:
A|                           A| C|
 | C| +DM1 = 0                |  |  +DM1 = 0
 |  | -DM1 = 0                |  |  -DM1 = 0
 | D|                         |  |
B|                           B| D|


Case 7:

   C|
A|  |
 |  | +DM=0
B|  | -DM=0
   D|
```

ADX

ADX Value	Trend Strength
0-25	Non-trending market or range-bound market
25-50	Strong trend
50-75	Very strong trend
75-100	Extremely strong trend (rarely happens and can be considered unsustainable)



PLUS_DI / MINOR_DI

$$-DI14 = \frac{-DM14}{TR14}$$

(Same thing for +DI14)

RSI

```
RSI = 100 * (prevGain/(prevGain+prevLoss))
```

策略

進場

1. Time: 9:15~13:25

2. ADX > 25，+DI > -DI 多單進場

   -DI > +DI 空單進場

```
Start                     2022-03-14 08:46:00
End                       2023-03-20 13:45:00
Duration                    371 days 04:59:00
Exposure Time [%]                   60.942436
Equity Final [$]                  25979.50912
Equity Peak [$]                 1224461.06689
Return [%]                         -94.804098
Buy & Hold Return [%]              -11.025582
Return (Ann.) [%]                  -94.423095
Volatility (Ann.) [%]               17.655774
Sharpe Ratio                              0.0
Sortino Ratio                             0.0
Calmar Ratio                              0.0
Max. Drawdown [%]                  -97.939343
Avg. Drawdown [%]                   -7.530406
Max. Drawdown Duration      257 days 02:17:00
Avg. Drawdown Duration        5 days 23:38:00
# Trades                                  460
Win Rate [%]                             40.0
Best Trade [%]                       1.877718
Worst Trade [%]                     -1.033341
Avg. Trade [%]                      -0.019879
Max. Trade Duration           0 days 04:08:00
Avg. Trade Duration           0 days 01:39:00
Profit Factor                        0.864667
Expectancy [%]                       -0.01921
SQN                                 -0.712733
_strategy                          myStrategy
_equity_curve                             ...
_trades                         Size  Entry...
dtype: object
```

```
adx_period = 14
    di_period = 14
```

策略

出場

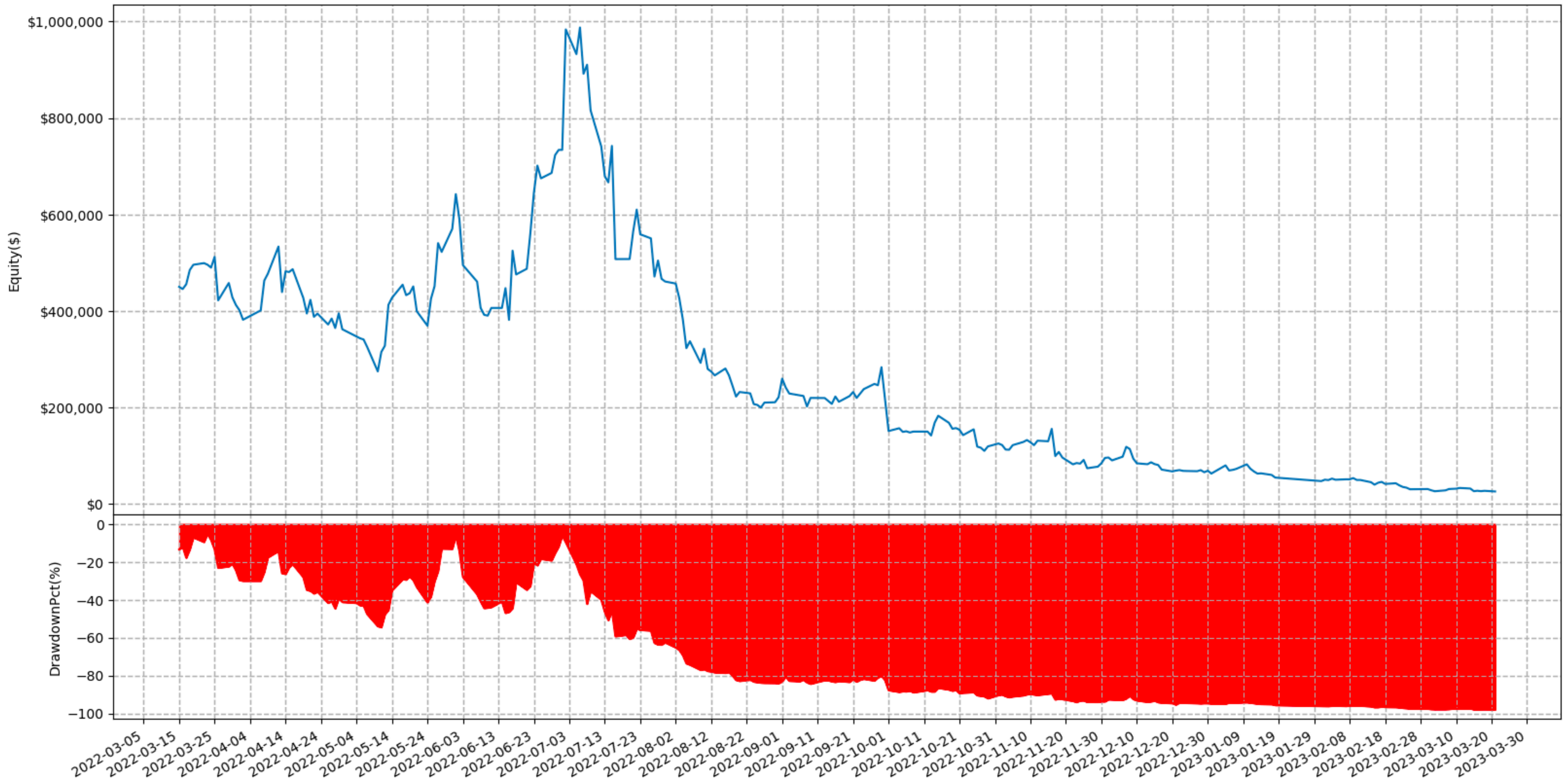
1. Time: >13:30
2. 停損/停利: 1%/3%
3. ADX < 25

Start	2022-03-14 08:46:00
End	2023-03-20 13:45:00
Duration	371 days 04:59:00
Exposure Time [%]	60.942436
Equity Final [$]	25979.50912
Equity Peak [$]	1224461.06689
Return [%]	-94.804098
Buy & Hold Return [%]	-11.025582
Return (Ann.) [%]	-94.423095
Volatility (Ann.) [%]	17.655774
Sharpe Ratio	0.0
Sortino Ratio	0.0
Calmar Ratio	0.0
Max. Drawdown [%]	-97.939343
Avg. Drawdown [%]	-7.530406
Max. Drawdown Duration	257 days 02:17:00
Avg. Drawdown Duration	5 days 23:38:00
# Trades	460
Win Rate [%]	40.0
Best Trade [%]	1.877718
Worst Trade [%]	-1.033341
Avg. Trade [%]	-0.019879
Max. Trade Duration	0 days 04:08:00
Avg. Trade Duration	0 days 01:39:00
Profit Factor	0.864667
Expectancy [%]	-0.01921
SQN	-0.712733
_strategy	myStrategy
_equity_curve	...
_trades	Size Entry...
dtype: object	

