# 国泰君安191因子回测-81-90

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# 1 Alpha81

$$Alpha = SMA(VOLUME, 21, 2) \tag{1}$$

```
dates          long(M) short(M) pnl(M)  %ret    %tvr   shrp (IR)      %dd   %win  bpmrgn fitness Coverage     %posret %inxret %negret IC
20100104-20101231 10.0  -10.0   -4.0    -20.69  5.2    -3.68(-0.233) 41.12 0.34  -159.08 -7.34   555 X 1260   -24.07  14.01   -17.31  -0.0142
20110101-20111231 10.0  -10.0   -1.43   -7.33   3.85   -1.99(-0.126) 22.85 0.43  -76.18  -2.75   614 X 1532   -44.53  -39.34  29.87   -0.0061
20120101-20121231 10.0  -10.0   -2.06   -10.59  3.47   -3.67(-0.232) 25.41 0.35  -122.18 -6.41   688 X 1685   -9.86   3.25    -11.32  -0.0114
20130101-20131231 10.0  -10.0   -4.1    -21.51  2.49   -5.83(-0.369) 41.65 0.29  -345.58 -17.13  703 X 1744   -8.18   19.03   -34.84  -0.0167
20140101-20141231 10.0  -9.99   0.58    2.94    3.27   0.54(0.034)   20.71 0.38  35.98   0.51    783 X 1728   56.49   35.54   -50.68  -0.003
20150101-20151231 10.0  -9.95   -4.91   -25.24  2.17   -3.21(-0.203) 50.62 0.32  -465.45 -10.96  857 X 1847   16.59   46.78   -67.24  -0.0126
20160101-20161231 10.0  -9.93   -2.28   -11.69  2.87   -4.24(-0.268) 26.8  0.36  -163.4  -8.57   933 X 1932   -25.67  -15.42  2.36    -0.0106
20170101-20171231 9.99  -9.94   -0.84   -4.28   2.87   -1.38(-0.087) 12.59 0.45  -59.77  -1.69   981 X 2268   -19.73  0.88    11.22   -0.0041
20180101-20181231 10.0  -9.98   -2.41   -12.38  2.62   -3.61(-0.228) 30.5  0.38  -189.52 -7.84   1031 X 2482  -59.03  -38.75  34.3    -0.0083
20190101-20191231 10.0  -9.97   -2.85   -14.61  3.15   -5.02(-0.318) 29.87 0.31  -185.61 -10.81  1084 X 2533  0.26    26.71   -29.54  -0.0102
20200101-20200331 10.0  -9.97   -0.51   -11.09  3.41   -3.02(-0.191) 8.66  0.33  -129.92 -5.44   1109 X 2580  -39.87  -12.47  17.8    -0.0089

20100104-20200331 10.0  -9.98   -24.81  -12.47  3.2    -2.81(-0.178) 248.1 0.36  -155.88 -5.54   830 X 1918   -12.38  4.85    -12.57  -0.0097
```

