In [2]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [3]:
```
data = pd.read_csv("./index_data.csv")
data['date'] = pd.to_datetime(data['date'])
```

动量因子风格择时信号：

需要数据： 沪深300指数和中证1000指数日收盘价

信号逻辑： 取前第一日和第十一日指数收盘价计算过去十天指数收益率：

(1) 沪深300指数收益率 > 中证1000指数收益率： 当天开盘买入沪深300指数,收盘平仓

(2) 沪深300指数收益率 < 中证1000指数收益率： 当天开盘买入中证1000指数，收盘平仓

(3) 若两者收益率均小于0：当天空仓

In [4]:
```
data["CSI300_Close_1"] = data['CSI300_Close'].shift()
data["CSI300_Close_11"] = data['CSI300_Close'].shift(11)
data["CSI1000_Close_1"] = data['CSI1000_Close'].shift()
data["CSI1000_Close_11"] = data['CSI1000_Close'].shift(11)
data['10_days_CSI300_rtn'] = data['CSI300_Close_1']/data['CSI300_Close_11']-1
data['10_days_CSI1000_rtn'] = data['CSI1000_Close_1']/data['CSI1000_Close_11']-1
data['Signal1'] = np.where(data['10_days_CSI300_rtn'] > data['10_days_CSI1000_rtn'], 1, -1)
data.loc[(data['10_days_CSI300_rtn'] * data['10_days_CSI1000_rtn'] > 0) & (data['10_days_CSI300_rtn'] < 0), 'Signal1'] = 0
data['Signal1_day_rtn'] = np.where(data['10_days_CSI300_rtn'] > data['10_days_CSI1000_rtn'], data['CSI300_Close']/data['CSI300_Close_1'], data['C
data.loc[(data['10_days_CSI300_rtn'] * data['10_days_CSI1000_rtn'] > 0) & (data['10_days_CSI300_rtn'] < 0), 'Signal1_day_rtn'] = 1
data['Signal1_rtn'] = np.cumprod(data['Signal1_day_rtn'])
```

In [5]:
```
plt.figure(figsize=(10, 4))
sns.lineplot(x='date',y='Signal1_rtn',data=data,color='steelblue')
```