```
adx_period = 14
    di_period = 14
```

策略

```python
adx_period = 14
    di_period = 14
```



問題

結果慘烈 並且 DI與ADX計算重複性高 -> 改變指標

策略修正

```
adx_period = 14
rsi_period = 12
overbought = 75
oversold = 25
```

Start	2022-03-14 08:46:00
End	2023-03-20 13:45:00
Duration	371 days 04:59:00
Exposure Time [%]	81.72423
Equity Final [$]	409467.4
Equity Peak [$]	752679.66
Return [%]	-18.10652
Buy & Hold Return [%]	-11.025582
Return (Ann.) [%]	-18.708533
Volatility (Ann.) [%]	53.844069
Sharpe Ratio	0.0
Sortino Ratio	0.0
Calmar Ratio	0.0
Max. Drawdown [%]	-55.595545
Avg. Drawdown [%]	-2.204893
Max. Drawdown Duration	249 days 02:16:00
Avg. Drawdown Duration	3 days 11:04:00
# Trades	358
Win Rate [%]	50.27933
Best Trade [%]	2.034386
Worst Trade [%]	-1.048887
Avg. Trade [%]	-0.009077
Max. Trade Duration	0 days 04:13:00
Avg. Trade Duration	0 days 02:50:00
Profit Factor	0.962525
Expectancy [%]	-0.00766
SQN	-0.303073
_strategy	myStrategy
_equity_curve	...
_trades	Size Entry...
dtype: object	

進場

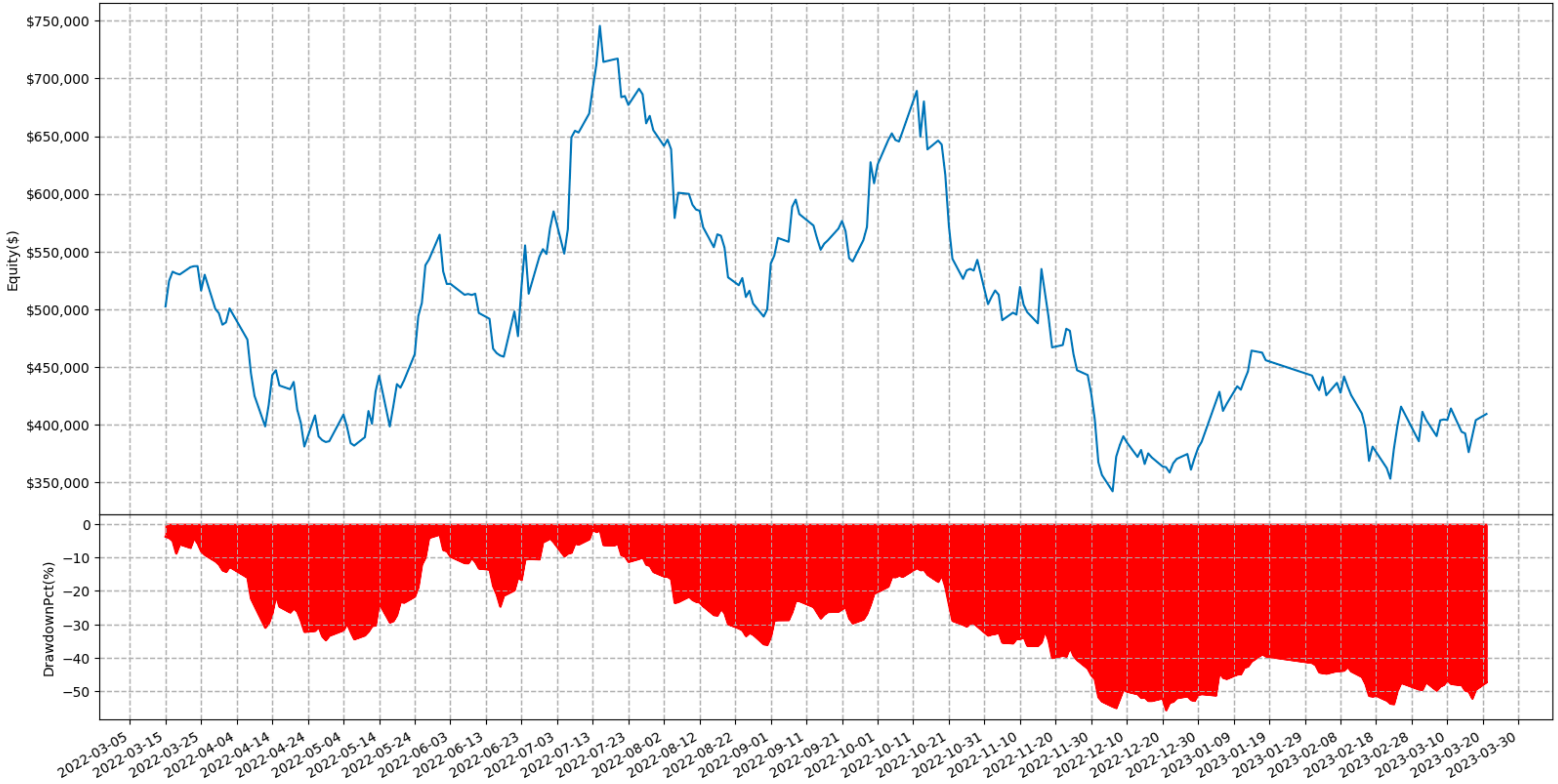
1. 改用RSI指標

2. ADX > 25 &

RSI>50，且RSI的斜率與Price斜率>0（沒有背離），多單進場

RSI<50 ，且RSI的斜率與Price斜率<0，空單進場

修正結果



Equity($)
$750,000
$700,000
$650,000
$600,000
$550,000
$500,000
$450,000
$400,000
$350,000
DrawdownPct(%)
0
−10
−20
−30
−40
−50
2022-03-05
2022-03-15
2022-03-25
2022-04-04
2022-04-14
2022-04-24
2022-05-04
2022-05-14
2022-05-24
2022-06-03
2022-06-13
2022-06-23
2022-07-03
2022-07-13
2022-07-23
2022-08-02
2022-08-12
2022-08-22
2022-09-01
2022-09-11
2022-09-21
2022-10-01
2022-10-11
2022-10-21
2022-10-31
2022-11-10
2022-11-20
2022-11-30
2022-12-10
2022-12-20
2022-12-30
2023-01-09
2023-01-19
2023-01-29
2023-02-08
2023-02-18
2023-02-28
2023-03-10
2023-03-20
2023-03-30

問題

MDD過大
Profit Factor太小
SQN極差
勝率與交易次數足夠

—>

增加獲利金額
RSI背離的問題改善