Figure 1: 回测结果



Figure 2: 相关性结果

# 2 Alpha82

$$Alpha = SMA((TSMAX(HIGH, 6) - CLOSE)/(TSMAX(HIGH, 6) - TSMIN(LOW, 6)) * 100, 15, 1) \tag{2}$$

```
dates          long(M) short(M) pnl(M) %ret   %tvr   shrp (IR)     %dd   %win  bpmrgn fitness Coverage     %posret %inxret %negret IC
20100104-20101231 10.0  -9.99   1.55   8.01   17.03  1.64(0.103)   5.86  0.53  18.83  1.12    927 X 881    16.47   14.01   -0.44   0.0138
20110101-20111231 10.0  -10.0   0.93   4.77   15.33  1.04(0.066)   6.87  0.54  12.46  0.58    1139 X 1001  -30.99  -39.34  40.55   0.0132
20120101-20121231 10.0  -9.99   2.74   14.11  15.44  3.55(0.225)   6.49  0.62  36.57  3.4     1265 X 1105  16.08   3.25    12.15   0.0292
20130101-20131231 10.01 -9.97   1.42   7.45   16.15  1.79(0.113)   8.6   0.58  18.45  1.22    1293 X 1154  33.95   19.03   -19.14  0.0114
20140101-20141231 10.02 -9.87   0.78   4.03   15.48  1.13(0.072)   8.48  0.56  10.38  0.58    1307 X 1204  42.59   35.54   -35.15  0.007
20150101-20151231 10.04 -9.61   7.36   38.63  15.47  3.43(0.217)   25.95 0.63  99.2   5.42    1422 X 1282  112.12  46.78   -38.65  0.0347
20160101-20161231 10.0  -9.61   2.81   14.51  14.92  3.25(0.206)   4.99  0.59  39.34  3.21    1518 X 1347  -1.26   -15.42  31.25   0.0222
20170101-20171231 10.0  -9.68   0.27   1.4    14.35  0.35(0.022)   6.55  0.56  3.88   0.11    1720 X 1528  -22.41  0.88    25.98   0.0063
20180101-20181231 9.96  -9.95   1.45   7.47   14.78  1.78(0.113)   7.3   0.58  20.27  1.27    1810 X 1703  -41.3   -38.75  56.31   0.0146
20190101-20191231 10.0  -9.93   2.23   11.45  16.03  3.31(0.209)   4.81  0.6   28.61  2.79    1914 X 1703  28.97   26.71   -6.15   0.0168
20200101-20200331 10.01 -9.92   0.07   1.52   15.88  0.28(0.018)   8.22  0.53  3.86   0.09    1912 X 1776  -17.81  -12.47  21.05   0.0047

20100104-20200331 10.0  -9.86   21.61  10.97  15.51  2.05(0.129)   26.04 0.58  28.19  1.72    1443 X 1303  14.7    4.85    7.1     0.0166
```

Figure 3: 回测结果



Figure 4: 相关性结果

# 3 Alpha83

$$Alpha = (-1 * RANK(COVIANCE(RANK(HIGH), RANK(VOLUME), 5)))  \quad (3)$$

```
dates              long(M) short(M) pnl(M)  %ret    %tvr   shrp (IR)     %dd    %win  bpmrgn fitness Coverage      %posret %inxret %negret IC
20100104-20101231  10.0    -10.0    2.01    10.36   59.03  4.53(0.286)   2.14   0.57  7.02   1.9     830 X 828     22.02   14.01   -1.29   0.0179
20110101-20111231  10.0    -10.0    2.6     13.32   59.43  7.67(0.485)   0.76   0.68  8.96   3.63    980 X 980     -22.46  -39.34  49.09   0.0249
20120101-20121231  10.0    -10.0    2.33    11.97   57.29  6.6(0.417)    1.08   0.65  8.36   3.02    1113 X 1114   16.6    3.25    7.34    0.0228
20130101-20131231  10.0    -10.0    1.89    9.93    55.83  5.29(0.335)   1.14   0.65  7.11   2.23    1168 X 1165   35.82   19.03   -15.95  0.0171
20140101-20141231  10.0    -9.99    2.07    10.58   57.34  5.46(0.345)   2.94   0.62  7.38   2.34    1137 X 1142   48.92   35.54   -27.78  0.0162
20150101-20151231  9.95    -9.98    2.46    12.6    59.64  3.41(0.216)   4.59   0.59  8.49   1.57    1126 X 1130   85.02   46.78   -59.5   0.0149
20160101-20161231  9.97    -9.99    2.47    12.68   55.95  6.52(0.412)   1.6    0.68  9.07   3.1     1286 X 1293   1.2     -15.42  24.16   0.0225
20170101-20171231  9.98    -9.98    3.12    16.03   57.19  7.96(0.503)   1.03   0.69  11.21  4.21    1496 X 1504   -3.12   0.88    35.19   0.0282
20180101-20181231  9.99    -9.98    2.39    12.33   55.06  6.36(0.402)   1.41   0.65  8.96   3.01    1663 X 1669   -26.22  -38.75  50.91   0.0202
20190101-20191231  9.98    -9.99    2.61    13.39   53.71  7.23(0.457)   1.09   0.69  9.98   3.61    1793 X 1800   34.1    26.71   -7.29   0.0206
20200101-20200331  9.97    -10.0    0.07    1.5     54.12  0.53(0.034)   3.15   0.45  1.12   0.09    1825 X 1849   -9.22   -12.47  12.22   0.0041

20100104-20200331  9.99    -9.99    24.03   12.07   56.98  5.48(0.347)   4.57   0.64  8.48   2.52    1273 X 1276   18.49   4.85    5.67    0.0201
```

