Inflation을 반영한 Real_Rtn

February 3, 2021

0.1 필요한 모듈을 가져오고 데이터를 로드합니다

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
import os

%matplotlib inline
warnings.filterwarnings('ignore')

plt.rcParams['font.family'] = 'DejaVu Sans'
```

[2]:
```
# FinanceDataReader로 데이터를 불러옵니다
# 예측할 종목은 한양증권(001750) 입니다

import FinanceDataReader as fdr
STOCK_CODE = '001750'
```

[3]:
```
# 기간은 10년으로 잡았습니다

df = fdr.DataReader(STOCK_CODE, '2010-12-31', '2020-12-31')

df.head()
```

[3]:

Date	Open	High	Low	Close	Volume	Change
2011-01-03	9650	9700	9620	9650	17148	0.005208
2011-01-04	9680	9730	9680	9700	22315	0.005181
2011-01-05	9700	9750	9620	9630	17870	-0.007216
2011-01-06	9630	9690	9570	9580	37280	-0.005192
2011-01-07	9580	9650	9540	9610	75268	0.003132

[4]:
```
# df.loc[:, "close"]를 하면 모든 row의 close를 인덱싱합니다
# 수익계산을 위해 조정된 종가만 유지하였습니다

df = df.loc[:, ['Close']]
```

```
# pandas DataFrame의 칼럼의 이름이 바뀐다

df.rename(columns={'Close':'adj_close'}, inplace=True)
```

0.2 종가를 사용하여 simple_rtn과 log_rtn을 계산합니다

[5]:
```
df['simple_rtn'] = df.adj_close.pct_change()
df['log_rtn'] = np.log(df.adj_close/df.adj_close.shift(1))
```

[6]:
```
df
```

[6]:
```
            adj_close  simple_rtn   log_rtn
Date
2011-01-03       9650         NaN       NaN
2011-01-04       9700    0.005181  0.005168
2011-01-05       9630   -0.007216 -0.007243
2011-01-06       9580   -0.005192 -0.005206
2011-01-07       9610    0.003132  0.003127
...               ...         ...       ...
2020-12-23       9450    0.007463  0.007435
2020-12-24       9530    0.008466  0.008430
2020-12-28       9530    0.000000  0.000000
2020-12-29       9190   -0.035677 -0.036329
2020-12-30       9220    0.003264  0.003259

[2463 rows x 3 columns]
```

[7]:
```
df['adj_close']
```

[7]:
```
Date
2011-01-03    9650
2011-01-04    9700
2011-01-05    9630
2011-01-06    9580
2011-01-07    9610
              ...
2020-12-23    9450
2020-12-24    9530
2020-12-28    9530
2020-12-29    9190
2020-12-30    9220
Name: adj_close, Length: 2463, dtype: int64
```

0.3 Quandl에서 월간 소비자 물가지수(CPI_미국) 값을 다운로드합니다

지수의 변동률(단순 수익)과 인플레이션 데이터를 한양증권(001750)의 주식 수익률과 병합하여 인플레이션을 설명합니다

[8]:
```
# 라이브러리 가져오기 및 인증(Quandl)

import pandas as pd
import quandl

QUANDL_KEY = '69jU9SAxaugLG5dEfahJ'
quandl.ApiConfig.api_key = QUANDL_KEY
```

[9]:
```
df_all_dates = pd.DataFrame(index=pd.date_range(start='2010-12-31',
                                                end='2020-12-31'))