```
Start                         2022-03-14 08:46:00
End                           2023-03-20 13:45:00
Duration                        371 days 04:59:00
Exposure Time [%]                        81.72423
Equity Final [$]                         409467.4
Equity Peak [$]                         752679.66
Return [%]                              -18.10652
Buy & Hold Return [%]                  -11.025582
Return (Ann.) [%]                      -18.708533
Volatility (Ann.) [%]                   53.844069
Sharpe Ratio                                  0.0
Sortino Ratio                                 0.0
Calmar Ratio                                  0.0
Max. Drawdown [%]                      -55.595545
Avg. Drawdown [%]                       -2.204893
Max. Drawdown Duration          249 days 02:16:00
Avg. Drawdown Duration            3 days 11:04:00
# Trades                                      358
Win Rate [%]                             50.27933
Best Trade [%]                           2.034386
Worst Trade [%]                         -1.048887
Avg. Trade [%]                          -0.009077
Max. Trade Duration               0 days 04:13:00
Avg. Trade Duration               0 days 02:50:00
Profit Factor                            0.962525
Expectancy [%]                           -0.00766
SQN                                     -0.303073
_strategy                              myStrategy
_equity_curve                                 ...
_trades                             Size  Entry...
dtype: object
```

策略修正 +Diverse

```
adx_period = 30
rsi_period = 22
overbought = 80
oversold = 20
```

進場

1. 若RSI與Price背離，
   Price下降做多單/Price上升做空單