Figure 5: 回测结果

| Corr   | ISSharpe | SemiOS | OSSharpe | Fitness | OSdays | ID            |
|--------|----------|--------|----------|---------|--------|---------------|
| 0.7295 | 4.31     | 5.92   | 4.14     | 1.74    | 175    | 211930_h_ori42 |
| 0.7237 | 4.92     | 7.75   | 2.55     | 2.24    | 175    | 211930_h_ori40 |
| 0.7023 | 7.71     | 7.82   | 4.5      | 6.65    | 133    | 213652_h1513  |

Figure 6: 相关性结果

# 4 Alpha84

$$Alpha = SUM((CLOSE > DELAY(CLOSE, 1)?VOLUME : (CLOSE < DELAY(CLOSE, 1)? - VOLUME : 0)), 20)  \quad (4)$$

```
dates              long(M) short(M) pnl(M)  %ret    %tvr   shrp (IR)      %dd     %win  bpmrgn  fitness Coverage     %posret %inxret %negret IC
20100104-20101231  10.0    -10.0    -3.09   -15.98  14.76  -3.03(-0.192)  32.82   0.35  -43.29  -3.16   298 X 628    -9.91   14.01   -22.04  -0.0165
20110101-20111231  10.0    -10.0    -2.03   -10.4   15.71  -2.76(-0.175)  27.5    0.41  -26.49  -2.25   308 X 725    -49.95  -39.34  29.14   -0.0098
20120101-20121231  10.0    -10.0    -2.56   -13.2   15.6   -4.31(-0.273)  31.06   0.4   -33.83  -3.97   327 X 773    -15.23  3.25    -11.16  -0.0154
20130101-20131231  10.0    -10.0    -4.06   -21.33  12.92  -5.13(-0.324)  41.37   0.35  -66.02  -6.59   392 X 927    -6.97   19.03   -35.67  -0.0161
20140101-20141231  10.0    -10.0    0.23    1.16    14.38  0.2(0.013)     25.29   0.4   3.24    0.06    410 X 848    47.32   35.54   -44.98  -0.0051
20150101-20151231  10.0    -10.0    -4.64   -23.79  9.7    -2.73(-0.173)  47.44   0.32  -98.11  -4.28   541 X 1114   14.16   46.78   -61.75  -0.0133
20160101-20161231  10.0    -10.0    -2.49   -12.74  11.82  -3.43(-0.217)  30.41   0.36  -43.09  -3.56   544 X 1110   -29.62  -15.42  4.15    -0.0109
20170101-20171231  10.0    -10.0    -1.73   -8.87   12.7   -2.04(-0.129)  21.6    0.47  -27.95  -1.7    534 X 1195   -32.55  0.88    14.81   -0.0069
20180101-20181231  10.0    -10.0    -3.01   -15.51  12.04  -3.7(-0.234)   38.02   0.39  -51.5   -4.19   578 X 1322   -63.18  -38.75  32.16   -0.0106
20190101-20191231  10.0    -10.0    -3.44   -17.64  12.02  -4.55(-0.288)  40.85   0.36  -58.69  -5.51   607 X 1377   -1.63   26.71   -33.65  -0.013
20200101-20200331  10.0    -10.0    -0.72   -15.5   10.42  -3.96(-0.251)  7.98    0.34  -59.51  -4.83   701 X 1566   -43.01  -12.47  12.03   -0.0095

20100104-20200331  10.0    -10.0    -27.56  -13.84  13.1   -2.8(-0.177)   275.57  0.38  -42.26  -2.88   460 X 1015   -15.39  4.85    -12.29  -0.0117
```

Figure 7: 回测结果

| -0.6714 | 5.4  | 4.91 | 3.16 | 8.78 | 136 | 213518_h388  |
|---------|------|------|------|------|-----|--------------|
| -0.684  | 4.52 | 4.94 | 2.6  | 7.69 | 175 | 211919_my_47 |
| -0.7539 | 2.7  | 6.47 | 5.83 | 1.68 | 136 | 213518_h4838 |