Out[5]:
```
<Axes: xlabel='date', ylabel='Signal1_rtn'>
```

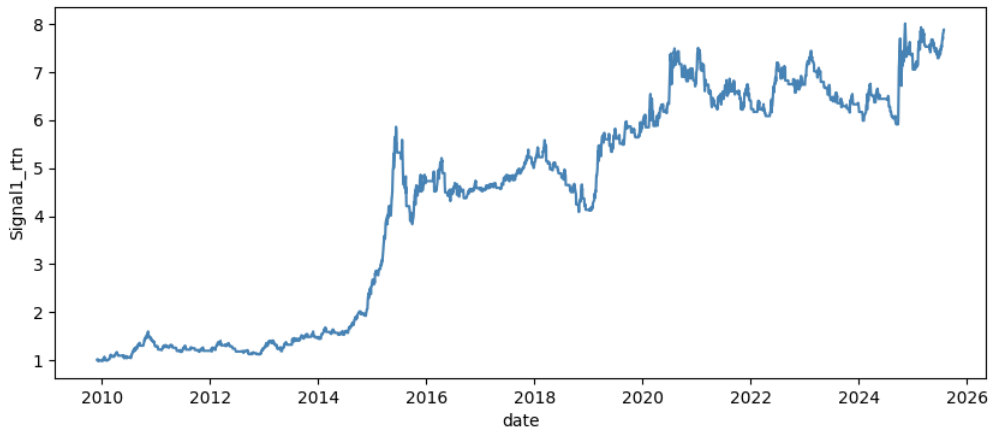
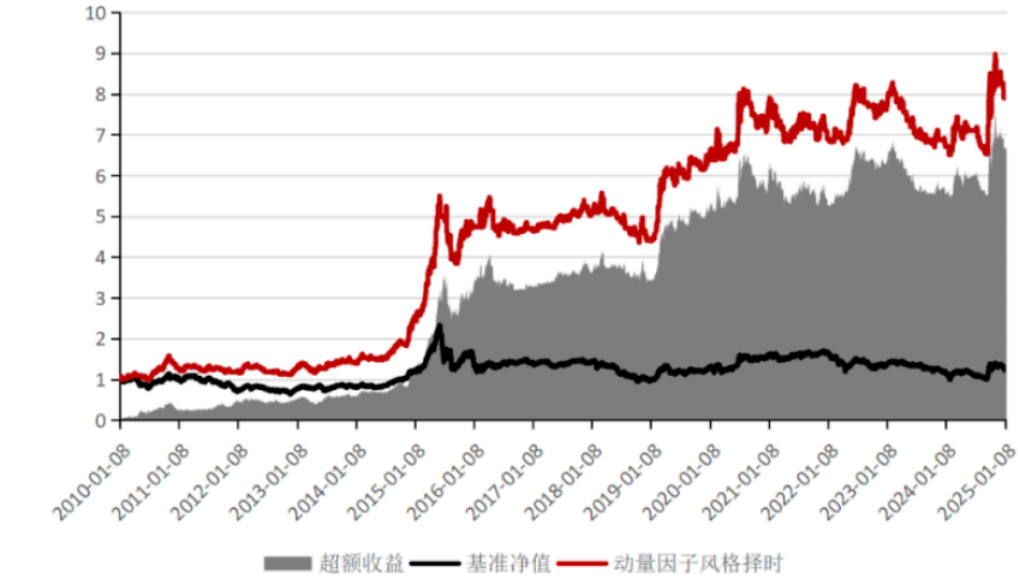


图 3：动量因子风格择时净值



数据来源：WIND、国联期货研究所

拥挤度动量因子风格择时信号：

需要数据： 大盘价值指数PB,小盘成长指数PB，万得全A指数PB

信号逻辑： 取前第一日和第五日指数PB计算指标：

R1 = (大盘价值指数PB-小盘成长指数PB)/万得全A指数PB

(1) R1(t-1) > R1(t-5)： 当天开盘买入沪深300指数,收盘平仓

(2) R1(t-1) < R1(t-5)： 当天开盘买入中证1000指数，收盘平仓

In [6]:
```
data['LCVI_PB_1'] = data['LCVI_PB'].shift()
data['LCVI_PB_5'] = data['LCVI_PB'].shift(5)
data['SCGI_PB_1'] = data['SCGI_PB'].shift()
data['SCGI_PB_5'] = data['SCGI_PB'].shift(5)
data['WASI_PB_1'] = data['WASI_PB'].shift()
data['WASI_PB_5'] = data['WASI_PB'].shift(5)
```

In [7]:
```
data['Signal2'] = np.where((data['LCVI_PB_1'] - data['SCGI_PB_1'])/data['WASI_PB_1'] > (data['LCVI_PB_5'] - data['SCGI_PB_5'])/data['WASI_PB_5'],
data['Signal2_day_rtn'] = np.where((data['LCVI_PB_1'] - data['SCGI_PB_1'])/data['WASI_PB_1'] > (data['LCVI_PB_5'] - data['SCGI_PB_5'])/data['WASI
data['Signal2_rtn'] = np.cumprod(data['Signal2_day_rtn'])
```

In [8]:
```
plt.figure(figsize=(10, 4))
sns.lineplot(x='date',y='Signal2_rtn',data=data,color='steelblue')
```