```
Start                     2022-03-14 08:50:00
End                       2023-03-20 13:45:00
Duration                    371 days 04:55:00
Exposure Time [%]                   43.627845
Equity Final [$]                   820799.306
Equity Peak [$]                    822813.264
Return [%]                          64.159861
Buy & Hold Return [%]              -11.123316
Return (Ann.) [%]                   65.143146
Volatility (Ann.) [%]               65.633056
Sharpe Ratio                         0.992536
Sortino Ratio                        2.803614
Calmar Ratio                         3.110435
Max. Drawdown [%]                  -20.943423
Avg. Drawdown [%]                   -1.825814
Max. Drawdown Duration      129 days 00:00:00
Avg. Drawdown Duration        4 days 12:29:00
# Trades                                  151
Win Rate [%]                        56.953642
Best Trade [%]                       2.556774
Worst Trade [%]                     -1.049257
Avg. Trade [%]                       0.069589
Max. Trade Duration           0 days 04:10:00
Avg. Trade Duration           0 days 03:31:00
Profit Factor                        1.372985
Expectancy [%]                        0.07137
SQN                                  1.450865
_strategy                          myStrategy
_equity_curve                             ...
_trades                         Size  Entry...
dtype: object
```

策略修正 +Diverse

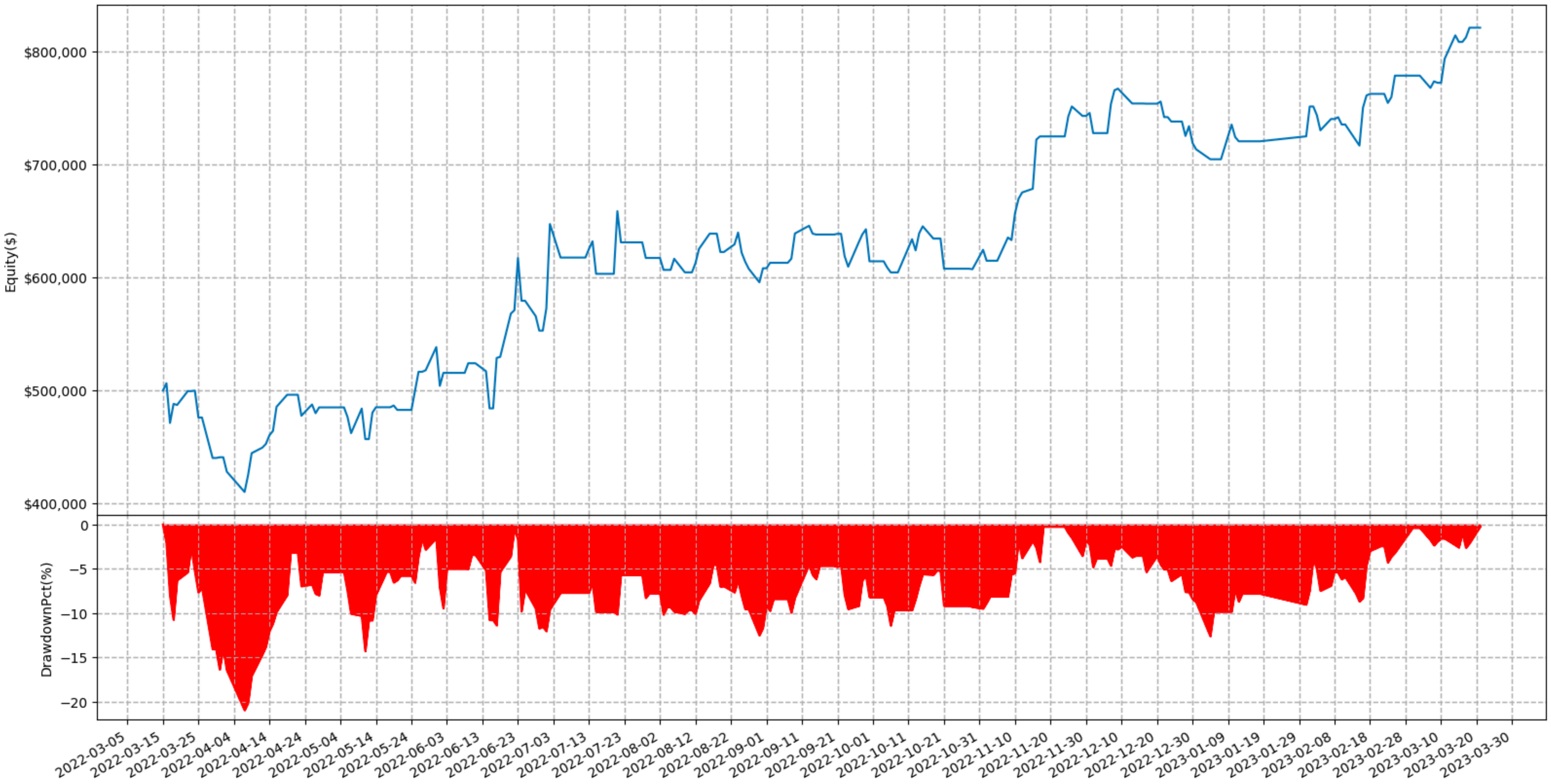
```
adx_period = 30
rsi_period = 22
overbought = 80
oversold = 20
```

出場

1. 停損停利: 1%/5%

```
Start                     2022-03-14 08:50:00
End                       2023-03-20 13:45:00
Duration                    371 days 04:55:00
Exposure Time [%]                   43.627845
Equity Final [$]                   820799.306
Equity Peak [$]                    822813.264
Return [%]                          64.159861
Buy & Hold Return [%]              -11.123316
Return (Ann.) [%]                   65.143146
Volatility (Ann.) [%]               65.633056
Sharpe Ratio                         0.992536
Sortino Ratio                        2.803614
Calmar Ratio                         3.110435
Max. Drawdown [%]                  -20.943423
Avg. Drawdown [%]                   -1.825814
Max. Drawdown Duration      129 days 00:00:00
Avg. Drawdown Duration        4 days 12:29:00
# Trades                                  151
Win Rate [%]                        56.953642
Best Trade [%]                       2.556774
Worst Trade [%]                     -1.049257
Avg. Trade [%]                       0.069589
Max. Trade Duration           0 days 04:10:00
Avg. Trade Duration           0 days 03:31:00
Profit Factor                        1.372985
Expectancy [%]                        0.07137
SQN                                  1.450865
_strategy                          myStrategy
_equity_curve                             ...
_trades                         Size  Entry...
dtype: object
```

策略修正結果



Equity($)
$800,000
$700,000
$600,000
$500,000
$400,000
DrawdownPct(%)
0
−5
−10
−15
−20
2022-03-05
2022-03-15
2022-03-25
2022-04-04
2022-04-14
2022-04-24
2022-05-04
2022-05-14
2022-05-24
2022-06-03
2022-06-13
2022-06-23
2022-07-03
2022-07-13
2022-07-23
2022-08-02
2022-08-12
2022-08-22
2022-09-01
2022-09-11
2022-09-21
2022-10-01
2022-10-11
2022-10-21
2022-10-31
2022-11-10
2022-11-20
2022-11-30
2022-12-10
2022-12-20
2022-12-30
2023-01-09
2023-01-19
2023-01-29
2023-02-08
2023-02-18
2023-02-28
2023-03-10
2023-03-20
2023-03-30

問題

MDD過大
交易次數過少
SQN, PF需要再提升
勝率足夠

—>

改變停損停利
增加入場條件

Start	2022-03-14 08:50:00
End	2023-03-20 13:45:00
Duration	371 days 04:55:00
Exposure Time [%]	43.627845
Equity Final [$]	820799.306
Equity Peak [$]	822813.264
Return [%]	64.159861
Buy & Hold Return [%]	-11.123316
Return (Ann.) [%]	65.143146
Volatility (Ann.) [%]	65.633056
Sharpe Ratio	0.992536
Sortino Ratio	2.803614
Calmar Ratio	3.110435
Max. Drawdown [%]	-20.943423
Avg. Drawdown [%]	-1.825814
Max. Drawdown Duration	129 days 00:00:00
Avg. Drawdown Duration	4 days 12:29:00
# Trades	151
Win Rate [%]	56.953642
Best Trade [%]	2.556774
Worst Trade [%]	-1.049257
Avg. Trade [%]	0.069589
Max. Trade Duration	0 days 04:10:00
Avg. Trade Duration	0 days 03:31:00
Profit Factor	1.372985
Expectancy [%]	0.07137
SQN	1.450865
_strategy	myStrategy
_equity_curve	...
_trades	Size Entry...
dtype: object	

策略修正 three-line-in-strike