Figure 8: 相关性结果

# 5 Alpha85

$$Alpha = (TSRANK((VOLUME/MEAN(VOLUME, 20)), 20) * TSRANK((-1 * DELTA(CLOSE, 7)), 8)) \quad (5)$$

```
dates             long(M) short(M) pnl(M)  %ret    %tvr    shrp (IR)       %dd    %win  bpmrgn fitness Coverage       %posret %inxret %negret IC
20100104-20101231 10.0    -10.0    1.82    9.41    99.42   3.47(0.22)      3.13   0.62  3.79   1.07    513 X 788      26.1    14.01   -7.28   0.0156
20110101-20111231 10.0    -10.0    2.04    10.47   98.56   5.1(0.322)      3.75   0.62  4.25   1.66    621 X 938      -21.41  -39.34  42.35   0.0177
20120101-20121231 10.0    -10.0    1.33    6.83    97.84   3.61(0.228)     3.3    0.63  2.79   0.95    768 X 1155     13.27   3.25    0.4     0.0133
20130101-20131231 10.0    -10.0    2.88    15.14   98.08   8.2(0.518)      1.18   0.71  6.17   3.22    864 X 1384     44.11   19.03   -13.85  0.0236
20140101-20141231 10.0    -10.0    2.95    15.04   98.5    6.66(0.421)     1.45   0.72  6.11   2.6     845 X 1316     56.22   35.54   -26.15  0.0233
20150101-20151231 10.02   -9.96    3.01    15.4    99.63   3.08(0.195)     11.45  0.65  6.2    1.21    807 X 1228     92.55   46.78   -62.11  0.0189
20160101-20161231 10.0    -10.0    1.87    9.59    100.08  4.26(0.269)     4.14   0.7   3.83   1.32    980 X 1470     -1.08   -15.42  20.27   0.0167
20170101-20171231 10.0    -10.0    2.02    10.33   96.22   6.01(0.38)      1.37   0.68  4.29   1.97    1143 X 1742    -3.78   0.88    24.45   0.0183
20180101-20181231 10.0    -9.99    1.52    7.85    94.62   3.76(0.238)     2.17   0.62  3.32   1.08    1298 X 1951    -27.34  -38.75  43.08   0.013
20190101-20191231 10.01   -9.99    0.47    2.39    94.27   1.34(0.085)     3.39   0.5   1.02   0.21    1399 X 2154    26.61   26.71   -21.87  0.0038
20200101-20200331 10.0    -9.98    -0.56   -12.13  95.58   -4.12(-0.261)   6.73   0.41  -5.08  -1.47   1430 X 2219    -30.88  -12.47  6.65    -0.0129

20100104-20200331 10.0    -9.99    19.35   9.72    97.67   3.78(0.239)     11.47  0.64  3.98   1.19    936 X 1432     19.31   4.85    0.11    0.0157
```

Figure 9: 回测结果

| Corr | ISSharpe | SemiOS | OSSharpe | Fitness | OSdays | ID |
|------|----------|--------|----------|---------|--------|----|
| 0.4776 | 2.97 | 2.8 | -4.01 | 1.3 | 129 | 213793_v1v2_191003_35 |
| 0.3886 | 5.3 | 3.1 | -0.49 | 2.76 | 133 | 213652_h16335 |
| 0.3849 | 4.47 | 6.57 | 1.76 | 2.05 | 100 | 214873_pv_model_7_gen2_191114_68 |