Out[8]: <Axes: xlabel='date', ylabel='Signal2_rtn'>

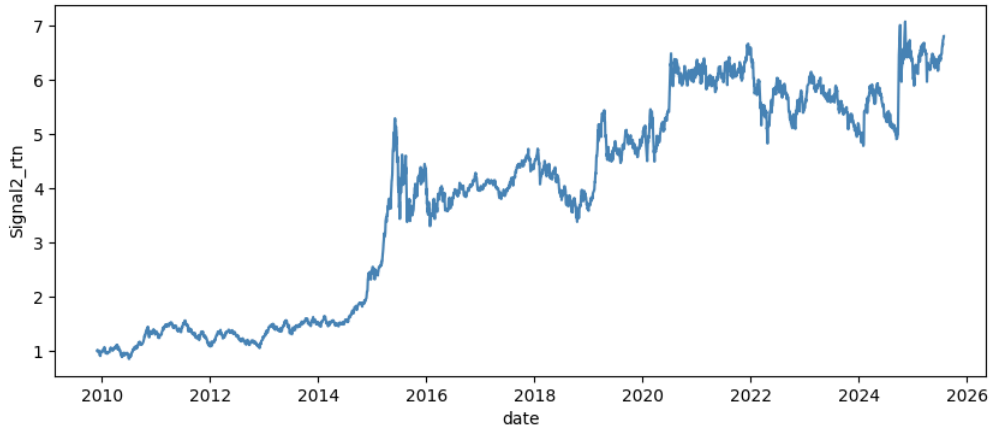
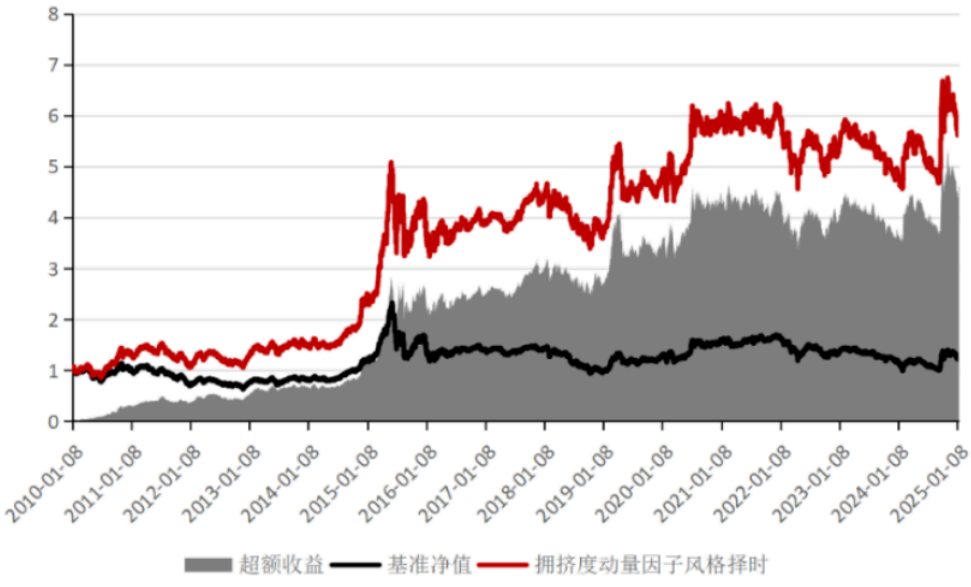


图 4：拥挤度动量因子风格择时净值



数据来源：WIND、国联期货研究所

相对强弱动量因子风格择时信号（大盘价值指数和小盘成长指数）

需要数据： 大盘价值指数、小盘成长指数、万得全A指数收盘价

信号逻辑： 取前第一日和第二日指数收盘价计算指标：

d1 = 大盘价值指数日收益率(t-1)-万得全A指数日收益率(t-1)

d2 = 小盘成长指数日收益率(t-1)-万得全A指数日收益率(t-1)

(1) d1，d2小于0.2%： 空仓

(2) d1 > d2: 择时沪深300指数

(3) d1 < d2: 择时中证1000指数

In [9]:
```
data['LCVI_Close_1'] = data['LCVI_Close'].shift()
data['LCVI_Close_2'] = data['LCVI_Close'].shift(2)
data['SCGI_Close_1'] = data['SCGI_Close'].shift()
data['SCGI_Close_2'] = data['SCGI_Close'].shift(2)
data['WASI_Close_1'] = data['WASI_Close'].shift()
data['WASI_Close_2'] = data['WASI_Close'].shift(2)
```