```
adx_period = 30
rsi_period = 14
overbought = 80
oversold = 20
```

進場

1. 如果出現three black crow，做空
2. 如果出現three white solider，做多

```
Start                     2022-03-14 08:50:00
End                       2023-03-20 13:45:00
Duration                    371 days 04:55:00
Exposure Time [%]                   39.310576
Equity Final [$]                   757363.922
Equity Peak [$]                    772661.744
Return [%]                          51.472784
Buy & Hold Return [%]              -11.123316
Return (Ann.) [%]                   52.232477
Volatility (Ann.) [%]               51.639257
Sharpe Ratio                         1.011488
Sortino Ratio                        2.684296
Calmar Ratio                         2.897958
Max. Drawdown [%]                  -18.023891
Avg. Drawdown [%]                   -2.299293
Max. Drawdown Duration      117 days 03:40:00
Avg. Drawdown Duration        6 days 00:26:00
# Trades                                  192
Win Rate [%]                        49.479167
Best Trade [%]                       2.893377
Worst Trade [%]                     -0.549013
Avg. Trade [%]                       0.042887
Max. Trade Duration           0 days 04:05:00
Avg. Trade Duration           0 days 02:28:00
Profit Factor                        1.265708
Expectancy [%]                       0.044116
SQN                                  1.251828
_strategy                          myStrategy
_equity_curve                             ...
_trades                         Size  Entry...
dtype: object
```

策略修正 three-line-in-strike

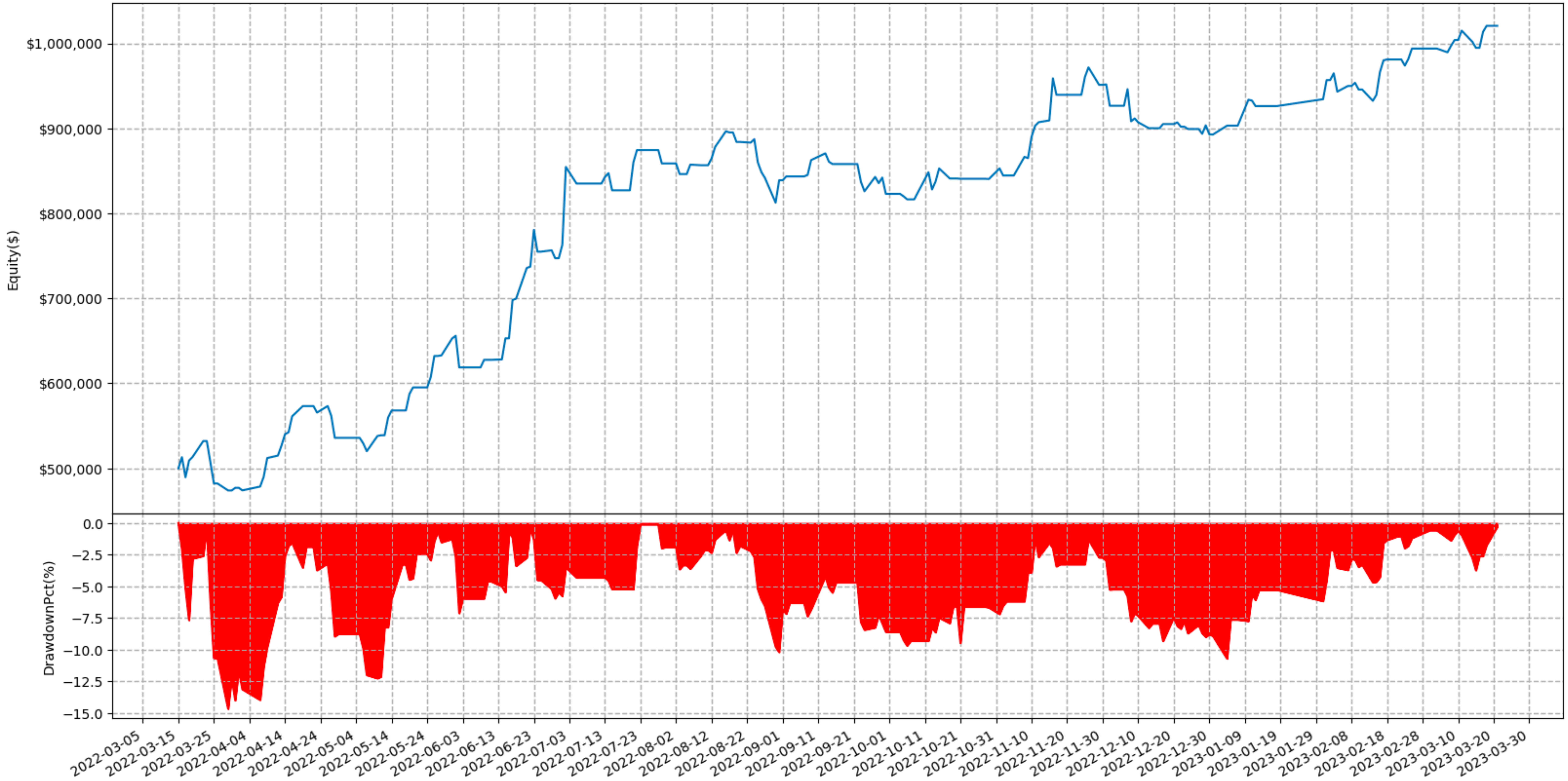
```
adx_period = 30
rsi_period = 14
overbought = 80
oversold = 20
```

進場

1. 停損停利：0.3%/5%