Figure 10: 相关性结果

# 6 Alpha86

$$
\begin{aligned}
Alpha = &((0.25 < (((DELAY(CLOSE, 20) - DELAY(CLOSE, 10))/10) - \\
&((DELAY(CLOSE, 10) - CLOSE)/10)))?(-1 * 1) : \\
&(((((DELAY(CLOSE, 20) - DELAY(CLOSE, 10))/10) - \\
&((DELAY(CLOSE, 10) - CLOSE)/10)) < 0)?1 : ((-1 * 1)* \\
&(CLOSE - DELAY(CLOSE, 1)))))
\end{aligned}
\quad (6)
$$

```
dates             long(M) short(M) pnl(M)  %ret    %tvr    shrp (IR)       %dd    %win  bpmrgn fitness Coverage       %posret %inxret %negret IC
20100104-20101231 10.0    -9.99    2.95    15.23   90.2    4.21(0.266)     3.2    0.6   6.75   1.73    1055 X 759     26.64   14.01   3.81    0.0221
20110101-20111231 10.0    -10.0    1.54    7.9     86.44   2.98(0.188)     3.28   0.58  3.65   0.9     1315 X 830     -32.79  -39.34  48.58   0.0145
20120101-20121231 10.0    -9.99    2.03    10.47   84.99   4.5(0.285)      2.86   0.62  4.92   1.58    1426 X 947     10.58   3.25    10.33   0.0185
20130101-20131231 10.0    -9.98    1.94    10.21   81.3    3.98(0.252)     2.53   0.57  5.02   1.41    1474 X 972     34.01   19.03   -13.65  0.0162
20140101-20141231 10.0    -9.93    2.84    14.55   80.39   5.63(0.356)     2.46   0.67  7.23   2.4     1458 X 1051    46.07   35.54   -17.21  0.0211
20150101-20151231 9.99    -9.75    4.28    21.92   82.72   2.07(0.131)     18.34  0.63  10.73  1.07    1418 X 1284    85.3    46.78   -42.48  0.0149
20160101-20161231 9.98    -9.65    1.59    7.89    82.57   1.73(0.109)     10.65  0.63  4.01   0.53    1631 X 1233    -10.2   -15.42  27.37   0.0138
20170101-20171231 9.97    -9.75    0.7     3.64    77.1    1.4(0.088)      3.0    0.53  1.89   0.3     1869 X 1380    -18.93  0.88    26.71   0.0076
20180101-20181231 9.99    -9.93    2.95    15.27   81.39   4.46(0.282)     3.55   0.59  7.49   1.93    2117 X 1395    -40.72  -38.75  71.53   0.0162
20190101-20191231 10.0    -9.9     2.47    12.75   83.72   5.2(0.329)      1.85   0.64  6.08   2.03    2118 X 1497    30.36   26.71   -5.08   0.0156
20200101-20200331 10.01   -9.85    0.93    20.36   89.05   3.83(0.242)     5.02   0.62  9.11   1.83    2347 X 1334    7.64    -12.47  33.12   0.0195

20100104-20200331 9.99    -9.89    24.22   12.18   83.23   2.72(0.172)     18.33  0.61  5.88   1.04    1606 X 1140    12.9    4.85    11.57   0.0161
```

Figure 11: 回测结果

```
+---------+----------+---------+----------+--------+--------+------------------------------+
| Corr    | ISSharpe | SemiOS  | OSSharpe |Fitness | OSdays | ID                           |
+---------+----------+---------+----------+--------+--------+------------------------------+
| 0.6805  | 3.41     | 6.33    | 4.76     | 2.66   | 175    | 211919_my_94                 |
| 0.6632  | 3.01     | 6.2     | 5.96     | 1.3    | 99     | 214976_pv_model_9_mod_gen2_191114_145|
| 0.6352  | 3.0      | 3.42    | 3.54     | 1.47   | 109    | 214471_pv_model_1_4_191101_39|
```

Figure 12: 相关性结果

# 7  Alpha87

$$Alpha = ((RANK(DECAYLINEAR(DELTA(VWAP, 4), 7)) +$$
$$TSRANK(DECAYLINEAR(((((LOW * 0.9) + (LOW * 0.1)) - VWAP)/ \qquad (7)$$
$$(OPEN - ((HIGH + LOW)/2))), 11), 7)) * -1)$$

```
dates              long(M) short(M) pnl(M) %ret   %tvr   shrp (IR)    %dd    %win  bpmrgn fitness Coverage    %posret %inxret %negret IC
20100104-20101231  10.0    -10.0    2.55   13.19  29.66  4.67(0.295)  2.72   0.62  17.79  3.11    903 X 905   25.54   14.01   0.84    0.0236
20110101-20111231  10.0    -10.0    1.45   7.42   29.13  3.27(0.207)  2.15   0.57  10.19  1.65    1066 X 1075 -26.92  -39.34  41.76   0.0153
20120101-20121231  10.0    -10.0    1.57   8.1    26.59  3.69(0.234)  2.81   0.59  12.18  2.04    1177 X 1193 13.98   3.25    2.21    0.018
20130101-20131231  10.0    -9.99    2.03   10.65  22.46  4.65(0.294)  1.8    0.65  18.97  3.2     1218 X 1229 35.71   19.03   -14.43  0.0177
20140101-20141231  10.01   -9.98    1.78   9.09   22.58  4.16(0.263)  3.28   0.65  16.11  2.64    1262 X 1248 48.04   35.54   -29.97  0.0165
20150101-20151231  10.03   -9.95    5.26   26.94  25.18  3.97(0.251)  11.99  0.61  42.84  4.11    1367 X 1337 99.58   46.78   -46.16  0.0294
20160101-20161231  10.0    -9.94    2.55   13.06  32.57  4.24(0.268)  3.13   0.64  16.06  2.69    1428 X 1436 2.55    -15.42  23.66   0.0232
20170101-20171231  10.0    -9.96    0.66   3.4    27.22  1.43(0.09)   3.13   0.57  5.0    0.5     1620 X 1629 -15.18  0.88    22.06   0.0099
20180101-20181231  9.99    -10.0    1.74   8.97   25.64  4.09(0.259)  2.45   0.61  14.0   2.42    1748 X 1765 -29.27  -38.75  47.21   0.0172
20190101-20191231  10.0    -9.99    1.59   8.16   23.32  4.83(0.305)  1.86   0.63  14.01  2.86    1806 X 1810 32.48   26.71   -16.18  0.0133
20200101-20200331  10.0    -9.99    0.02   0.39   21.7   0.14(0.009)  4.3    0.52  0.72   0.02    1844 X 1844 -10.97  -12.47  11.77   0.0031

20100104-20200331  10.0    -9.98    21.21  10.65  26.33  3.4(0.215)   12.02  0.61  16.19  2.16    1371 X 1375 17.97   4.85    3.33    0.0181
```