In [10]:
```
LCVI_rtn_1 = data['LCVI_Close_1']/data['LCVI_Close_2']
SCGI_rtn_1 = data['SCGI_Close_1']/data['SCGI_Close_2']
WASI_rtn_1 = data['WASI_Close_1']/data['WASI_Close_2']

data['Signal3'] = np.where(LCVI_rtn_1 > SCGI_rtn_1, 1, -1)
data.loc[(LCVI_rtn_1 - WASI_rtn_1 < 0.002) & (SCGI_rtn_1 - WASI_rtn_1 < 0.002),'Signal3'] = 0
data['Signal3_day_rtn'] = np.where(LCVI_rtn_1 > SCGI_rtn_1, data['CSI300_Close']/data['CSI300_Close_1'], data['CSI1000_Close']/data['CSI1000_Clos
data.loc[(LCVI_rtn_1 - WASI_rtn_1 < 0.002) & (SCGI_rtn_1 - WASI_rtn_1 < 0.002),'Signal3_day_rtn'] = 1
data['Signal3_rtn'] = np.cumprod(data['Signal3_day_rtn'])
```

In [11]:
```
plt.figure(figsize=(10, 4))
sns.lineplot(x='date',y='Signal3_rtn',data=data,color='steelblue')
```

Out[11]:
```
<Axes: xlabel='date', ylabel='Signal3_rtn'>
```

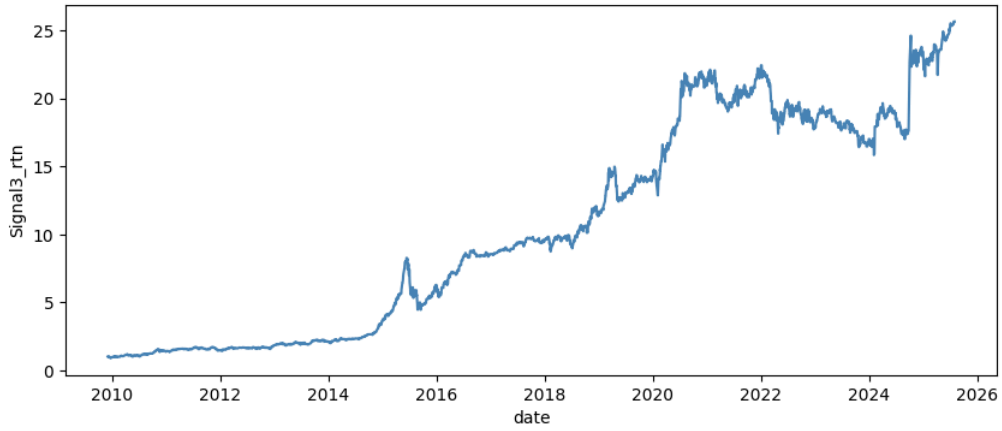
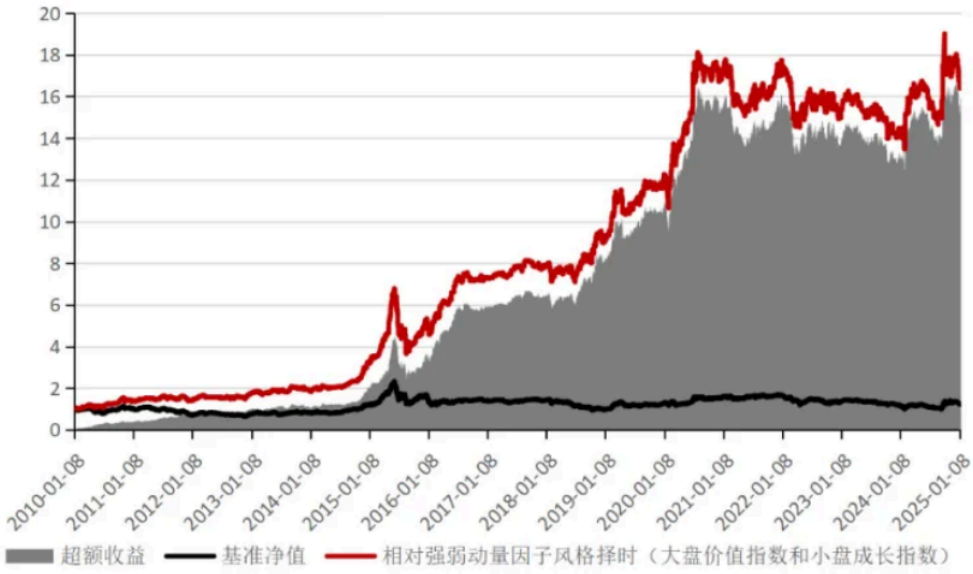


图 5：相对强弱动量因子风格择时净值（大盘价值指数和小盘成长指数）



相对强弱动量因子风格择时信号（沪深300指数和中证1000指数）

需要数据： 沪深300指数、中证1000指数、万得全A指数收盘价

信号逻辑： 取前第一日和第二日指数收盘价计算指标：

d1 = 沪深300指数日收益率(t-1)-万得全A指数日收益率(t-1)

d2 = 中证1000指数日收益率(t-1)-万得全A指数日收益率(t-1)

(1) d1，d2小于0.2%： 空仓

(2) d1 > d2: 择时沪深300指数

(3) d1 < d2: 择时中证1000指数

In [12]:
```
data['CSI300_Close_2'] = data['CSI300_Close'].shift(2)
data['CSI1000_Close_2'] = data['CSI1000_Close'].shift(2)
```

In [13]:
```
CSI300_rtn_1 = data['CSI300_Close_1']/data['CSI300_Close_2']
CSI1000_rtn_1 = data['CSI1000_Close_1']/data['CSI1000_Close_2']

data['Signal4'] = np.where(CSI300_rtn_1 > CSI1000_rtn_1, 1, -1)
data.loc[(CSI300_rtn_1 - WASI_rtn_1 < 0.002) & (CSI1000_rtn_1 - WASI_rtn_1 < 0.002),'Signal4'] = 0
data['Signal4_day_rtn'] = np.where(CSI300_rtn_1 > CSI1000_rtn_1, data['CSI300_Close']/data['CSI300_Close_1'], data['CSI1000_Close']/data['CSI1000
data.loc[(CSI300_rtn_1 - WASI_rtn_1 < 0.002) & (CSI1000_rtn_1 - WASI_rtn_1 < 0.002),'Signal4_day_rtn'] = 1
data['Signal4_rtn'] = np.cumprod(data['Signal4_day_rtn'])
```

In [14]:
```
plt.figure(figsize=(10, 4))
sns.lineplot(x='date',y='Signal4_rtn',data=data,color='steelblue')
```