df_all_dates
```

[9]:
```
Empty DataFrame
Columns: []
Index: [2010-12-31 00:00:00, 2011-01-01 00:00:00, 2011-01-02 00:00:00,
2011-01-03 00:00:00, 2011-01-04 00:00:00, 2011-01-05 00:00:00, 2011-01-06
00:00:00, 2011-01-07 00:00:00, 2011-01-08 00:00:00, 2011-01-09 00:00:00,
2011-01-10 00:00:00, 2011-01-11 00:00:00, 2011-01-12 00:00:00, 2011-01-13
00:00:00, 2011-01-14 00:00:00, 2011-01-15 00:00:00, 2011-01-16 00:00:00,
2011-01-17 00:00:00, 2011-01-18 00:00:00, 2011-01-19 00:00:00, 2011-01-20
00:00:00, 2011-01-21 00:00:00, 2011-01-22 00:00:00, 2011-01-23 00:00:00,
2011-01-24 00:00:00, 2011-01-25 00:00:00, 2011-01-26 00:00:00, 2011-01-27
00:00:00, 2011-01-28 00:00:00, 2011-01-29 00:00:00, 2011-01-30 00:00:00,
2011-01-31 00:00:00, 2011-02-01 00:00:00, 2011-02-02 00:00:00, 2011-02-03
00:00:00, 2011-02-04 00:00:00, 2011-02-05 00:00:00, 2011-02-06 00:00:00,
2011-02-07 00:00:00, 2011-02-08 00:00:00, 2011-02-09 00:00:00, 2011-02-10
00:00:00, 2011-02-11 00:00:00, 2011-02-12 00:00:00, 2011-02-13 00:00:00,
2011-02-14 00:00:00, 2011-02-15 00:00:00, 2011-02-16 00:00:00, 2011-02-17
00:00:00, 2011-02-18 00:00:00, 2011-02-19 00:00:00, 2011-02-20 00:00:00,
2011-02-21 00:00:00, 2011-02-22 00:00:00, 2011-02-23 00:00:00, 2011-02-24
00:00:00, 2011-02-25 00:00:00, 2011-02-26 00:00:00, 2011-02-27 00:00:00,
2011-02-28 00:00:00, 2011-03-01 00:00:00, 2011-03-02 00:00:00, 2011-03-03
00:00:00, 2011-03-04 00:00:00, 2011-03-05 00:00:00, 2011-03-06 00:00:00,
2011-03-07 00:00:00, 2011-03-08 00:00:00, 2011-03-09 00:00:00, 2011-03-10
00:00:00, 2011-03-11 00:00:00, 2011-03-12 00:00:00, 2011-03-13 00:00:00,
2011-03-14 00:00:00, 2011-03-15 00:00:00, 2011-03-16 00:00:00, 2011-03-17
00:00:00, 2011-03-18 00:00:00, 2011-03-19 00:00:00, 2011-03-20 00:00:00,
2011-03-21 00:00:00, 2011-03-22 00:00:00, 2011-03-23 00:00:00, 2011-03-24
00:00:00, 2011-03-25 00:00:00, 2011-03-26 00:00:00, 2011-03-27 00:00:00,
2011-03-28 00:00:00, 2011-03-29 00:00:00, 2011-03-30 00:00:00, 2011-03-31
00:00:00, 2011-04-01 00:00:00, 2011-04-02 00:00:00, 2011-04-03 00:00:00,
2011-04-04 00:00:00, 2011-04-05 00:00:00, 2011-04-06 00:00:00, 2011-04-07
```

```
00:00:00, 2011-04-08 00:00:00, 2011-04-09 00:00:00, ...]

[3654 rows x 0 columns]
```

[10]:
```
# 가능한 모든 날짜로 DataFrame을 만들고 가격을 결합합니다

df = df_all_dates.join(df['adj_close'], how='left').fillna(method='ffill').
 ↪asfreq('M')
df
```

[10]:
```
            adj_close
2010-12-31        NaN
2011-01-31     9200.0
2011-02-28     8980.0
2011-03-31     8610.0
2011-04-30     8300.0
...               ...
2020-08-31     8630.0
2020-09-30     8400.0
2020-10-31     8850.0
2020-11-30     9750.0
2020-12-31     9220.0

[121 rows x 1 columns]
```

[11]:
```
# Quandl에서 인플레이션 데이터를 다운로드 합니다

df_cpi = quandl.get(dataset='RATEINF/CPI_USA',
                    start_date='2010-12-31',
                    end_date='2020-12-31')
df_cpi.rename(columns={'Value':'cpi'}, inplace=True)

df_cpi
```

[11]:
```
                cpi
Date
2010-12-31  219.179
2011-01-31  220.223
2011-02-28  221.309
2011-03-31  223.467
2011-04-30  224.906
...             ...
2020-08-31  259.918
2020-09-30  260.280
2020-10-31  260.388
2020-11-30  260.229
2020-12-31  260.474
```

```
[121 rows x 1 columns]
```

[12]:
```
# 인플레이션 데이터를 가격에 병합합니다

df_merged = df.join(df_cpi, how='left')

df_merged
```

[12]:
```
            adj_close      cpi
2010-12-31        NaN  219.179
2011-01-31     9200.0  220.223
2011-02-28     8980.0  221.309
2011-03-31     8610.0  223.467
2011-04-30     8300.0  224.906
...               ...      ...
2020-08-31     8630.0  259.918
2020-09-30     8400.0  260.280
2020-10-31     8850.0  260.388
2020-11-30     9750.0  260.229
2020-12-31     9220.0  260.474

[121 rows x 2 columns]
```

[13]:
```
# 단순 수익률과 인플레이션을 계산합니다

df_merged['simple_rtn'] = df_merged.adj_close.pct_change()
df_merged['inflation_rate'] = df_merged.cpi.pct_change()

df_merged
```

[13]:
```
            adj_close      cpi  simple_rtn  inflation_rate
2010-12-31        NaN  219.179         NaN             NaN
2011-01-31     9200.0  220.223         NaN        0.004763
2011-02-28     8980.0  221.309   -0.023913        0.004931
2011-03-31     8610.0  223.467   -0.041203        0.009751
2011-04-30     8300.0  224.906   -0.036005        0.006439
...               ...      ...         ...             ...
2020-08-31     8630.0  259.918    0.044794        0.003153
2020-09-30     8400.0  260.280   -0.026651        0.001393
2020-10-31     8850.0  260.388    0.053571        0.000415
2020-11-30     9750.0  260.229    0.101695       -0.000611
2020-12-31     9220.0  260.474   -0.054359        0.000941