Figure 13: 回测结果

```
+---------+----------+---------+----------+--------+--------+------------------------------+
| Corr    | ISSharpe | SemiOS  | OSSharpe |Fitness | OSdays | ID                           |
+---------+----------+---------+----------+--------+--------+------------------------------+
| 0.7961  | 3.48     | 4.27    | 2.2      | 4.56   | 175    | 211919_my_11                 |
| 0.7732  | 3.41     | 6.33    | 4.76     | 2.66   | 175    | 211919_my_94                 |
| 0.7565  | 4.64     | 6.52    | 5.52     | 2.47   | 100    | 214893_pv_model_7_mod_gen4_191114_107|
```

Figure 14: 相关性结果

# 8  Alpha88

$$Alpha = (CLOSE - DELAY(CLOSE, 20))/DELAY(CLOSE, 20) * 100 \qquad (8)$$

```
dates              long(M) short(M) pnl(M) %ret    %tvr   shrp (IR)     %dd     %win  bpmrgn fitness Coverage    %posret %inxret %negret IC
20100104-20101231  9.99    -10.0    -3.28  -16.94  33.66  -2.87(-0.182) 35.65   0.42  -20.13 -2.04   773 X 1014  -4.92   14.01   -28.94  -0.0256
20110101-20111231  10.0    -10.0    -2.75  -14.11  31.91  -2.83(-0.179) 32.32   0.45  -17.69 -1.88   940 X 1182  -51.87  -39.34  23.64   -0.026
20120101-20121231  9.99    -10.0    -4.64  -23.87  32.11  -5.4(-0.341)  47.44   0.34  -29.72 -4.65   1062 X 1297 -26.01  3.25    -21.71  -0.0421
20130101-20131231  9.96    -10.01   -4.71  -24.76  32.21  -4.31(-0.273) 47.76   0.41  -30.77 -3.78   1012 X 1434 -2.66   19.03   -46.79  -0.0318
20140101-20141231  9.92    -10.02   -3.06  -15.62  31.27  -3.06(-0.193) 39.54   0.39  -20.01 -2.16   1046 X 1458 18.33   35.54   -49.27  -0.021
20150101-20151231  9.83    -10.04   -10.91 -56.57  30.37  -4.21(-0.266) 111.49  0.41  -74.11 -5.74   1114 X 1582 -3.28   46.78   -108.11 -0.0463
20160101-20161231  9.93    -10.0    -6.14  -31.54  32.03  -4.71(-0.298) 64.38   0.34  -39.41 -4.67   1156 X 1703 -56.06  -15.42  -7.22   -0.0347
20170101-20171231  9.95    -10.0    -2.33  -11.97  31.07  -2.36(-0.149) 23.4    0.43  -15.4  -1.46   1413 X 1815 -39.84  0.88    15.79   -0.0198
20180101-20181231  9.99    -9.97    -5.81  -29.93  32.28  -6.29(-0.398) 59.7    0.34  -37.14 -6.06   1650 X 1856 -86.3   -38.75  26.46   -0.043
20190101-20191231  9.96    -10.0    -6.46  -33.18  33.43  -6.46(-0.408) 64.91   0.32  -39.7  -6.43   1548 X 2061 -29.77  26.71   -36.57  -0.0389
20200101-20200331  9.94    -10.01   -0.77  -16.54  30.03  -2.01(-0.127) 17.84   0.41  -22.05 -1.49   1440 X 2242 -43.31  -12.47  10.02   -0.0202

20100104-20200331  9.95    -10.0    -50.85 -25.64  31.99  -3.82(-0.241) 513.58  0.39  -32.01 -3.42   1178 X 1557 -28.69  4.85    -22.52  -0.0326
```