Out[14]: <Axes: xlabel='date', ylabel='Signal4_rtn'>

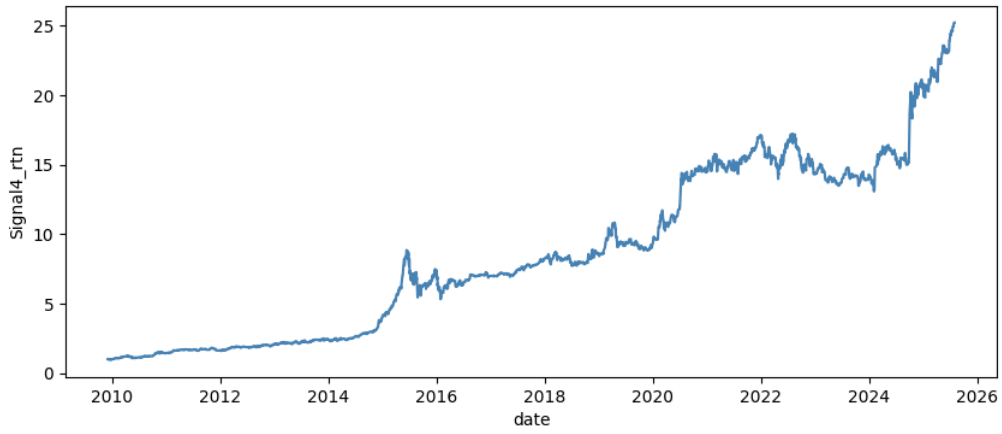


图 6：相对强弱动量因子风格择时净值（沪深 300 指数和中证 1000 指数）

数据来源：WIND、国联期货研究所

多维动量复合风格择时对冲信号

信号逻辑： 根据以上四个信号计算指标

c1 = 择时沪深300指数信号数量

c2 = 择时中证1000指数信号数量

(1) c1 - c2 > 2: 7.5%多IF + 7.5%空IM

(2) 0 < c1 - c2 < 2: 5%多IF + 5%空IM

(3) c1 - c2 = 0: 空仓

(4) -2 < c1 - c2 < 0: 5%多IM + 5%空IF

(5) c1 - c2 < -2: 7.5%多IM + 7.5%空IF

In [56]:
```
margin = 0.12
data['Signal_all'] = data['Signal1'] + data['Signal2'] + data['Signal3'] + data['Signal4']
condlist = [data['Signal_all'] > 2, data['Signal_all'] > 0, data['Signal_all'] == 0, data['Signal_all'] > -2]
choicelist = [(data['CSI300_Close']/data['CSI300_Close_1']-1)*0.075/margin-(data['CSI1000_Close']/data['CSI1000_Close_1']-1)*0.075/margin+1, (dat
data['Signal_all_day_rtn'] = np.select(condlist, choicelist,default = -(data['CSI300_Close']/data['CSI300_Close_1']-1)*0.075/margin+(data['CSI100
data['Signal_all_rtn'] = np.cumprod(data['Signal_all_day_rtn'])
```

In [57]:
```
plt.figure(figsize=(10, 4))
sns.lineplot(x='date',y='Signal_all_rtn',data=data,color='steelblue')
```

Out[57]: <Axes: xlabel='date', ylabel='Signal_all_rtn'>

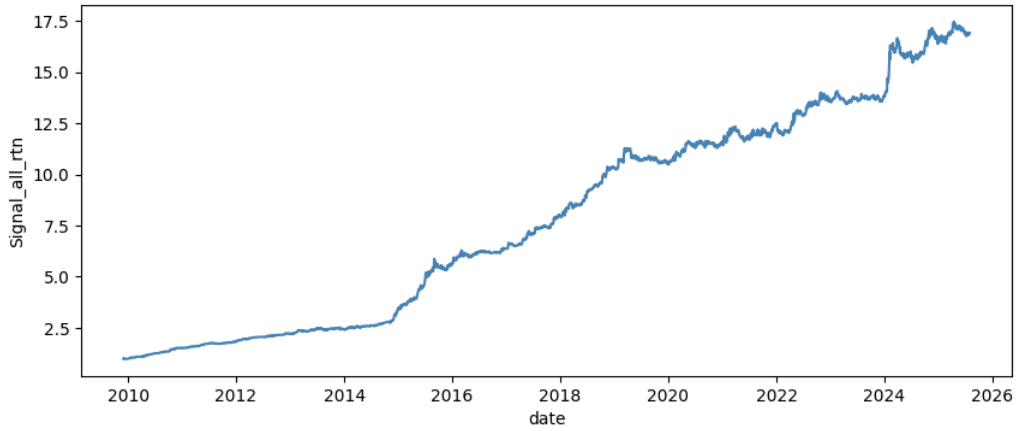


图 7：多维动量因子择时对冲策略净值