```
Start                     2022-03-14 08:50:00
End                       2023-03-20 13:45:00
Duration                    371 days 04:55:00
Exposure Time [%]                   39.310576
Equity Final [$]                   757363.922
Equity Peak [$]                    772661.744
Return [%]                          51.472784
Buy & Hold Return [%]              -11.123316
Return (Ann.) [%]                   52.232477
Volatility (Ann.) [%]               51.639257
Sharpe Ratio                         1.011488
Sortino Ratio                        2.684296
Calmar Ratio                         2.897958
Max. Drawdown [%]                  -18.023891
Avg. Drawdown [%]                   -2.299293
Max. Drawdown Duration      117 days 03:40:00
Avg. Drawdown Duration        6 days 00:26:00
# Trades                                  192
Win Rate [%]                        49.479167
Best Trade [%]                       2.893377
Worst Trade [%]                     -0.549013
Avg. Trade [%]                       0.042887
Max. Trade Duration           0 days 04:05:00
Avg. Trade Duration           0 days 02:28:00
Profit Factor                        1.265708
Expectancy [%]                       0.044116
SQN                                  1.251828
_strategy                          myStrategy
_equity_curve                             ...
_trades                         Size  Entry...
dtype: object
```

修正結果



$1,000,000
$900,000
$800,000
$700,000
$600,000
$500,000
Equity($)
0.0
−2.5
−5.0
−7.5
−10.0
−12.5
−15.0
DrawdownPct(%)
2022-03-05
2022-03-15
2022-03-25
2022-04-04
2022-04-14
2022-04-24
2022-05-04
2022-05-14
2022-05-24
2022-06-03
2022-06-13
2022-06-23
2022-07-03
2022-07-13
2022-07-23
2022-08-02
2022-08-12
2022-08-22
2022-09-01
2022-09-11
2022-09-21
2022-10-01
2022-10-11
2022-10-21
2022-10-31
2022-11-10
2022-11-20
2022-11-30
2022-12-10
2022-12-20
2022-12-30
2023-01-09
2023-01-19
2023-01-29
2023-02-08
2023-02-18
2023-02-28
2023-03-10
2023-03-20
2023-03-30

問題

MDD過大
SQN, PF需要再提升

—>　再增加獲利比例

Start	2022-03-14 08:50:00
End	2023-03-20 13:45:00
Duration	371 days 04:55:00
Exposure Time [%]	39.310576
Equity Final [$]	757363.922
Equity Peak [$]	772661.744
Return [%]	51.472784
Buy & Hold Return [%]	-11.123316
Return (Ann.) [%]	52.232477
Volatility (Ann.) [%]	51.639257
Sharpe Ratio	1.011488
Sortino Ratio	2.684296
Calmar Ratio	2.897958
Max. Drawdown [%]	-18.023891
Avg. Drawdown [%]	-2.299293
Max. Drawdown Duration	117 days 03:40:00
Avg. Drawdown Duration	6 days 00:26:00
# Trades	192
Win Rate [%]	49.479167
Best Trade [%]	2.893377
Worst Trade [%]	-0.549013
Avg. Trade [%]	0.042887
Max. Trade Duration	0 days 04:05:00
Avg. Trade Duration	0 days 02:28:00
Profit Factor	1.265708
Expectancy [%]	0.044116
SQN	1.251828
_strategy	myStrategy
_equity_curve	...
_trades	Size Entry...
dtype: object	

最終策略

```
adx_period = 30
rsi_period = 22
overbought = 70
oversold = 30
```

進場

1. Time: 9:15~13:15 (避免收盤前再進行交易)
2. RSI>overbought & ADX下破25，空單
3. RSI<oversold & ADX下破25，多單
4. RSI下破overbought & ADX突破25，空單
5. RSI突破oversold & ADX突破25，多單
6. RSI>45，ADX>25，RSI沒背離，多單
7. RSI<55，ADX>25，RSI沒背離，空單
8. ADX>25，RSI背離 -> 價錢反向做多/做空
9. Three White Soldier，ADX>25，多單
10. Three Black Crow，ADX>25，空單

```
Start                     2022-03-14 08:50:00
End                       2023-03-20 13:45:00
Duration                    371 days 04:55:00
Exposure Time [%]                    41.67336
Equity Final [$]                 1020623.1416
Equity Peak [$]                  1023724.5968
Return [%]                         104.124628
Buy & Hold Return [%]              -11.123316
Return (Ann.) [%]                  105.887076
Volatility (Ann.) [%]               61.809095
Sharpe Ratio                         1.713131
Sortino Ratio                        6.538486
Calmar Ratio                         7.214156
Max. Drawdown [%]                  -14.677681
Avg. Drawdown [%]                   -1.429721
Max. Drawdown Duration       86 days 21:40:00
Avg. Drawdown Duration        3 days 01:11:00
# Trades                                  207
Win Rate [%]                        55.555556
Best Trade [%]                       3.141716
Worst Trade [%]                      -0.71694
Avg. Trade [%]                       0.081582
Max. Trade Duration           0 days 04:10:00
Avg. Trade Duration           0 days 02:26:00
Profit Factor                        1.580888
Expectancy [%]                       0.082872
SQN                                  2.376047
_strategy                          myStrategy
_equity_curve                             ...
_trades                         Size  Entry...
dtype: object
```

最終策略

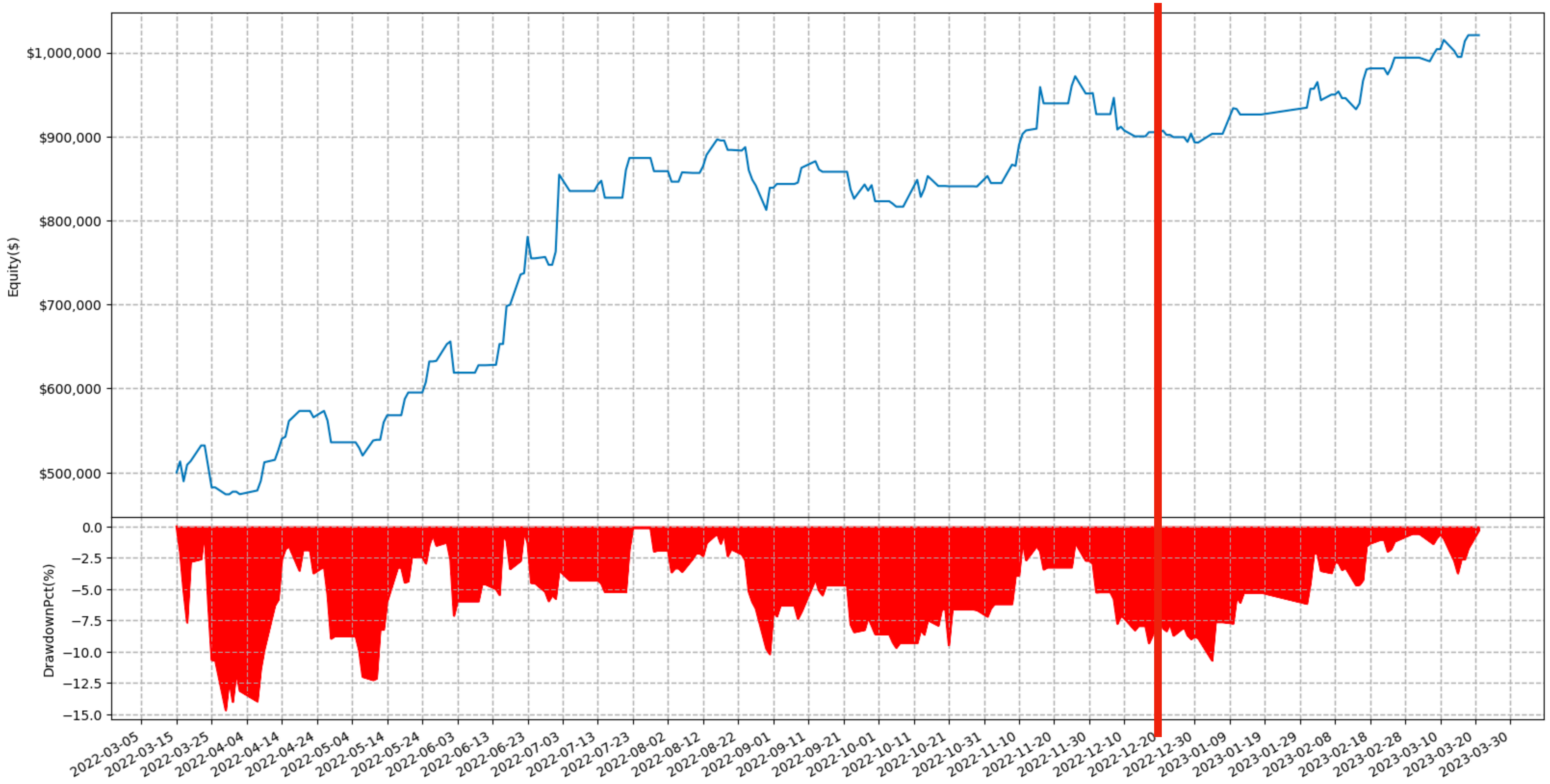
```
adx_period = 30
rsi_period = 22
overbought = 70
oversold = 30
```

出場

1. Time: >13:30
2. 停損停利：0.7%/3.5%
3. 已經持有單，但前述進場條件與持單相反時

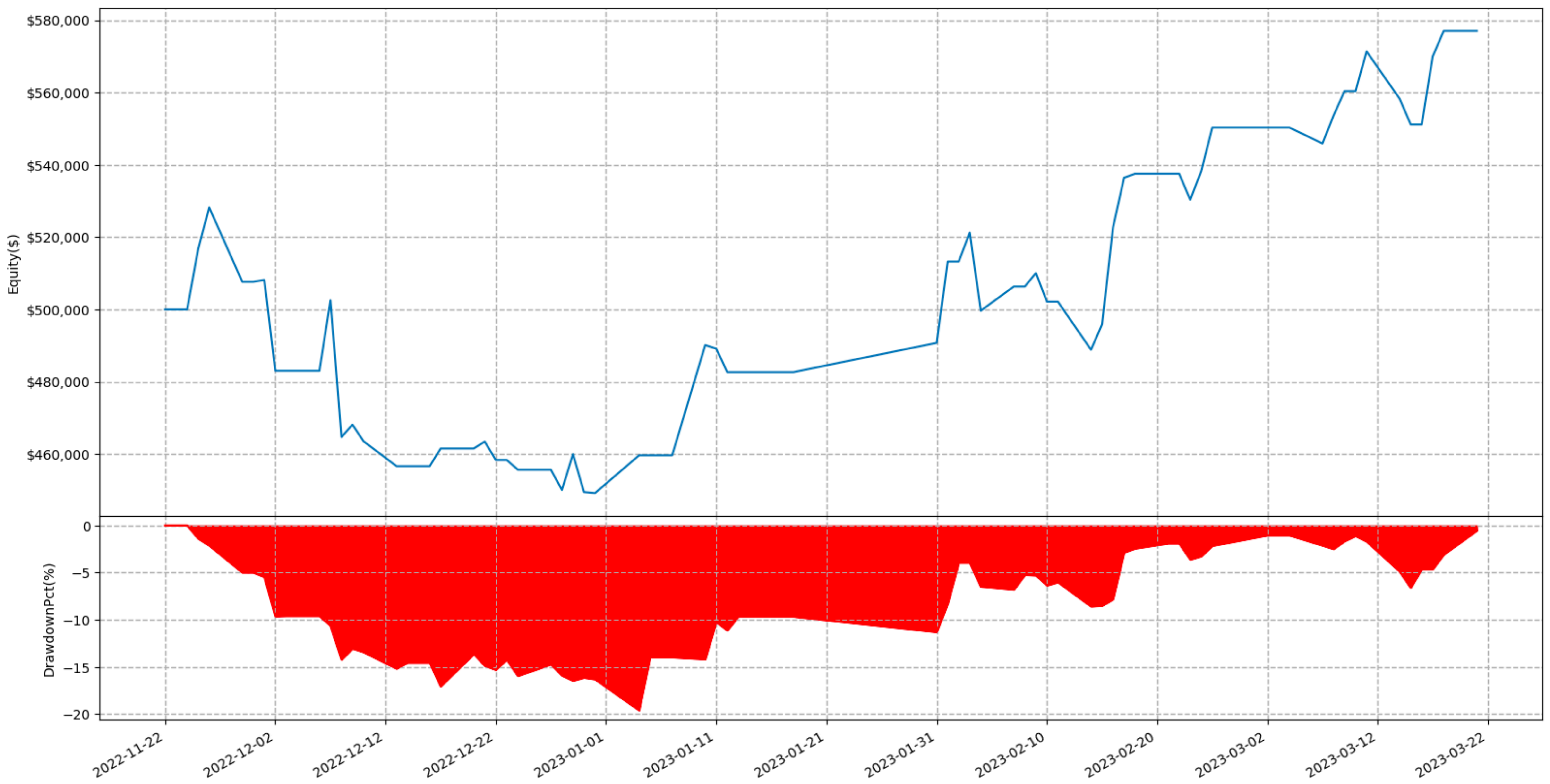
Start	2022-03-14 08:50:00
End	2023-03-20 13:45:00
Duration	371 days 04:55:00
Exposure Time [%]	41.67336
Equity Final [$]	1020623.1416
Equity Peak [$]	1023724.5968
Return [%]	104.124628
Buy & Hold Return [%]	-11.123316
Return (Ann.) [%]	105.887076
Volatility (Ann.) [%]	61.809095
Sharpe Ratio	1.713131
Sortino Ratio	6.538486
Calmar Ratio	7.214156
Max. Drawdown [%]	-14.677681
Avg. Drawdown [%]	-1.429721
Max. Drawdown Duration	86 days 21:40:00
Avg. Drawdown Duration	3 days 01:11:00
# Trades	207
Win Rate [%]	55.555556
Best Trade [%]	3.141716
Worst Trade [%]	-0.71694
Avg. Trade [%]	0.081582
Max. Trade Duration	0 days 04:10:00
Avg. Trade Duration	0 days 02:26:00
Profit Factor	1.580888
Expectancy [%]	0.082872
SQN	2.376047
_strategy	myStrategy
_equity_curve	...
_trades	Size Entry...
dtype: object	

最終結果




```
Start                         2022-03-14 08:50:00
End                           2023-03-20 13:45:00
Duration                        371 days 04:55:00
Exposure Time [%]                        41.67336
Equity Final [$]                     1020623.1416
Equity Peak [$]                      1023724.5968
Return [%]                             104.124628
Buy & Hold Return [%]                  -11.123316
Return (Ann.) [%]                      105.887076
Volatility (Ann.) [%]                   61.809095
Sharpe Ratio                             1.713131
Sortino Ratio                            6.538486
Calmar Ratio                             7.214156
Max. Drawdown [%]                      -14.677681
Avg. Drawdown [%]                       -1.429721
Max. Drawdown Duration        86 days 21:40:00
Avg. Drawdown Duration         3 days 01:11:00
# Trades                                      207
Win Rate [%]                            55.555556
Best Trade [%]                           3.141716
Worst Trade [%]                          -0.71694
Avg. Trade [%]                           0.081582
Max. Trade Duration            0 days 04:10:00
Avg. Trade Duration            0 days 02:26:00
Profit Factor                            1.580888
Expectancy [%]                           0.082872
SQN                                      2.376047
_strategy                              myStrategy
_equity_curve                                 ...
_trades                              Size  Entry...
dtype: object
```

樣本外




```
Start                     2022-11-21 08:50:00
End                       2023-03-20 13:45:00
Duration                    119 days 04:55:00
Exposure Time [%]                        42.8
Equity Final [$]                  577080.7068
Equity Peak [$]                    580182.162
Return [%]                          15.416141
Buy & Hold Return [%]                6.028002
Return (Ann.) [%]                   61.888355
Volatility (Ann.) [%]               55.686867
Sharpe Ratio                         1.111364
Sortino Ratio                        2.781623
Calmar Ratio                         3.156037
Max. Drawdown [%]                  -19.609518
Avg. Drawdown [%]                    -1.87396
Max. Drawdown Duration       80 days 00:55:00
Avg. Drawdown Duration        4 days 03:31:00
# Trades                                   62
Win Rate [%]                         54.83871
Best Trade [%]                       1.069565
Worst Trade [%]                     -0.710282
Avg. Trade [%]                       0.038782
Max. Trade Duration           0 days 04:10:00
Avg. Trade Duration           0 days 02:31:00
Profit Factor                        1.303224
Expectancy [%]                       0.039567
SQN                                  0.822876
_strategy                          myStrategy
_equity_curve                             ...
_trades                         Size  EntryB...
dtype: object
```