Figure 15: 回测结果

```
+---------+----------+---------+----------+--------+---------+----------------+
| Corr    | ISSharpe | SemiOS  | OSSharpe |Fitness | OSdays  | ID             |
+---------+----------+---------+----------+--------+---------+----------------+
| 0.4884  | 2.51     | 2.15    | -1.01    | 1.1    | 97      | 215072_fac156  |
| 0.4618  | 2.4      | 1.92    | -0.48    | 1.19   | 90      | 215415_fac85   |
| 0.459   | 3.65     | 1.18    | 0.64     | 1.4    | 162     | 212376_t20_h35 |
+---------+----------+---------+----------+--------+---------+----------------+
```

Figure 16: 相关性结果

# 9　Alpha89

$$Alpha = (SMA(CLOSE, 13, 2) - SMA(CLOSE, 27, 2) - SMA(SMA(CLOSE, 13, 2) - SMA(CLOSE, 27, 2), 10, 2)) \tag{9}$$

```
dates            long(M) short(M) pnl(M)  %ret    %tvr    shrp (IR)      %dd    %win  bpmrgn fitness Coverage      %posret %inxret %negret IC
20100104-20101231 10.0   -10.0    -2.24   -11.59  12.94   -1.9(-0.12)    28.64  0.48  -35.82 -1.8    910 X 906     -4.23   14.01   -18.94  -0.0024
20110101-20111231 10.0   -10.0    -0.18   -0.94   10.77   -0.17(-0.011)  8.06   0.48  -3.46  -0.05   1090 X 1056   -38.42  -39.34  36.56   -0.0004
20120101-20121231 10.0   -10.0    -0.88   -4.53   11.63   -0.81(-0.051)  14.66  0.47  -15.57 -0.5    1154 X 1220   -3.06   3.25    -5.99   -0.0012
20130101-20131231 9.99   -10.0    -1.04   -5.46   10.65   -0.81(-0.051)  17.39  0.47  -20.51 -0.58   1203 X 1244   13.55   19.03   -24.46  -0.0012
20140101-20141231 9.9    -10.0    -2.19   -10.78  12.01   -1.68(-0.106)  33.37  0.44  -37.3  -1.59   1145 X 1367   21.18   35.54   -43.27  -0.0022
20150101-20151231 9.97   -9.98    2.64    13.6    10.07   0.99(0.063)    30.37  0.51  53.85  1.15    1256 X 1448   101.15  46.78   -73.94  0.002
20160101-20161231 9.96   -9.99    -2.0    -10.29  10.49   -1.66(-0.105)  29.87  0.46  -39.26 -1.65   1396 X 1469   -43.06  -15.42  22.39   -0.0012
20170101-20171231 9.97   -9.98    -0.11   -0.53   10.69   -0.09(-0.006)  14.15  0.43  -2.02  -0.02   1612 X 1638   -31.38  0.88    30.28   -0.0009
20180101-20181231 10.0   -9.98    -2.3    -11.85  11.82   -2.01(-0.127)  26.45  0.44  -40.09 -2.01   1719 X 1794   -65.21  -38.75  41.62   -0.0035
20190101-20191231 9.98   -9.99    -1.52   -7.66   11.47   -1.09(-0.069)  22.72  0.43  -27.1  -0.89   1727 X 1890   10.1    26.71   -25.63  -0.002
20200101-20200331 9.97   -10.02   -0.66   -14.02  13.94   -1.9(-0.12)    13.3   0.53  -40.75 -1.9    1707 X 1981   -33.59  -12.47  5.07    -0.0061

20100104-20200331 9.98   -9.99    -10.47  -5.21   11.32   -0.71(-0.045)  106.94 0.46  -18.61 -0.48   1331 X 1417   -4.67   4.85    -5.87   -0.0014
```

Figure 17: 回测结果

```
+---------+----------+---------+----------+--------+---------+----------------+
| Corr    | ISSharpe | SemiOS  | OSSharpe |Fitness | OSdays  | ID             |
+---------+----------+---------+----------+--------+---------+----------------+
| 0.1736  | 3.06     | 2.72    | 0.84     | 1.71   | 89      | 215478_fac272  |
| 0.1606  | 3.65     | 1.18    | 0.64     | 1.4    | 162     | 212376_t20_h35 |
| 0.1605  | 3.54     | 3.28    | 2.19     | 1.59   | 164     | 212322_ld3_10  |
+---------+----------+---------+----------+--------+---------+----------------+
```

Figure 18: 相关性结果

# 10　Alpha90

$$Alpha = (RANK(CORR(RANK(VWAP), RANK(VOLUME), 5)) * -1) \tag{10}$$

```
dates            long(M) short(M) pnl(M)  %ret    %tvr    shrp (IR)      %dd    %win  bpmrgn fitness Coverage      %posret %inxret %negret IC
20100104-20101231 10.0   -10.0    1.84    9.5     71.97   4.75(0.3)      1.43   0.63  5.28   1.73    828 X 829     23.08   14.01   -4.07   0.0171
20110101-20111231 10.0   -10.0    2.28    11.7    71.28   6.9(0.436)     0.78   0.63  6.57   2.8     980 X 979     -22.0   -39.34  45.41   0.0222
20120101-20121231 10.0   -10.0    2.34    12.06   70.09   7.47(0.473)    1.84   0.67  6.88   3.1     1113 X 1112   17.44   3.25    6.67    0.0238
20130101-20131231 10.0   -10.0    2.18    11.44   69.02   7.21(0.456)    0.8    0.69  6.63   2.93    1163 X 1163   36.48   19.03   -13.58  0.0204
20140101-20141231 10.0   -9.99    1.61    8.23    70.08   5.01(0.317)    1.12   0.62  4.7    1.72    1139 X 1136   47.44   35.54   -31.02  0.0149
20150101-20151231 9.97   -9.95    2.49    12.78   72.72   3.77(0.238)    3.35   0.64  7.06   1.58    1128 X 1126   86.18   46.78   -60.64  0.0159
20160101-20161231 9.99   -9.95    2.21    11.35   70.6    7.02(0.444)    1.31   0.7   6.43   2.82    1291 X 1287   1.29    -15.42  21.45   0.0212
20170101-20171231 9.99   -9.94    2.69    13.85   70.09   8.1(0.512)     0.85   0.7   7.91   3.6     1501 X 1498   -3.58   0.88    31.39   0.0255
20180101-20181231 9.99   -9.99    1.84    9.47    68.13   5.26(0.333)    1.41   0.61  5.56   1.96    1665 X 1666   -26.79  -38.75  45.76   0.0154
20190101-20191231 9.99   -10.0    1.97    10.08   68.27   5.88(0.372)    1.65   0.63  5.91   2.26    1795 X 1798   32.87   26.71   -12.68  0.0158
20200101-20200331 9.97   -10.01   -0.01   -0.27   69.0    -0.12(-0.007)  3.09   0.47  -0.16  -0.01   1835 X 1838   -8.87   -12.47  8.31    0.0012

20100104-20200331 9.99   -9.98    21.45   10.78   70.2    5.5(0.348)     3.34   0.65  6.15   2.15    1274 X 1273   18.55   4.85    3.01    0.0188
```

Figure 19: 回测结果

| Corr | ISSharpe | SemiOS | OSSharpe | Fitness | OSdays | ID |
|--------|----------|--------|----------|---------|--------|-----------------|
| 0.72 | 4.62 | 5.89 | 2.2 | 2.24 | 97 | 215072_fac252 |
| 0.7023 | 5.92 | 6.79 | 2.67 | 2.46 | 175 | 211930_h_ori76 |
| 0.7001 | 4.31 | 5.92 | 4.14 | 1.74 | 175 | 211930_h_ori42 |

Figure 20: 相关性结果