[121 rows x 4 columns]
```

[14]:
```
df_merged['real_rtn'] = (df_merged.simple_rtn + 1) / (df_merged.inflation_rate +␣
↪1) - 1
```

[15]:
```
# 인플레이션에 대한 수익 조정
# 맨 오른쪽 열 real_rtn에는 인플레이션 조정 수익이 포함됩니다

df_merged
```

[15]:

	adj_close	cpi	simple_rtn	inflation_rate	real_rtn
2010-12-31	NaN	219.179	NaN	NaN	NaN
2011-01-31	9200.0	220.223	NaN	0.004763	NaN
2011-02-28	8980.0	221.309	-0.023913	0.004931	-0.028703
2011-03-31	8610.0	223.467	-0.041203	0.009751	-0.050462
2011-04-30	8300.0	224.906	-0.036005	0.006439	-0.042173
...	...	...	...	...	...
2020-08-31	8630.0	259.918	0.044794	0.003153	0.041510
2020-09-30	8400.0	260.280	-0.026651	0.001393	-0.028005
2020-10-31	8850.0	260.388	0.053571	0.000415	0.053134
2020-11-30	9750.0	260.229	0.101695	-0.000611	0.102368
2020-12-31	9220.0	260.474	-0.054359	0.000941	-0.055248

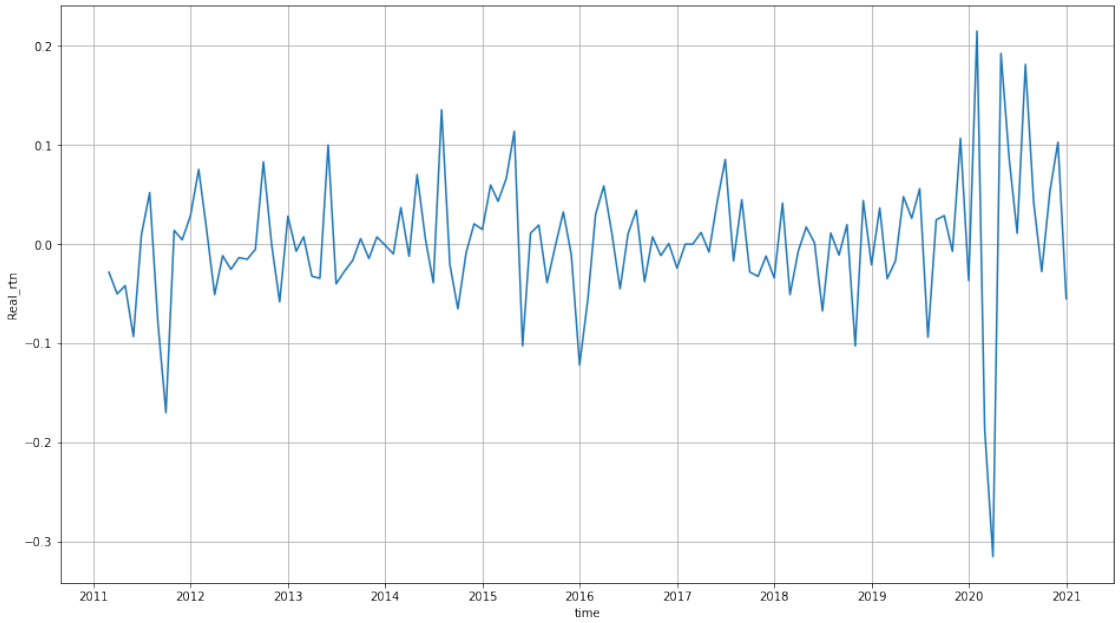
[121 rows x 5 columns]

0.4 시각화합니다

인플레이션은 플러스 수익률을 낮추고 손실 규모를 증가시킵니다. Real_rtn은 시간 경과에 따른 투자 성과에 대한 인플레이션의 영향을 설명합니다. 또한 투자 실적에 대한 보다 현실적인 비교를 제공해주는 기준이 됩니다. 실질적으로 수익률을 낮추고 손실 규모를 증가시킵니다. Quandl에 연동되는 대한민국 데이터를 발견하지 못해서 USA 기준으로 Real_rtn을 계산하였습니다.

[16]:
```
plt.figure(figsize=(16,9))
plt.grid(True)
sns.lineplot(y=df_merged['real_rtn'], x=df_merged.index)
plt.xlabel('time')
plt.ylabel('Real_rtn')
```

[16]:
```
Text(0, 0.5, 'Real_rtn')
```


0.2
0.1
0.0
−0.1
−0.2
−0.3
Real_rtn
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
time

[ ]: