

project_01 (5)

March 4, 2023

1 Purpose

I have two goals for this project:

1. To help you master data manipulation and visualization
2. To help you understand the risk-return tradeoff for several measures of risk

2 Tasks

2.1 Packages and Settings

```
[1]: import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
```

```
[2]: %config InlineBackend.figure_format = 'retina'
%precision 4
pd.options.display.float_format = '{:.4f}'.format
```

2.2 Data

I used the following code cell to download the data for this project. Leave this code cell commented out and use the CSV files I provided with this notebook.

```
[3]: # import yfinance as yf
# import pandas_datareader as pdr
# import requests_cache
# session = requests_cache.CachedSession(expire_after=1)
```

```
[4]: # wiki = pd.read_html('https://en.wikipedia.org/wiki/Russell_1000_Index')
```

```
[5]: # (
#     yf.Tickers(
#         tickers=wiki[2]['Ticker'].str.replace(pat='.', repl='-', regex=False).
#         ↪to_list(),
#         session=session
#     )
#     .history(period='max', auto_adjust=False)
```

```
# .assign(Date = lambda x: x.index.tz_localize(None))
# .set_index('Date')
# .rename_axis(columns=['Variable', 'Ticker'])
# ['Adj Close']
# .pct_change()
# .loc['1962':'2022']
# .to_csv('returns.csv')
# )
```

```
[6]: # (
#     pdr.DataReader(
#         name='F-F_Research_Data_Factors_daily',
#         data_source='famafrench',
#         start='1900',
#         session=session
#     )
#     [0]
#     .rename_axis(columns='Variable')
#     .div(100)
#     .loc['1962':'2022']
#     .to_csv('ff.csv')
# )
```

Run the following code cell to read the data for this project. The `returns.csv` file contains daily returns for the Russell 1000 stocks from 1962 through 2022, and the `ff.csv` contains daily Fama and French factors from 1962 through 2022.

```
[7]: returns = pd.read_csv('returns.csv', index_col='Date', parse_dates=True)
ff = pd.read_csv('ff.csv', index_col='Date', parse_dates=True)
```

```
[8]: returns.rename_axis(columns='Ticker')
```

```
[8]: Ticker      A      AA      AAL      AAP      AAPL      ABBV      ABC      ABNB  \
Date
1962-01-02    NaN     NaN     NaN     NaN     NaN     NaN     NaN     NaN
1962-01-03    NaN  0.0153     NaN     NaN     NaN     NaN     NaN     NaN
1962-01-04    NaN  0.0000     NaN     NaN     NaN     NaN     NaN     NaN
1962-01-05    NaN -0.0019     NaN     NaN     NaN     NaN     NaN     NaN
1962-01-08    NaN -0.0340     NaN     NaN     NaN     NaN     NaN     NaN
...
2022-12-23  0.0015  0.0080  0.0119  0.0084 -0.0028 -0.0010  0.0044  0.0045
2022-12-27  0.0021  0.0149 -0.0142  0.0121 -0.0139 -0.0007 -0.0059 -0.0206
2022-12-28 -0.0098 -0.0236 -0.0168  0.0019 -0.0307 -0.0047 -0.0097 -0.0120
2022-12-29  0.0203  0.0630  0.0308  0.0070  0.0283  0.0020 -0.0078  0.0332
2022-12-30 -0.0081 -0.0234  0.0016  0.0049  0.0025 -0.0058 -0.0020  0.0032

Ticker      ABT      ACGL  ...      YUM      Z      ZBH      ZBRA      ZG  \
```

```

Date
1962-01-02      NaN      NaN ...      NaN      NaN      NaN      NaN      NaN
1962-01-03      NaN      NaN ...      NaN      NaN      NaN      NaN      NaN
1962-01-04      NaN      NaN ...      NaN      NaN      NaN      NaN      NaN
1962-01-05      NaN      NaN ...      NaN      NaN      NaN      NaN      NaN
1962-01-08      NaN      NaN ...      NaN      NaN      NaN      NaN      NaN
...
2022-12-23  0.0014  0.0084 ...  0.0006 -0.0099  0.0011  0.0029 -0.0099
2022-12-27  0.0036  0.0038 ...  0.0078 -0.0190  0.0047  0.0112 -0.0181
2022-12-28 -0.0068 -0.0160 ... -0.0045 -0.0372 -0.0101 -0.0166 -0.0365
2022-12-29  0.0230  0.0081 ...  0.0053  0.0217  0.0146  0.0433  0.0234
2022-12-30 -0.0047 -0.0052 ... -0.0147  0.0075 -0.0026 -0.0043  0.0035

Ticker          ZI      ZION      ZM      ZS      ZTS
Date
1962-01-02      NaN      NaN      NaN      NaN      NaN
1962-01-03      NaN      NaN      NaN      NaN      NaN
1962-01-04      NaN      NaN      NaN      NaN      NaN
1962-01-05      NaN      NaN      NaN      NaN      NaN
1962-01-08      NaN      NaN      NaN      NaN      NaN
...
2022-12-23 -0.0052  0.0035 -0.0008 -0.0053  0.0050
2022-12-27 -0.0087  0.0080 -0.0065 -0.0111 -0.0032
2022-12-28 -0.0042 -0.0178 -0.0015  0.0027 -0.0101
2022-12-29  0.0605  0.0231  0.0404  0.0372  0.0300
2022-12-30 -0.0013  0.0016 -0.0038  0.0003 -0.0108

```

[15356 rows x 1010 columns]

```
[9]: ff.head()
```

```

[9]:           Mkt-RF      SMB      HML      RF
Date
1962-01-02 -0.0080  0.0087  0.0058  0.0001
1962-01-03  0.0024  0.0021  0.0097  0.0001
1962-01-04 -0.0083  0.0001  0.0066  0.0001
1962-01-05 -0.0134  0.0008  0.0032  0.0001
1962-01-08 -0.0075  0.0021  0.0032  0.0001

```

2.3 Single Stocks

For this section, use the single stock returns in `returns`. You may select years t and $t + 1$, but only use stocks with complete returns data for years t and $t + 1$.

2.3.1 Task 1: Do mean returns in year t predict mean returns in year $t + 1$?

```
[10]: # mean returns for year t=2017 & t+1=2018
mean_ret2017 = returns.loc['2017'].mean(skipna=True)
mean_ret2018 = returns.loc['2018'].mean(skipna=True)

# merged returns for year t=2017 & t+1=2018
total_df = pd.concat([mean_ret2017, mean_ret2018], axis=1).dropna()
total_df.columns = ["2017", "2018"]
total_df
```

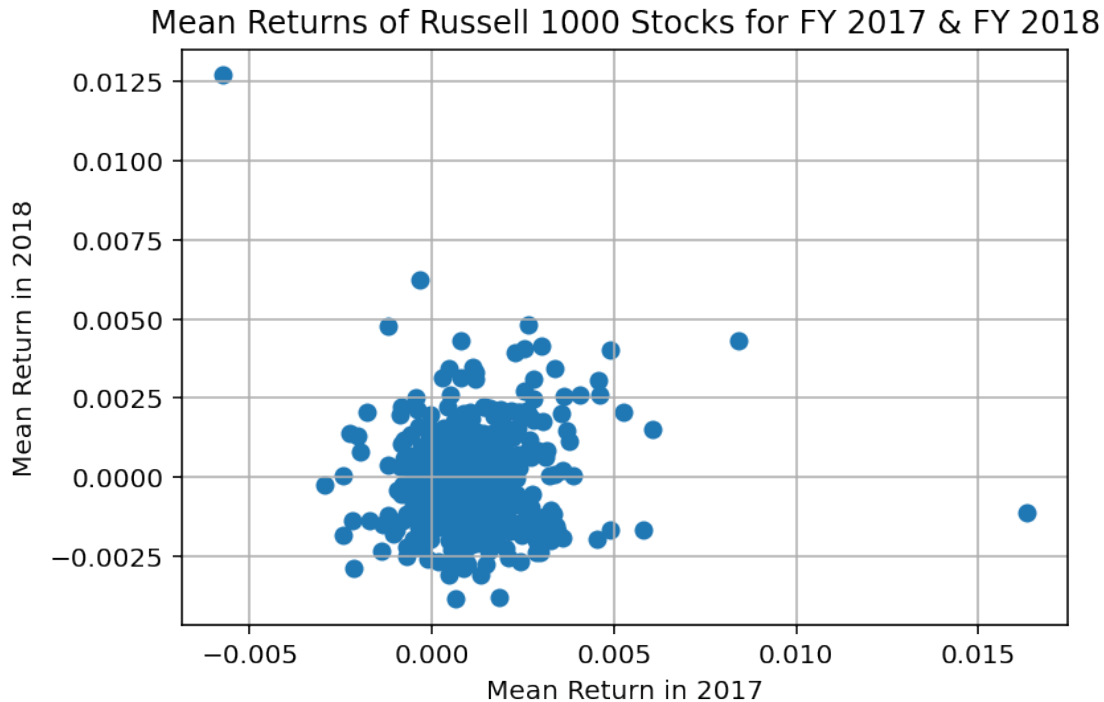
```
[10]:
```

	2017	2018
A	0.0016	0.0002
AA	0.0029	-0.0024
AAL	0.0006	-0.0016
AAP	-0.0018	0.0020
AAPL	0.0016	-0.0001
...
ZBH	0.0007	-0.0005
ZBRA	0.0009	0.0020
ZG	0.0006	-0.0005
ZION	0.0008	-0.0007
ZTS	0.0013	0.0008

[880 rows x 2 columns]

```
[11]: # Plotting of the graph
plt.scatter(mean_ret2017, mean_ret2018)
plt.xlabel('Mean Return in 2017')
plt.ylabel('Mean Return in 2018')
plt.title('Mean Returns of Russell 1000 Stocks for FY 2017 & FY 2018')
plt.grid()
plt.show
```

```
[11]: <function matplotlib.pyplot.show(close=None, block=None)>
```



```
[12]: # Calculating the correlation between Mean Returns in t and t+1
correlation_mean_ret = total_df.corr()
correlation_mean_ret
```

```
[12]:      2017    2018
2017  1.0000  0.0292
2018  0.0292  1.0000
```

```
[13]: # We have calculated the mean returns for FY 2017 and FY 2018.
# Then we have merged the two data frames using pd.concat() and printed the
# result out.
# We have used scatter plot to determine the relationship between the two data
# frames. The distance between the datapoints depicts the strength of
# relationship between them.
# To predict if mean returns in year t predict mean returns in year t+1, we have
# used correlation (total_df.corr()) as a parameter to perform the analysis.
# A correlation coefficient of 0.0292 means that the means of the two years are
# positively but weakly correlated i.e. if mean returns in year t change, it
# has a weak effect on the returns of year t+1.
```

2.3.2 Task 2: Does volatility in year t predict volatility in year $t + 1$?

```
[14]: # std dev for year t & t+1
std_2017 = returns.loc['2017'].std(skipna=True)
std_2018 = returns.loc['2018'].std(skipna=True)

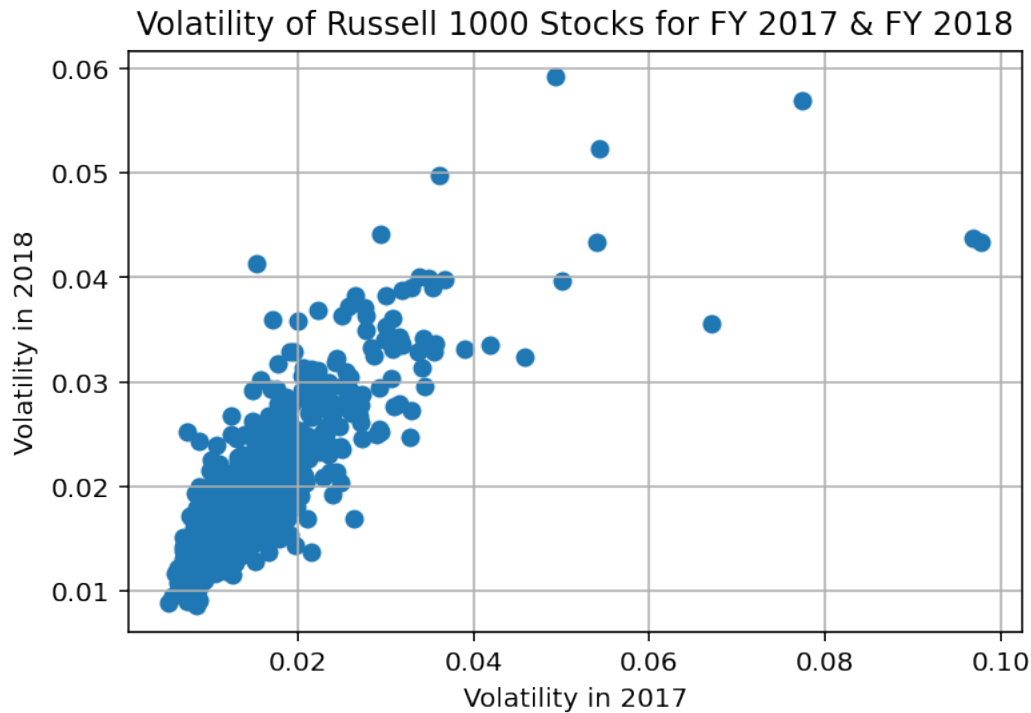
# combining std dev for year t & t+1
total_df_v = pd.concat([std_2017, std_2018], axis=1).dropna()
total_df_v.columns = ["2017", "2018"]
total_df_v
```

```
[14]:      2017   2018
A      0.0105 0.0171
AA     0.0236 0.0282
AAL    0.0180 0.0252
AAP    0.0248 0.0203
AAPL   0.0111 0.0181
...     ...   ...
ZBH    0.0123 0.0148
ZBRA   0.0154 0.0254
ZG     0.0191 0.0329
ZION   0.0142 0.0157
ZTS    0.0093 0.0148

[880 rows x 2 columns]
```

```
[15]: # Plotting of the graph
plt.scatter(std_2017, std_2018)
plt.xlabel('Volatility in 2017')
plt.ylabel('Volatility in 2018')
plt.title('Volatility of Russell 1000 Stocks for FY 2017 & FY 2018')
plt.grid()
plt.show
```

```
[15]: <function matplotlib.pyplot.show(close=None, block=None)>
```



```
[16]: # Calculating the correlation between Volatility in t and t+1
correlation_v = total_df_v.corr()
correlation_v
```

```
[16]:      2017    2018
2017  1.0000  0.8086
2018  0.8086  1.0000
```

```
[17]: # We have calculated the volatility for FY 2017 and FY 2018.
# Then we have merged the two data frames using pd.concat() and printed the
↳ result out.
# We have used scatter plot to determine the relationship between the two data
↳ frames. The distance between the datapoints depicts the strength of
↳ relationship between them.
# To predict if volatility of returns in year t predicts volatility in year t+1,
↳ we have used correlation (total_df_v.corr()) as a parameter to perform the
↳ analysis.
# A correlation coefficient of 0.8086 means that the volatility of year 't' and
↳ year 't+1' are positively and highly correlated i.e. if volatility in year t
↳ changes in one direction, it has a strong effect on the volatility of year
↳ t+1, in the same direction.
```

2.3.3 Task 3: Do Sharpe Ratios in year t predict Sharpe Ratios in year $t + 1$?

```
[18]: # Risk-free rate in  $t$  &  $t+1$ 
rf = ff['RF'].loc['2017':'2018']
rf_mean = rf.mean()
rf.head()
```

```
[18]: Date
2017-01-03    0.0000
2017-01-04    0.0000
2017-01-05    0.0000
2017-01-06    0.0000
2017-01-09    0.0000
Name: RF, dtype: float64
```

```
[19]: # Annualized return for year  $t$  &  $t+1$ 
ann_ret2017 = returns.loc['2017'].mean(skipna=True) * 252
ann_ret2018 = returns.loc['2018'].mean(skipna=True) * 252

# Annualized volatility for year  $t$  &  $t+1$ 
ann_vol2017 = returns.loc['2017'].std(skipna=True) * np.sqrt(252)
ann_vol2018 = returns.loc['2018'].std(skipna=True) * np.sqrt(252)

# Sharpe Ratio for year  $t * t+1$ 
sharpe_ratio2017 = (ann_ret2017 - rf_mean) / ann_vol2017
sharpe_ratio2018 = (ann_ret2018 - rf_mean) / ann_vol2018

sr_df = pd.concat([sharpe_ratio2017, sharpe_ratio2018], axis=1).dropna()
sr_df.columns = ["2017", "2018"]
sr_df
```

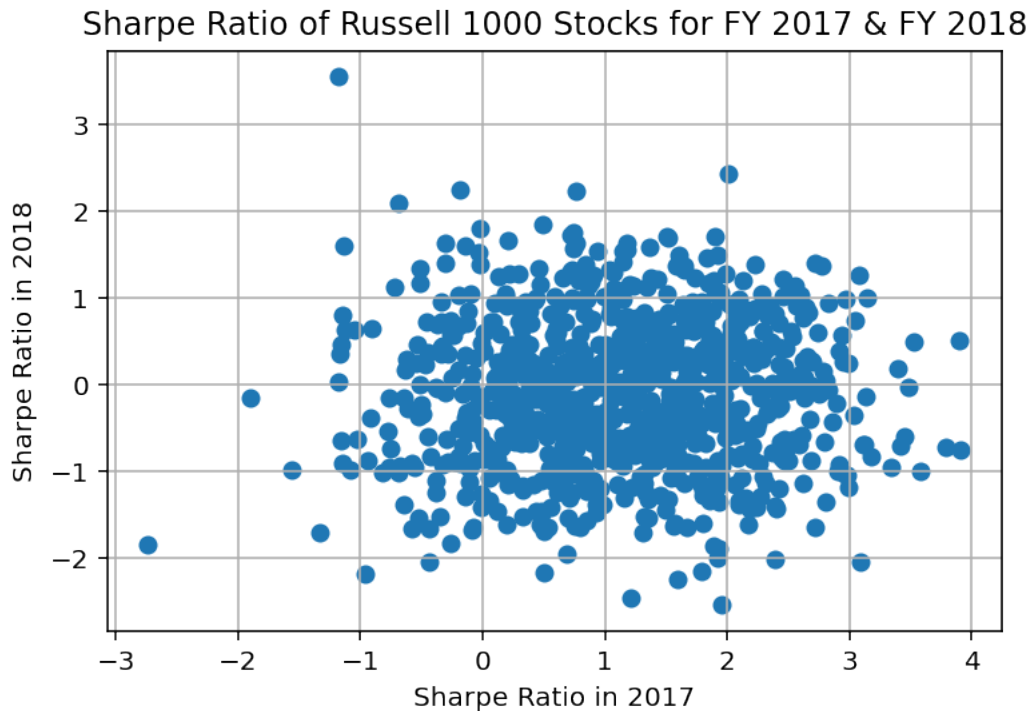
```
[19]:      2017    2018
A      2.4693  0.1968
AA     1.9327 -1.3538
AAL    0.5524 -0.9839
AAP   -1.1378  1.5902
AAPL   2.3422 -0.0504
...     ...     ...
ZBH    0.9439 -0.4941
ZBRA   0.9035  1.2614
ZG     0.5203 -0.2214
ZION   0.8965 -0.6853
ZTS    2.1355  0.8767
```

```
[880 rows x 2 columns]
```



```
[20]: # Plotting of the graph
plt.scatter(sharpe_ratio2017, sharpe_ratio2018)
plt.xlabel('Sharpe Ratio in 2017')
plt.ylabel('Sharpe Ratio in 2018')
plt.title('Sharpe Ratio of Russell 1000 Stocks for FY 2017 & FY 2018')
plt.grid()
plt.show
```

```
[20]: <function matplotlib.pyplot.show(close=None, block=None)>
```



```
[21]: # Calculating the correlation between Sharpe Ratio in t and t+1
correlation_sr = sr_df.corr()
correlation_sr
```

```
[21]:      2017    2018
2017  1.0000  0.0347
2018  0.0347  1.0000
```

```
[22]: # We have calculated the Sharpe Ratios for FY 2017 and FY 2018 individually.
# We have taken the mean of risk-free rate between years FY2017-18.
# Then we have merged the two data frames using pd.concat() and printed the
↳ result out.
```

```
# We have used scatter plot to determine the relationship between the two data
frames. The distance between the datapoints depicts the strength of
relationship between them.
# To predict if sharpe ratio in year t predicts the sharpe ratio in year t+1, we
have used correlation (sr_df.corr()) as a parameter to perform the analysis.
# A correlation coefficient of 0.0347 means that the sharpe ratio of year 't'
and year 't+1' are weakly, positively correlated i.e. a change in sharpe
ratio of year 't' would have a weak effect on the sharpe ratio for year 't+1'
```

2.3.4 Task 4: Do CAPM betas in year t predict CAPM betas in year $t + 1$?

```
[23]: # Returns in t & t+1
returns_2017 = returns.loc['2017']
returns_2018 = returns.loc['2018']
```

```
[24]: # Beta function defined
def beta(ri, rf=ff['RF'], rm_rf=ff['Mkt-RF']):
    ri_rf = ri.sub(rf).dropna()
    rm_rf = rm_rf.loc[ri_rf.index]
    return ri_rf.cov(rm_rf) / rm_rf.var()
```

```
[25]: # CAPM Beta in t & t+1
beta_2017 = returns_2017.apply(beta)
beta_2018 = returns_2018.apply(beta)

# Beta in t & t+1 combined
beta_df= pd.concat([beta_2017, beta_2018], axis=1).dropna()
beta_df.columns = ["2017", "2018"]
beta_df
```

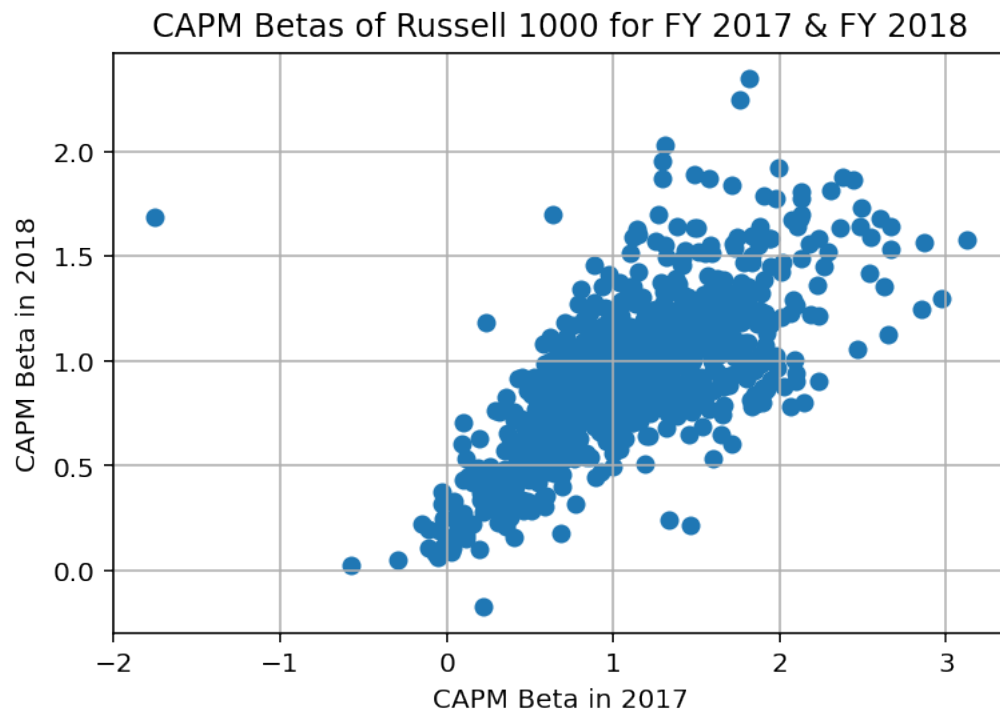
```
[25]:
```

	2017	2018
A	1.2132	1.0994
AA	2.0835	1.2904
AAL	1.7952	1.3265
AAP	0.6942	0.8526
AAPL	1.1904	1.2410
...
ZBH	0.8974	0.9266
ZBRA	1.5401	1.3151
ZG	1.6489	0.9059
ZION	1.7197	0.9336
ZTS	0.6948	1.0227

```
[880 rows x 2 columns]
```

```
[26]: # Plotting of the graph
plt.scatter(beta_2017, beta_2018)
plt.xlabel('CAPM Beta in 2017')
plt.ylabel('CAPM Beta in 2018')
plt.title('CAPM Betas of Russell 1000 for FY 2017 & FY 2018')
plt.grid()
plt.show
```

```
[26]: <function matplotlib.pyplot.show(close=None, block=None)>
```



```
[27]: # Calculating the correlation between CAPM beta in t and t+1
correlation_beta = beta_df.corr()
correlation_beta
```

```
[27]:      2017    2018
2017  1.0000  0.7018
2018  0.7018  1.0000
```

```
[28]: # We have calculated the CAPM betas for FY 2017 and FY 2018. We have defined a
      ↪ function beta() for the same.
      # Then we have merged the two data frames using pd.concat() and printed the
      ↪ result out.
```

```

# We have used scatter plot to determine the relationship between the two data
frames. The distance between the datapoints depicts the strength of
relationship between them.
# To predict if CAPM beta in year t predicts the CAPM beta in year t+1, we have
used correlation (beta_df.corr()) as a parameter to perform the analysis.
# A correlation coefficient of 0.7018 means that the CAPM betas of year 't' and
year 't+1' are highly, positively correlated i.e. a change in the CAPM betas
of year 't' would have a strong uphill linear relationship with the CAPM
betas for year 't+1'

```

2.3.5 Task 5: Does volatility in year t predict mean returns in year $t + 1$?

```

[29]: # Volatility for year t
std_2017 = returns.loc['2017'].std(skipna=True)

# Mean returns for year t+1
mean_ret2018 = returns.loc['2018'].mean(skipna=True)

# Vol and mean combined
vol_mean_df = pd.concat([std_2017, mean_ret2018], axis=1).dropna()
vol_mean_df.columns = ["Vol_2017", "Ret_2018"]
vol_mean_df

```

```

[29]:      Vol_2017  Ret_2018
A      0.0105   0.0002
AA     0.0236  -0.0024
AAL    0.0180  -0.0016
AAP    0.0248   0.0020
AAPL   0.0111  -0.0001
...      ...      ...
ZBH    0.0123  -0.0005
ZBRA   0.0154   0.0020
ZG     0.0191  -0.0005
ZION   0.0142  -0.0007
ZTS    0.0093   0.0008

```

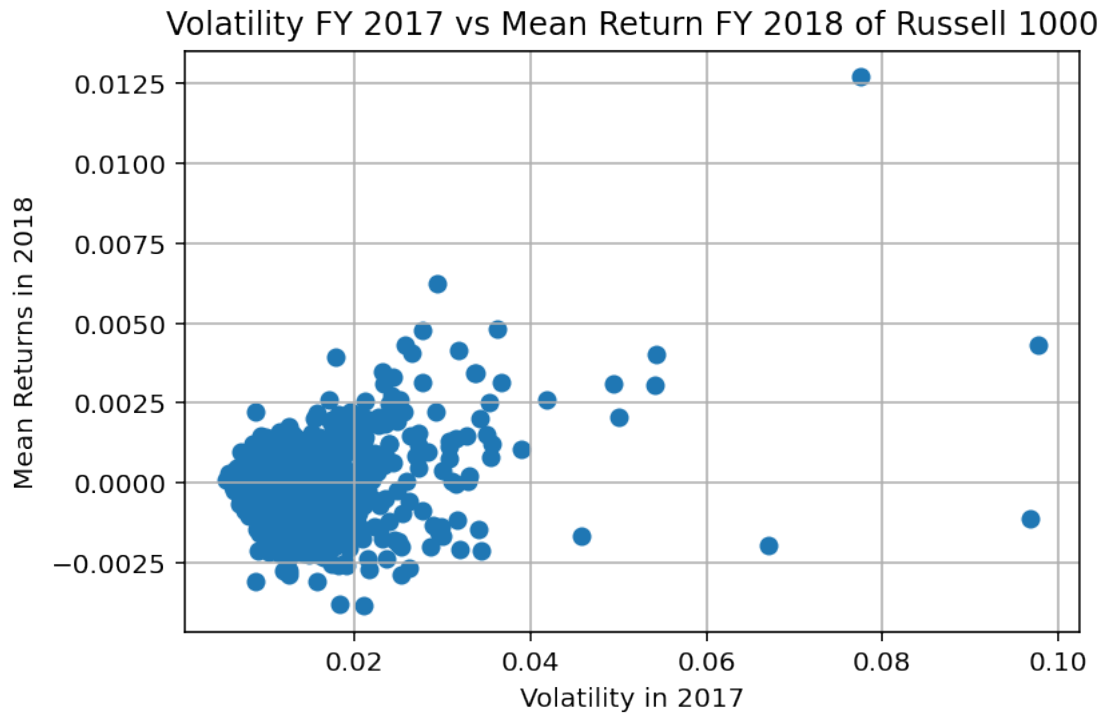
[880 rows x 2 columns]

```

[30]: # Plotting of the graph
plt.scatter(std_2017, mean_ret2018)
plt.xlabel('Volatility in 2017')
plt.ylabel('Mean Returns in 2018')
plt.title('Volatility FY 2017 vs Mean Return FY 2018 of Russell 1000')
plt.grid()
plt.show

```

```
[30]: <function matplotlib.pyplot.show(close=None, block=None)>
```



```
[31]: # Calculating the correlation between Volatility and Mean Returns
correlation_vol_mean = vol_mean_df.corr()
correlation_vol_mean
```

```
[31]:      Vol_2017  Ret_2018
Vol_2017    1.0000    0.2735
Ret_2018    0.2735    1.0000
```

```
[32]: # We have calculated the volatility for FY 2017 and the mean returns for FY
      ↪ 2018.
      # Then we have merged the two data frames using pd.concat() and printed the
      ↪ result out.
      # We have used scatter plot to determine the relationship between the two data
      ↪ frames. The distance between the datapoints depicts the strength of
      ↪ relationship between them.
      # To predict if volatility in year predicts the mean returns in year +1, we
      ↪ have used correlation (vol_mean_df.corr()) as a parameter to perform the
      ↪ analysis.
```

```
# A correlation coefficient of 0.2735 means that the volatility in year 2017
↳ and the mean returns of year 2018 show positive correlation i.e. a change in
↳ the volatility of year 't' has a weak uphill linear relationship to the
↳ mean returns for the year 't+1'
```

2.3.6 Task 6: Does CAPM beta in year t predict mean returns in year $t + 1$?

```
[33]: # CAPM beta in t
beta_2017 = returns_2017.apply(beta)

# Mean returns in t+1
mean_ret2018 = returns.loc['2018'].mean(skipna=True)

# CAPM Beta and Mean Return combined
CAPM_mean_df = pd.concat([beta_2017, mean_ret2018], axis=1).dropna()
CAPM_mean_df.columns = ["CAPM2017" , "Ret2018"]
CAPM_mean_df
```

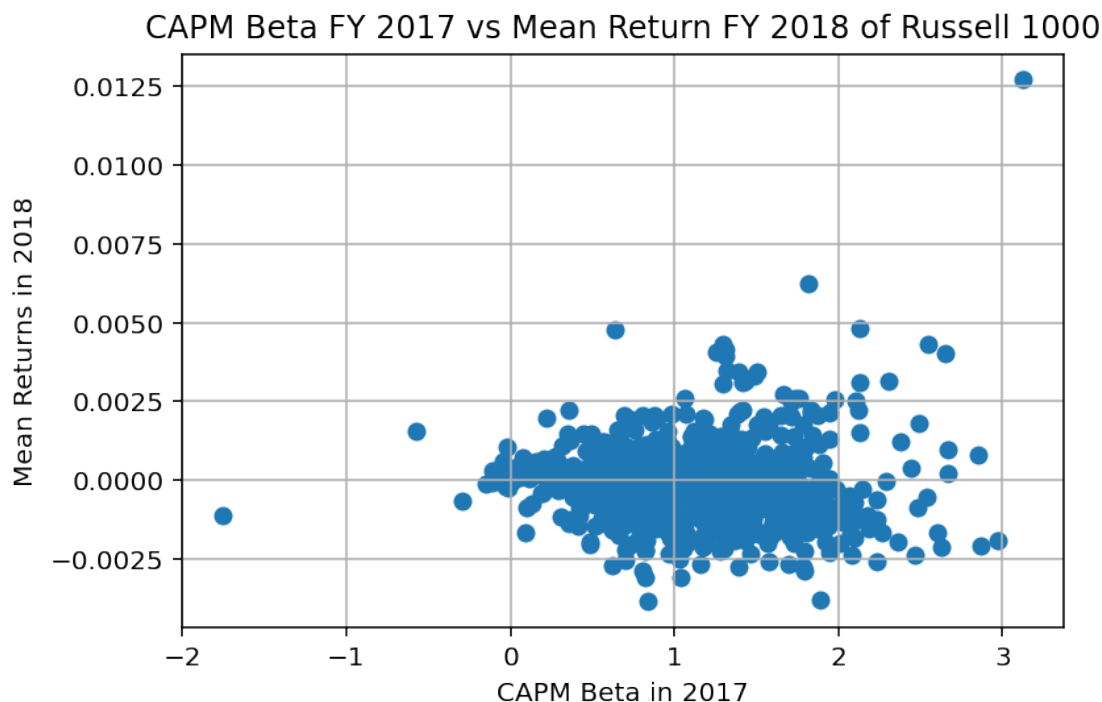
```
[33]:
```

	CAPM2017	Ret2018
A	1.2132	0.0002
AA	2.0835	-0.0024
AAL	1.7952	-0.0016
AAP	0.6942	0.0020
AAPL	1.1904	-0.0001
...
ZBH	0.8974	-0.0005
ZBRA	1.5401	0.0020
ZG	1.6489	-0.0005
ZION	1.7197	-0.0007
ZTS	0.6948	0.0008

[880 rows x 2 columns]

```
[34]: # Plotting of the graph
plt.scatter(beta_2017, mean_ret2018)
plt.xlabel('CAPM Beta in 2017')
plt.ylabel('Mean Returns in 2018')
plt.title('CAPM Beta FY 2017 vs Mean Return FY 2018 of Russell 1000')
plt.grid()
plt.show
```

```
[34]: <function matplotlib.pyplot.show(close=None, block=None)>
```



```
[35]: # Calculating the correlation between CAPM and Mean Returns
correlation_CAPM_mean = CAPM_mean_df.corr()
correlation_CAPM_mean
```

```
[35]:          CAPM2017  Ret2018
CAPM2017    1.0000  -0.0255
Ret2018    -0.0255    1.0000
```

```
[36]: # We have calculated the CAPM betas for FY 2017 and the mean returns for FY
      ↪ 2018.
      # Then we have merged the two data frames using pd.concat() and printed the
      ↪ result out.
      # We have used scatter plot to determine the relationship between the two data
      ↪ frames. The distance between the datapoints depicts the strength of
      ↪ relationship between them.
      # To predict if CAPM betas in year 't' predicts the mean returns in year 't+1', we
      ↪ have used correlation (CAPM_mean_df.corr()) as a parameter to perform the
      ↪ analysis.
      # A correlation coefficient of -0.0255 means that the CAPM betas for year 2017
      ↪ and the mean returns for the year 2018 show negative correlation i.e. a
      ↪ change in the CAPM betas of the year 't' has a weak downhill linear
      ↪ relationship to the mean returns for the year 't+1'
```

2.4 Portfolios I

For this section, create 100 random portfolios of 50 stocks each from the daily returns in `returns`. Equally weight these portfolios and rebalance them daily. Use the same stocks and years t and $t+1$ as the previous section.

```
[37]: # defining returns for t & t+1
returns_2017 = returns.loc["2017"].fillna(0)
returns_2018 = returns.loc["2018"].fillna(0)

returns_2017, returns_2018
```

```
[37]: (
      A      AA      AAL      AAP      AAPL      ABBV      ABC      ABNB  \
Date
2017-01-03  0.0204  0.0267 -0.0084  0.0088  0.0028 -0.0034  0.0565  0.0000
2017-01-04  0.0131  0.0496  0.0086  0.0082 -0.0011  0.0141  0.0248  0.0000
2017-01-05 -0.0119  0.0129 -0.0173 -0.0007  0.0051  0.0076 -0.0116  0.0000
2017-01-06  0.0312  0.0010  0.0070 -0.0131  0.0111  0.0003  0.0134  0.0000
2017-01-09  0.0031 -0.0391  0.0188 -0.0006  0.0092  0.0066  0.0080  0.0000
...
2017-12-22 -0.0025  0.0204 -0.0038  0.0042  0.0000  0.0031 -0.0057  0.0000
2017-12-26 -0.0015  0.0078  0.0049  0.0140 -0.0254 -0.0047  0.0085  0.0000
2017-12-27  0.0007  0.0290 -0.0085 -0.0215  0.0002  0.0035 -0.0070  0.0000
2017-12-28  0.0022  0.0444  0.0011 -0.0006  0.0028 -0.0031 -0.0001  0.0000
2017-12-29 -0.0049 -0.0050 -0.0082 -0.0002 -0.0108 -0.0110 -0.0083  0.0000

      ABT      ACGL  ...      YUM      Z      ZBH      ZBRA      ZG  \
Date
2017-01-03  0.0167 -0.0046  ... -0.0019  0.0206  0.0013  0.0057  0.0255
2017-01-04  0.0079  0.0071  ...  0.0036 -0.0035  0.0092  0.0090 -0.0021
2017-01-05  0.0086 -0.0102  ...  0.0033 -0.0181  0.0064 -0.0262 -0.0131
2017-01-06  0.0272  0.0099  ...  0.0121  0.0077  0.0001  0.0143  0.0090
2017-01-09 -0.0010 -0.0145  ...  0.0028  0.0068  0.0194  0.0001  0.0022
...
2017-12-22  0.0000  0.0023  ... -0.0012 -0.0007  0.0014 -0.0130 -0.0012
2017-12-26  0.0012  0.0062  ... -0.0025 -0.0080 -0.0013 -0.0034 -0.0069
2017-12-27  0.0082  0.0023  ...  0.0026 -0.0098  0.0015  0.0015 -0.0084
2017-12-28 -0.0002  0.0041  ...  0.0033 -0.0041  0.0154 -0.0064 -0.0039
2017-12-29 -0.0068 -0.0009  ... -0.0128 -0.0121 -0.0089 -0.0046 -0.0136

      ZI      ZION      ZM      ZS      ZTS
Date
2017-01-03  0.0000  0.0033  0.0000  0.0000  0.0011
2017-01-04  0.0000  0.0144  0.0000  0.0000  0.0097
2017-01-05  0.0000 -0.0162  0.0000  0.0000 -0.0033
2017-01-06  0.0000  0.0065  0.0000  0.0000  0.0032
2017-01-09  0.0000 -0.0108  0.0000  0.0000 -0.0028
...
      ...      ...      ...      ...      ...
```


2017-12-22	0.0000	-0.0025	0.0000	0.0000	-0.0040
2017-12-26	0.0000	-0.0092	0.0000	0.0000	0.0049
2017-12-27	0.0000	-0.0029	0.0000	0.0000	0.0015
2017-12-28	0.0000	0.0124	0.0000	0.0000	-0.0008
2017-12-29	0.0000	-0.0099	0.0000	0.0000	-0.0048

[251 rows x 1010 columns],

	A	AA	AAL	AAP	AAPL	ABBV	ABC	ABNB	\
Date									
2018-01-02	0.0094	0.0241	0.0185	0.0642	0.0179	0.0176	0.0242	0.0000	
2018-01-03	0.0254	-0.0121	-0.0123	0.0090	-0.0002	0.0156	0.0037	0.0000	
2018-01-04	-0.0075	0.0037	0.0063	0.0369	0.0046	-0.0057	-0.0022	0.0000	
2018-01-05	0.0160	-0.0112	-0.0004	0.0106	0.0114	0.0174	0.0121	0.0000	
2018-01-08	0.0021	0.0168	-0.0099	-0.0070	-0.0037	-0.0160	0.0166	0.0000	
...	
2018-12-24	-0.0098	-0.0470	-0.0344	-0.0164	-0.0259	-0.0089	-0.0169	0.0000	
2018-12-26	0.0458	0.0791	0.0865	0.0410	0.0704	0.0580	0.0322	0.0000	
2018-12-27	0.0143	0.0007	-0.0077	-0.0022	-0.0065	0.0098	0.0067	0.0000	
2018-12-28	-0.0054	-0.0206	-0.0066	0.0050	0.0005	0.0135	0.0058	0.0000	
2018-12-31	0.0227	-0.0008	0.0088	0.0129	0.0097	0.0117	0.0059	0.0000	

	ABT	ACGL	...	YUM	Z	ZBH	ZBRA	ZG	\
Date			...						
2018-01-02	0.0301	-0.0272	...	-0.0001	0.0381	0.0281	-0.0009	0.0383	
2018-01-03	0.0022	0.0009	...	-0.0009	0.0115	0.0069	0.0199	0.0102	
2018-01-04	-0.0017	0.0037	...	0.0102	-0.0195	-0.0014	0.0198	-0.0169	
2018-01-05	0.0029	-0.0039	...	0.0058	0.0114	0.0099	0.0156	0.0079	
2018-01-08	-0.0029	0.0001	...	0.0017	0.0035	0.0019	0.0100	0.0066	
...	
2018-12-24	-0.0254	-0.0294	...	-0.0127	0.0035	-0.0216	-0.0229	0.0025	
2018-12-26	0.0619	0.0452	...	0.0341	0.0883	0.0493	0.0673	0.0899	
2018-12-27	0.0145	0.0239	...	0.0108	0.0415	-0.0007	0.0186	0.0411	
2018-12-28	0.0065	-0.0057	...	0.0071	-0.0184	0.0092	0.0040	-0.0207	
2018-12-31	0.0174	0.0125	...	0.0034	0.0022	0.0104	0.0209	0.0051	

	ZI	ZION	ZM	ZS	ZTS
Date					
2018-01-02	0.0000	-0.0026	0.0000	0.0000	-0.0037
2018-01-03	0.0000	-0.0012	0.0000	0.0000	0.0046
2018-01-04	0.0000	0.0041	0.0000	0.0000	0.0060
2018-01-05	0.0000	0.0004	0.0000	0.0000	0.0114
2018-01-08	0.0000	-0.0049	0.0000	0.0000	0.0120
...
2018-12-24	0.0000	-0.0141	0.0000	0.0169	-0.0294
2018-12-26	0.0000	0.0519	0.0000	0.1007	0.0459
2018-12-27	0.0000	-0.0012	0.0000	0.0266	0.0170
2018-12-28	0.0000	-0.0007	0.0000	-0.0092	0.0019

```
2018-12-31 0.0000 0.0077 0.0000 -0.0148 0.0124
```

```
[251 rows x 1010 columns])
```

```
[38]: np.random.seed(1234)
num_portfolio = 100
num_stocks = 50
returns= returns.loc['2017-01-01':'2019-01-01']
stocks= returns.columns.tolist()
portfolio_returns_dict_t_1 = {}

# Creating dictionary for t+1
for i in range (num_portfolio):
    filtered_stocks = np.random.choice(stocks, num_stocks, replace = False)
    portfolio = returns[filtered_stocks]
    wts = pd.Series(1/num_portfolio, index= filtered_stocks)
    pfolio_returns = portfolio.mul(wts, axis=1)
    pfolio_returns_sum = pfolio_returns.sum(axis=1)
    dly_portfolio_return = pfolio_returns_sum.dropna()
    portfolio_returns_dict_t_1[f"Portfolio {i+1}: {' '.join(filtered_stocks)}"] = dly_portfolio_return.loc['2018-01-01':
    '2019-01-01']

print(portfolio_returns_dict_t_1)

np.random.seed(1234)
num_portfolio = 100
num_stocks = 50
returns= returns.loc['2017-01-01':'2019-01-01']
stocks= returns.columns.tolist()
portfolio_returns_dict_t = {}

# Creating dictionary for t
for i in range (num_portfolio):
    filtered_stocks = np.random.choice(stocks, num_stocks, replace = False)
    portfolio = returns[filtered_stocks]
    wts = pd.Series(1/num_portfolio, index= filtered_stocks)
    pfolio_returns = portfolio.mul(wts, axis=1)
    pfolio_returns_sum = pfolio_returns.sum(axis=1)
    dly_portfolio_return = pfolio_returns_sum.dropna()
    portfolio_returns_dict_t[f"Portfolio {i+1}: {' '.join(filtered_stocks)}"] =
    dly_portfolio_return.loc['2017-01-01':'2018-01-01']

print(portfolio_returns_dict_t)
```

```
{'Portfolio 1: ZTS, KHC, EW, NET, J, RIVN, ODFL, AXP, JCI, BOH, NATI, VRT, T,
REYN, KD, IBKR, BX, CNM, NWSA, RSG, ROST, ALK, KNX, TWKS, DOW, HOG, THG, STLD,
```

HUBS, EXAS, TXT, BKR, CCI, EQIX, TSCO, AN, CTSH, CBRE, RKT, SBAC, AGO, CACC, QRVO, GLW, NVCR, COLM, ESTC, EVR, CLH, FOXA': Date

2018-01-02	0.0025
2018-01-03	0.0025
2018-01-04	0.0030
2018-01-05	0.0012
2018-01-08	0.0002
...	
2018-12-24	-0.0080
2018-12-26	0.0191
2018-12-27	0.0016
2018-12-28	0.0010
2018-12-31	0.0040

Length: 251, dtype: float64, 'Portfolio 2: PAYC, CRWD, SIX, CVS, TDY, HXL, LNC, REG, KSS, APP, ROK, CHE, VRTX, WH, CG, AMZN, OVV, MTCH, NNN, AWK, OC, SLGN, AEP, BEPC, MTN, FWONK, TNDM, WLK, MDB, FSLR, M, CRM, HAS, USFD, BXP, RNR, BLDR, ABT, OMF, VSAT, NXST, RH, ON, DUK, TNL, MPW, XRAY, LSI, CB, JBGS': Date

2018-01-02	0.0048
2018-01-03	0.0001
2018-01-04	0.0011
2018-01-05	0.0018
2018-01-08	0.0042
...	
2018-12-24	-0.0119
2018-12-26	0.0255
2018-12-27	0.0033
2018-12-28	0.0004
2018-12-31	0.0045

Length: 251, dtype: float64, 'Portfolio 3: ZS, ALB, ALL, AMZN, NOC, INFA, FIS, CMCSA, ETN, TRMB, FRT, LYB, LSCC, CPA, NYCB, GGG, BWXT, FNF, HHC, AVY, STZ, COUP, ADT, LLY, CNXC, SKX, SON, MP, FCX, CARR, PTON, FIVE, DXCM, ULTA, LCID, CTAS, FR, AVB, HUBB, SYF, IVZ, IFF, VST, IP, ATO, LRCX, SQ, CSCO, LEA, LSXMA': Date

2018-01-02	0.0040
2018-01-03	0.0032
2018-01-04	0.0001
2018-01-05	0.0027
2018-01-08	-0.0001
...	
2018-12-24	-0.0094
2018-12-26	0.0221
2018-12-27	0.0043
2018-12-28	-0.0005
2018-12-31	0.0044

Length: 251, dtype: float64, 'Portfolio 4: PLTR, CNXC, ZI, CNP, WST, BPOP, WDAY, NFE, AXS, ROKU, BEPC, AME, RRC, IVZ, VLO, PYCR, EHC, MS, LAMR, SWN, UTHR, Z, PATH, ESI, SLG, CHPT, XOM, OVV, UAL, MKC, DTE, SYK, IEX, DVN, EWBC, ATUS, BILL, GTES, LSCC, DGX, IBKR, HR, CCI, VNO, TSLA, RS, PPL, ANSS, SNDR, CDNS': Date

2018-01-02	0.0040
2018-01-03	0.0019
2018-01-04	-0.0008
2018-01-05	-0.0008
2018-01-08	0.0019
...	
2018-12-24	-0.0117
2018-12-26	0.0224
2018-12-27	0.0020
2018-12-28	-0.0012
2018-12-31	0.0029

Length: 251, dtype: float64, 'Portfolio 5: LH, TW, FFIV, IR, LHX, DXC, MAT, J, ADI, PARAA, REYN, FITB, RYN, MU, ECL, NFE, UHAL-B, NVCR, DHR, BEPC, LUV, AVB, FTV, HUM, SAM, IBKR, NTAP, UA, NATI, WMB, NDSN, QS, PM, KBR, LVS, MGM, DISH, BRO, HOLX, EHAB, EXP, HHC, WYNN, RXO, K, SITE, NYCB, INTU, LUMN, PLD': Date

2018-01-02	0.0039
2018-01-03	0.0015
2018-01-04	0.0018
2018-01-05	0.0017
2018-01-08	-0.0001
...	
2018-12-24	-0.0098
2018-12-26	0.0198
2018-12-27	0.0020
2018-12-28	0.0003
2018-12-31	0.0044

Length: 251, dtype: float64, 'Portfolio 6: HAYW, EWBC, LUMN, ROL, PAYC, L, DHR, BK, CACI, AAP, BF-A, BBWI, LSXMA, BAC, SAIC, BEN, CPRT, FTV, BG, CTVA, TXG, TXT, HPP, RYAN, TPR, FRT, SLM, STT, MGM, SYU, OXY, UHS, ENTG, EXR, UHAL, GPS, FISV, CBSH, WST, VRSK, USFD, DELL, PCTY, TSCO, PTC, BMRN, OHI, PLD, SEIC, PYCR': Date

2018-01-02	0.0029
2018-01-03	0.0004
2018-01-04	0.0009
2018-01-05	0.0016
2018-01-08	0.0005
...	
2018-12-24	-0.0116
2018-12-26	0.0197
2018-12-27	0.0030
2018-12-28	-0.0001
2018-12-31	0.0045

Length: 251, dtype: float64, 'Portfolio 7: PCG, LVS, SQ, ARES, HR, AIRC, BRKR, NWSA, FRPT, PSTG, SLM, CDNS, TAP, NDSN, SNOW, POOL, ROL, CVNA, WPC, J, TTEK, AOS, BXP, INFA, IRM, MS, FG, MSA, CL, HCA, MNST, WBA, LSCC, R, PH, HBAN, HII, UGI, WU, BLD, FSLR, WMS, TMO, EPR, GGG, GEHC, BOH, CAH, IART, FHN': Date

2018-01-02	0.0026
2018-01-03	0.0006
2018-01-04	0.0007

```

2018-01-05    0.0039
2018-01-08    0.0031
...
2018-12-24   -0.0100
2018-12-26    0.0196
2018-12-27    0.0029
2018-12-28   -0.0005
2018-12-31    0.0038
Length: 251, dtype: float64, 'Portfolio 8: RGA, CSL, HII, AAPL, SBNY, NCNO, CNC,
BLK, RIVN, WIX, UAA, TNL, JWN, CPT, VTS, UNM, PEG, AGL, RYAN, CSGP, TECH, TPL,
NET, CLX, HAS, DXCM, CAR, ECL, M, EXPE, DOCS, ADI, LCID, HAYW, PNC, HUBB, BURL,
LYB, CHRW, SBAC, MPW, ZBRA, GWW, FICO, AXS, SPGI, ERIE, AM, OLED, NVDA': Date
2018-01-02    0.0027
2018-01-03    0.0028
2018-01-04   -0.0002
2018-01-05    0.0018
2018-01-08    0.0031
...
2018-12-24   -0.0092
2018-12-26    0.0214
2018-12-27    0.0032
2018-12-28    0.0000
2018-12-31    0.0032
Length: 251, dtype: float64, 'Portfolio 9: UA, JNPR, AXON, OZK, MTD, MO, CMCSA,
INCY, UAL, PWR, MTZ, LVS, AZPN, INTC, AGO, ES, WBA, TDY, NWL, STT, SUI, DAR,
ADI, AXTA, GIS, PODD, SOFI, ABT, BR, FLO, VAC, EQH, AR, PACW, MKC, TXT, FOX,
CTVA, RARE, TYL, EIX, PSA, MOH, CACC, HWM, WST, CASY, ORCL, CHDN, WMT': Date
2018-01-02    0.0050
2018-01-03    0.0010
2018-01-04    0.0015
2018-01-05    0.0019
2018-01-08    0.0030
...
2018-12-24   -0.0110
2018-12-26    0.0219
2018-12-27    0.0030
2018-12-28   -0.0006
2018-12-31    0.0058
Length: 251, dtype: float64, 'Portfolio 10: HTZ, STLD, MP, MO, WWD, WSC, EXPD,
SJM, VTRS, SGFY, RBLX, LDOS, HBAN, MET, DT, EIX, COIN, AMD, LPX, PTC, CC, BOKF,
TTWO, AZPN, GM, AMZN, AMCR, CERT, VAC, OKE, PPG, APP, PFE, ZBRA, BKR, PINC, IAA,
F, MSFT, WDC, EVRG, WRK, EWBC, THO, VRSK, BALL, ELS, ED, CAH, SLB': Date
2018-01-02    0.0050
2018-01-03    0.0026
2018-01-04    0.0036
2018-01-05    0.0019
2018-01-08    0.0020
...

```

2018-12-24	-0.0102
2018-12-26	0.0182
2018-12-27	0.0022
2018-12-28	0.0017
2018-12-31	0.0033
Length: 251, dtype: float64, 'Portfolio 11: OZK, RTX, LRCX, ULTA, WSC, OHI, MDLZ, WAT, SF, HLT, AKAM, BOKF, MBC, DT, HAL, EPR, RL, MIDD, LPLA, ACGL, H, BR, ATO, LHX, EWBC, GOOG, TNL, JEF, CI, IAC, IDXX, PRGO, WBS, MRVL, IQV, SIRI, IBM, U, QRV0, ESAB, DGX, AVB, AMG, CG, NFE, EGP, PEP, JCI, MDT, DHI': Date	
2018-01-02	0.0029
2018-01-03	0.0038
2018-01-04	0.0011
2018-01-05	0.0014
2018-01-08	0.0012
...	
2018-12-24	-0.0107
2018-12-26	0.0205
2018-12-27	0.0027
2018-12-28	0.0006
2018-12-31	0.0031
Length: 251, dtype: float64, 'Portfolio 12: NVT, AGR, RGA, QDEL, TFC, CIEN, FBIN, FHN, KMX, NTRS, USFD, CAT, WAL, AGNC, FR, RMD, BYD, JBL, PRU, X, DOCS, ESTC, SNV, WAB, MRVI, MPW, LSXMK, CAH, GTES, POST, EL, CGNX, MTB, APH, OLN, SPB, TWLO, NVR, EXAS, IDXX, LAMR, EQIX, NWL, RE, CNM, OHI, FYBR, CINP, RS, VTS': Date	
2018-01-02	0.0019
2018-01-03	0.0039
2018-01-04	0.0028
2018-01-05	0.0029
2018-01-08	0.0003
...	
2018-12-24	-0.0115
2018-12-26	0.0220
2018-12-27	0.0025
2018-12-28	0.0004
2018-12-31	0.0050
Length: 251, dtype: float64, 'Portfolio 13: SSNC, R, GWRE, HAL, UA, HIW, ZG, CFG, DD, REG, UNP, HPE, TRGP, HRP, CME, CPB, WE, FTNT, MASI, TFX, WTW, MAN, BFAM, PYPL, AM, BILL, RIVN, KEYS, DAR, CTAS, MMC, DOCU, NDSN, NOV, CVNA, NTRA, GOOG, PNFP, NVST, PWR, DKNR, MRCY, L, MSI, NWL, CAH, LOW, RYAN, BAC, GEHC': Date	
2018-01-02	0.0041
2018-01-03	0.0035
2018-01-04	0.0025
2018-01-05	0.0024
2018-01-08	0.0009
...	
2018-12-24	-0.0105
2018-12-26	0.0231
2018-12-27	0.0030

```

2018-12-28    -0.0008
2018-12-31     0.0046
Length: 251, dtype: float64, 'Portfolio 14: PEG, BKI, NCR, SSNC, UHAL-B, RITM,
ABT, KMX, BA, OMC, K, TDOC, TRIP, DNA, AMD, NDAQ, EWBC, HD, ISRG, TPL, NNN,
CTRA, PRGO, TROW, CHDN, MSCI, MP, CVNA, PNC, MRK, GDDY, MDB, ESTC, CPT, COLD,
PCG, WMS, NSC, EXC, GH, TTC, ENTG, WOOF, ELAN, AWK, SNV, AAPL, CBSH, COST, LAD':
Date
2018-01-02     0.0031
2018-01-03     0.0013
2018-01-04     0.0012
2018-01-05     0.0033
2018-01-08     0.0034
...
2018-12-24    -0.0101
2018-12-26     0.0257
2018-12-27     0.0035
2018-12-28     0.0018
2018-12-31     0.0044
Length: 251, dtype: float64, 'Portfolio 15: ORCL, BRK-B, TOL, OGE, RUN, HHC,
OXY, MAT, MSCI, MDT, UNVR, AOS, INCY, HR, OHI, AEE, G, ETSY, JLL, FRPT, IPG,
JNJ, KD, UTHR, PNC, ACN, VMI, CBSH, TWKS, AVGO, HOLX, NVT, MSA, WSO, CR, AFL,
HUN, LAD, TW, CRWD, RGA, QGEN, VTS, CPRI, NVR, FFIV, TSN, DCI, REXR, SPB': Date
2018-01-02     0.0040
2018-01-03     0.0018
2018-01-04     0.0003
2018-01-05     0.0021
2018-01-08     0.0020
...
2018-12-24    -0.0105
2018-12-26     0.0201
2018-12-27     0.0031
2018-12-28    -0.0002
2018-12-31     0.0053
Length: 251, dtype: float64, 'Portfolio 16: SWK, REG, WMT, GLW, GME, F, FBIN,
SGFY, MSI, LECO, FOX, VRTX, WOOF, ALNY, BEPC, NTAP, BG, JHG, HIG, NKE, MPW, SPR,
CFG, PYPL, BF-B, UTHR, FOUR, DGX, RS, ORLY, AXON, DOCS, LKQ, TROW, BIO, BALL,
RGA, ABT, MAR, IBM, BBY, AMBP, BWXT, SRPT, CTLT, CSL, DRI, RUN, BRX, LNT': Date
2018-01-02     0.0040
2018-01-03     0.0032
2018-01-04     0.0007
2018-01-05     0.0014
2018-01-08     0.0022
...
2018-12-24    -0.0108
2018-12-26     0.0198
2018-12-27     0.0035
2018-12-28    -0.0007
2018-12-31     0.0058

```

Length: 251, dtype: float64, 'Portfolio 17: SLG, ALGM, AN, KMPR, BLD, MAS, TOST, NEU, GOOG, APA, MAN, EMN, ADSK, OWL, GGG, BDX, AGL, EHAB, OKTA, CNM, EHC, VLO, HE, AGO, MANH, BKI, TT, BFAM, RYN, F, SPG, CG, UWMC, BSY, NI, GILD, DRI, AOS, DOCU, WSM, CRWD, CF, ORCL, ORLY, LUMN, GS, EQIX, DNB, MHK, NTAP': Date

2018-01-02	0.0044
2018-01-03	0.0020
2018-01-04	0.0023
2018-01-05	0.0016
2018-01-08	0.0013

...

2018-12-24	-0.0103
2018-12-26	0.0179
2018-12-27	0.0030
2018-12-28	-0.0007
2018-12-31	0.0025

Length: 251, dtype: float64, 'Portfolio 18: G, PFGC, TOL, SLGN, PSTG, PTON, IEX, HST, RITM, HEI-A, DRI, HE, KEX, UMPQ, ALGN, MA, QDEL, AJG, CDAY, NYT, JWN, DD, AES, IDA, CAT, KHC, MKSI, HLT, CPA, COST, CNM, WBA, GM, NOC, AXTA, BAC, RNG, TRV, WAB, PGR, NBIX, WTM, LSCC, TNDM, FRC, SNPS, SUI, OKE, DIS, CNP': Date

2018-01-02	0.0035
2018-01-03	0.0026
2018-01-04	0.0013
2018-01-05	0.0026
2018-01-08	0.0039

...

2018-12-24	-0.0112
2018-12-26	0.0233
2018-12-27	0.0036
2018-12-28	-0.0002
2018-12-31	0.0052

Length: 251, dtype: float64, 'Portfolio 19: NSA, USB, COHR, DOW, R, QRVO, FANG, AL, GGG, EMR, MO, MOS, LII, COUP, CLX, CUBE, HSY, ALNY, OTIS, GH, AYI, ENOV, ROK, OLED, COIN, TSCO, EXEL, AIZ, RPRX, RE, DRI, MRO, UAA, HLT, PPL, RYN, OVV, BALL, STLD, PM, CAT, CRWD, WMB, STT, ENPH, TWLO, NWL, W, EW, AZO': Date

2018-01-02	0.0056
2018-01-03	0.0041
2018-01-04	0.0006
2018-01-05	0.0015
2018-01-08	0.0021

...

2018-12-24	-0.0118
2018-12-26	0.0256
2018-12-27	0.0034
2018-12-28	0.0001
2018-12-31	0.0043

Length: 251, dtype: float64, 'Portfolio 20: IBM, FLT, NTNX, BLK, MSM, SEB, TRGP, CHD, DNB, RE, UBER, PEG, GPS, GM, QDEL, DV, FDS, MAR, DOCS, CHRW, VEEV, ANET, ATR, STE, AZTA, NEU, MSA, LSI, RTX, INCY, DAR, HE, PNR, HUN, ERIE, ESAB, SCCO,

AN, WSC, BA, CI, NVST, ELV, ITT, NUE, OVV, CLVT, GEHC, BWXT, WY': Date

2018-01-02	0.0029
2018-01-03	0.0030
2018-01-04	0.0006
2018-01-05	0.0018
2018-01-08	0.0019
...	
2018-12-24	-0.0101
2018-12-26	0.0186
2018-12-27	0.0035
2018-12-28	0.0004
2018-12-31	0.0047

Length: 251, dtype: float64, 'Portfolio 21: BRO, APTV, EPR, GL, HAS, MIDD, KBR, ETN, ED, PKG, PEAK, PARA, DTM, BIIB, EQIX, TGT, OKTA, JEF, M, AGR, BMRN, AGNC, HXL, LPLA, NCR, BAC, WMS, RJF, ARES, ATUS, PATH, CLVT, VTS, BR, TNL, MO, RS, ATO, NATI, SBNY, VSCO, SITE, CNP, CMA, SLG, JAMF, PG, VMW, IPG, FDS': Date

2018-01-02	0.0024
2018-01-03	0.0011
2018-01-04	-0.0010
2018-01-05	0.0009
2018-01-08	0.0015
...	
2018-12-24	-0.0107
2018-12-26	0.0192
2018-12-27	0.0021
2018-12-28	-0.0000
2018-12-31	0.0039

Length: 251, dtype: float64, 'Portfolio 22: QDEL, CHDN, IDA, WMS, IBKR, TROW, REYN, APO, APD, DAL, ACN, DD, AKAM, SEIC, EQT, FSLR, UHAL, CRI, CAG, HOG, PPL, FISV, UBER, IVZ, WRK, MU, KLAC, NWL, ACGL, EXP, CIEN, FRC, AMG, KMX, BMRN, NOW, AVB, DV, MTG, URI, STE, PARA, COUP, PCOR, NDAQ, LEN, RH, UNM, USB, ARMK': Date

2018-01-02	0.0044
2018-01-03	0.0024
2018-01-04	0.0020
2018-01-05	0.0019
2018-01-08	0.0017
...	
2018-12-24	-0.0126
2018-12-26	0.0238
2018-12-27	0.0041
2018-12-28	-0.0007
2018-12-31	0.0037

Length: 251, dtype: float64, 'Portfolio 23: EVRG, PHM, KSS, RXO, WSM, FND, ESAB, PEP, OC, TNL, BWA, AZEK, NOW, RYN, CPA, LKQ, MSI, PLNT, TSCO, GGG, NFE, UMPQ, ICE, SPR, FRPT, SJM, PNW, LDOS, PDCE, THG, CPRT, MPWR, BRX, FWONK, ABT, PCG, WE, AZO, C, REXR, WBS, GLW, GRMN, MSM, SPOT, RL, PEGA, UHS, CAT, ROKU': Date

2018-01-02	0.0029
2018-01-03	0.0003

2018-01-04	0.0001
2018-01-05	0.0014
2018-01-08	0.0022
...	
2018-12-24	-0.0095
2018-12-26	0.0222
2018-12-27	0.0034
2018-12-28	-0.0005
2018-12-31	0.0042

Length: 251, dtype: float64, 'Portfolio 24: HOLX, KMPR, JPM, DECK, LNT, FCN, ADP, TDC, XPO, VTRS, RUN, CPB, SYNH, SMG, QGEN, FIS, AJG, BX, VTR, MA, BKR, RS, FITB, M, SBUX, VMC, IPG, PLTR, CPT, UBER, NATI, GLOB, TFSL, AZEK, ST, HLT, ALNY, PDCE, CHE, BSX, VST, CVS, COF, AL, AMH, AMZN, DRI, GOOGL, CVX, LMT': Date

2018-01-02	0.0031
2018-01-03	0.0019
2018-01-04	0.0008
2018-01-05	0.0010
2018-01-08	0.0025
...	
2018-12-24	-0.0105
2018-12-26	0.0234
2018-12-27	0.0030
2018-12-28	-0.0009
2018-12-31	0.0055

Length: 251, dtype: float64, 'Portfolio 25: STZ, QDEL, BHF, SCI, APD, GO, LMT, FND, ARE, ODFL, AR, PXD, KKR, OZK, TW, ALK, TSCO, CASY, CMA, NCLH, RHI, VMC, TNL, AKAM, MTD, DXCM, RNG, FRC, NLY, UMPQ, WEX, EVR, QCOM, UDR, DLB, IBKR, SPLK, CB, DXC, ACGL, IAC, NVST, HAS, PB, HOLX, HIG, MCHP, FISV, NVCR, GOOGL': Date

2018-01-02	0.0026
2018-01-03	0.0034
2018-01-04	0.0004
2018-01-05	0.0021
2018-01-08	0.0014
...	
2018-12-24	-0.0103
2018-12-26	0.0259
2018-12-27	0.0040
2018-12-28	0.0001
2018-12-31	0.0037

Length: 251, dtype: float64, 'Portfolio 26: CTLT, TRU, QCOM, TKR, MKTX, DOCU, PVH, LIN, LSI, LULU, PRU, MRNA, PRI, ATR, ALLE, NATI, TPL, TROW, PFG, MAR, MMC, AEE, FR, PNFP, TDOC, DIS, PNW, GFS, BRO, BF-A, MTG, JAZZ, WEC, TJX, SKX, SON, MCK, IPGP, MSGS, GWW, FMC, SSRM, PEN, CPB, WSC, MRO, NTRA, NCR, EXR, AN': Date

2018-01-02	0.0039
2018-01-03	0.0010
2018-01-04	0.0005
2018-01-05	0.0020
2018-01-08	0.0019

```

...
2018-12-24    -0.0113
2018-12-26     0.0227
2018-12-27     0.0034
2018-12-28     0.0008
2018-12-31     0.0056
Length: 251, dtype: float64, 'Portfolio 27: PEAK, PPC, LFUS, IP, EGP, CAH, CSGP,
ARMK, TDC, EXEL, NWS, SYK, TRMB, TWLO, SAM, FOXA, WBA, STWD, WDAY, MBC, GFS,
JKHY, DE, COLM, NTRS, ISRG, WRB, ETSY, WOOF, NCR, DINO, MLM, RSG, ALGM, CTSH,
BLD, CDNS, LW, PLTR, BMY, WE, VNT, AYX, VRSK, CSCO, BF-B, ZS, LUV, BRO, NFE':
Date
2018-01-02     0.0029
2018-01-03     0.0022
2018-01-04     0.0005
2018-01-05     0.0017
2018-01-08     0.0022
...
2018-12-24    -0.0093
2018-12-26     0.0215
2018-12-27     0.0046
2018-12-28    -0.0011
2018-12-31     0.0039
Length: 251, dtype: float64, 'Portfolio 28: AWI, WDAY, DD, AM, LW, AMC, WMT,
LEN, BA, NNN, APA, SGEN, TEAM, EXC, ICE, WHR, WSC, MAS, BIO, EXR, AAL, GDDY,
WWD, GOOGL, FYBR, AWK, NKE, LNT, SGFY, UBER, UGI, UA, EVRG, BAH, BERY, TFSL, ZM,
CLF, EVA, AGR, KHC, SLB, TTEK, LVS, ETN, DFS, IRM, PCG, MKTX, TRGP': Date
2018-01-02     0.0043
2018-01-03     0.0030
2018-01-04     0.0016
2018-01-05     0.0008
2018-01-08     0.0016
...
2018-12-24    -0.0130
2018-12-26     0.0202
2018-12-27     0.0010
2018-12-28     0.0010
2018-12-31     0.0031
Length: 251, dtype: float64, 'Portfolio 29: PCAR, PINS, EHAB, FWONK, LII, DECK,
ESTC, ETSY, KEX, MAT, FOUR, AFL, TRMB, MPWR, ERIE, HZNP, VRTX, CFG, SPR, BEPC,
FG, WSO, MCD, TWKS, FRPT, PEN, TKR, NTN, SSNC, RXO, VOYA, SNV, LDOS, ENTG,
EXPE, MRVI, UPS, HOOD, XOM, RTX, HUBB, GNRC, LESL, NEU, TTC, LHX, RARE, LLY,
CTVA, PNR': Date
2018-01-02     0.0045
2018-01-03     0.0017
2018-01-04     0.0012
2018-01-05     0.0028
2018-01-08     0.0015
...

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2018-12-24	-0.0082
2018-12-26	0.0219
2018-12-27	0.0043
2018-12-28	-0.0001
2018-12-31	0.0046
Length: 251, dtype: float64, 'Portfolio 30: CMS, LULU, DV, UTHR, OWL, WOLF, BKNG, RSG, HOG, TROW, ESTC, NCLH, HBAN, FCNCA, PPL, TMO, TFC, OC, PENN, TRMB, REXR, HCA, X, BKI, FOUR, FIS, LESL, EHAB, WRB, MDU, BMRN, ACGL, AGNC, RPRX, CAT, HLT, PEP, LYFT, ATR, ICE, PB, AWI, TER, DKNG, S, J, AJG, AAPL, BR, YUM': Date	
2018-01-02	0.0025
2018-01-03	0.0006
2018-01-04	0.0020
2018-01-05	0.0022
2018-01-08	0.0021
...	
2018-12-24	-0.0101
2018-12-26	0.0185
2018-12-27	0.0027
2018-12-28	0.0005
2018-12-31	0.0043
Length: 251, dtype: float64, 'Portfolio 31: CGNX, WY, CAH, ALL, TRGP, AEE, HTZ, NVCR, ABNB, NCLH, AMH, OC, BKR, THO, GD, SMG, IDXX, IPG, APTV, ITT, XRAY, PCTY, RGEN, DFS, WBA, BURL, CLF, FAF, AIZ, HAYW, WTM, HSY, SPLK, KEYS, OZK, CVS, CSL, KSS, TRV, DDOG, TXT, TXG, KD, ICUI, CLVT, PKG, TEAM, PCAR, CBRE, ST': Date	
2018-01-02	0.0048
2018-01-03	0.0034
2018-01-04	0.0018
2018-01-05	0.0026
2018-01-08	0.0017
...	
2018-12-24	-0.0092
2018-12-26	0.0213
2018-12-27	0.0024
2018-12-28	-0.0000
2018-12-31	0.0047
Length: 251, dtype: float64, 'Portfolio 32: ETN, WY, BSX, OMC, MP, DISH, OLN, PPG, DLB, DOCS, KMI, ETR, TTC, WAB, WEX, AMCR, NKE, SWKS, ZTS, GTES, TWKS, HUBB, VICI, LOW, SJM, AXTA, FRT, CMA, LH, DAL, BRK-B, BC, VNT, PRU, MAR, HPP, RGEN, SLM, ELAN, WOLF, AFG, CFR, MAN, HIW, EQIX, EXC, TDY, CSCO, PEAK, SMG': Date	
2018-01-02	0.0032
2018-01-03	0.0007
2018-01-04	-0.0003
2018-01-05	0.0025
2018-01-08	0.0012
...	
2018-12-24	-0.0122
2018-12-26	0.0194
2018-12-27	0.0029

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2018-12-28    0.0005
2018-12-31    0.0045
Length: 251, dtype: float64, 'Portfolio 33: EGP, SLB, HRL, VIRT, AMD, APH, DE,
GIS, DTM, BG, UAA, MTD, BA, ED, IT, SBAC, AVY, RIVN, MKC, INFA, ABBV, TRGP, DIS,
ANSS, ARES, VRSK, GD, AFG, GWW, BRX, LNG, HAYW, ALGN, BAC, TDG, CL, CRL, PRI,
EXR, KLAC, BKR, NTNX, MET, FBIN, FANG, MSA, UNM, LHX, GILD, HR': Date
2018-01-02    0.0034
2018-01-03    0.0036
2018-01-04    0.0016
2018-01-05    0.0026
2018-01-08    0.0021
...
2018-12-24   -0.0129
2018-12-26    0.0208
2018-12-27    0.0035
2018-12-28   -0.0010
2018-12-31    0.0047
Length: 251, dtype: float64, 'Portfolio 34: BOKF, LPX, AJG, FOUR, SWKS, MMC, OC,
WOLF, MPWR, NWL, IAC, AMGN, LW, NXST, WRB, KEX, MKC, ATR, DG, CAH, ALGM, EGP,
JNPR, CMS, NWSA, MSM, HII, RTX, ATUS, ZTS, EHC, RF, GIS, LBRDK, OTIS, V, WMS,
UWMC, SPOT, WPC, VMI, DDOG, VAC, SCHW, HTZ, SITE, CL, MHK, CCL, MNST': Date
2018-01-02    0.0027
2018-01-03    0.0017
2018-01-04    0.0010
2018-01-05    0.0009
2018-01-08    0.0015
...
2018-12-24   -0.0112
2018-12-26    0.0202
2018-12-27    0.0026
2018-12-28   -0.0002
2018-12-31    0.0042
Length: 251, dtype: float64, 'Portfolio 35: MORN, DNB, NOC, TRGP, HWM, DG, ECL,
EW, QGEN, FHN, BWA, NNN, CTSH, DIS, DTM, PFE, ADM, V, RL, T, DLB, LFUS, COF,
HOLX, OKE, CTAS, BIO, RGEN, PARA, SNV, REYN, CIEN, UTHR, MMC, KSS, CAG, WIX,
RITM, PTON, LYB, BALL, TPL, DELL, CZR, TWKS, BIIB, IEX, LITE, NVCR, ABC': Date
2018-01-02    0.0040
2018-01-03    0.0016
2018-01-04    0.0035
2018-01-05    0.0013
2018-01-08    0.0010
...
2018-12-24   -0.0125
2018-12-26    0.0229
2018-12-27    0.0026
2018-12-28    0.0018
2018-12-31    0.0062
Length: 251, dtype: float64, 'Portfolio 36: RGEN, CHE, AGO, SJM, WWE, POOL, IDA,

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TRIP, LCID, BALL, PCG, ALLE, SGFY, FFIV, NFG, RL, TXT, DRI, JBL, HWM, CVX, FHN, GO, RHI, AMD, SBAC, MAS, JNPR, DKNG, WTRG, INTC, BG, LW, FSLR, FTV, VMI, VTRS, MSI, JEF, NCR, VRSN, BMRN, CB, ATUS, MCW, PINC, FAF, HTZ, ICE, DVN': Date

2018-01-02	0.0036
2018-01-03	0.0008
2018-01-04	0.0025
2018-01-05	0.0016
2018-01-08	0.0015
...	
2018-12-24	-0.0112
2018-12-26	0.0200
2018-12-27	0.0023
2018-12-28	-0.0004
2018-12-31	0.0045

Length: 251, dtype: float64, 'Portfolio 37: GME, SLG, WEC, FSLR, FYBR, GPC, NEM, MANH, THG, JBL, PNR, WTM, VNT, CBRE, SPR, WOLF, LSCC, HR, CHRW, TTC, WH, GXO, MSFT, ZS, AMAT, LBRDA, MCD, CHK, ACN, ATUS, CPRT, DNA, VMW, KKR, NBIX, WBA, HCA, FCN, WHR, ABC, H, DD, ATVI, SPB, FWNK, MPWR, SY, AJG, WRB, UDR': Date

2018-01-02	0.0042
2018-01-03	0.0025
2018-01-04	0.0005
2018-01-05	0.0018
2018-01-08	0.0017
...	
2018-12-24	-0.0107
2018-12-26	0.0196
2018-12-27	0.0041
2018-12-28	0.0001
2018-12-31	0.0051

Length: 251, dtype: float64, 'Portfolio 38: CLH, GPS, LLY, VRSN, AA, KKR, CMI, SBUX, FSLR, SPOT, ATVI, WST, PEAK, DVA, GWRE, TRIP, ASH, PNFP, MSM, STE, GOOG, EXR, DT, JNPR, ABC, HXL, RIVN, WM, UMPQ, FWONA, CSGP, CASY, EOG, MIDD, FNF, AWK, UHS, AMH, VRT, WLK, HPP, RH, ARW, TECH, PFG, PNC, CSCO, KMPR, CVS, ERIE': Date

2018-01-02	0.0022
2018-01-03	0.0030
2018-01-04	0.0007
2018-01-05	0.0021
2018-01-08	0.0021
...	
2018-12-24	-0.0122
2018-12-26	0.0220
2018-12-27	0.0034
2018-12-28	-0.0013
2018-12-31	0.0046

Length: 251, dtype: float64, 'Portfolio 39: BKI, PNR, AWI, APP, STLD, LAMR, HCA, NTNX, ETSY, MRNA, JHG, CPT, MCW, BKR, AAL, GGG, SEB, OZK, GE, ZTS, GDDY, NDSN, NI, TDOC, AGR, BDX, TRGP, TER, BALL, REGN, EA, OWL, COHR, JNPR, NCR, CABO, EW, ITT, GLW, AOS, AVT, CACI, EHC, CR, CPB, HOOD, ETR, DH, FYBR, CUBE': Date

2018-01-02	0.0048
2018-01-03	0.0028
2018-01-04	0.0005
2018-01-05	0.0018
2018-01-08	0.0017
...	
2018-12-24	-0.0123
2018-12-26	0.0196
2018-12-27	0.0029
2018-12-28	0.0004
2018-12-31	0.0054

Length: 251, dtype: float64, 'Portfolio 40: STLD, DAR, HON, NEE, TDG, VSAT, CME, DE, NEM, HOG, AMGN, DVN, ROL, MP, CHK, SNA, JAMF, HUBS, SOFI, APTV, BERY, JWN, NWSA, OLN, LVS, TSN, IPG, DRVN, FFIV, DOV, DASH, AZO, MKC, QDEL, IBM, BIIB, SYI, RUN, NEWR, SEIC, NCNO, AGL, CTRA, AAL, DNA, ABBV, CPRT, VTR, VZ, LEG': Date

2018-01-02	0.0046
2018-01-03	0.0006
2018-01-04	0.0029
2018-01-05	0.0017
2018-01-08	0.0008
...	
2018-12-24	-0.0094
2018-12-26	0.0188
2018-12-27	0.0036
2018-12-28	-0.0018
2018-12-31	0.0044

Length: 251, dtype: float64, 'Portfolio 41: NVCR, NTN, WSC, SLG, HUN, STE, NTRA, SPG, CNP, FHN, TXT, APO, HHC, AVTR, NRG, ADT, SNA, HSIC, NKE, NTAP, UWM, LYB, SF, JBLU, BILL, MAN, MBC, PWR, WPC, UTHR, SLGN, BPOP, IP, PSX, PEGA, MMM, FR, JBL, VST, WBD, SWN, BHF, CRWD, UNH, MS, DEI, EQIX, ES, MKSI, AMCR': Date

2018-01-02	0.0046
2018-01-03	0.0007
2018-01-04	-0.0000
2018-01-05	0.0022
2018-01-08	0.0009
...	
2018-12-24	-0.0108
2018-12-26	0.0219
2018-12-27	0.0015
2018-12-28	0.0011
2018-12-31	0.0044

Length: 251, dtype: float64, 'Portfolio 42: AEP, MOS, SMG, VEEV, AON, VSAT, R, PLUG, GH, ECL, NYT, GPK, HUN, ZBH, PLTR, LAZ, PCG, ETR, CVS, VRT, REYN, CDAY, UNH, STZ, EXPD, ISRG, POST, RE, WBD, MRVL, BA, WSM, TREX, HRB, MCK, PEP, HE, PXD, TNDM, PYPL, COO, MCHP, S, LEG, WAL, WRK, LSCC, ARE, H, YUM': Date

2018-01-02	0.0047
2018-01-03	0.0024
2018-01-04	-0.0004

2018-01-05	0.0027
2018-01-08	0.0038
...	
2018-12-24	-0.0105
2018-12-26	0.0259
2018-12-27	0.0029
2018-12-28	0.0000
2018-12-31	0.0037
Length: 251, dtype: float64, 'Portfolio 43: NVDA, LDOS, KRC, CAR, NEM, PATH, GLOB, GPS, PODD, TGT, CBSH, SRCL, DECK, ARW, BAX, LOPE, BEN, EQIX, VRSN, DDOG, NLY, IVZ, DV, BA, ENTG, TPR, GFS, FNF, BDX, CNXC, PACW, PEN, QS, HIG, PGR, LW, LHX, EW, NEWR, SNX, DVA, SKX, SF, SWK, MS, MTG, LIN, MCK, OSK, JBL': Date	
2018-01-02	0.0011
2018-01-03	0.0016
2018-01-04	0.0010
2018-01-05	0.0027
2018-01-08	0.0044
...	
2018-12-24	-0.0091
2018-12-26	0.0217
2018-12-27	0.0042
2018-12-28	-0.0011
2018-12-31	0.0032
Length: 251, dtype: float64, 'Portfolio 44: AAL, REG, RGA, MOH, RSG, MSI, NWL, CPRT, TFX, WMS, STZ, ELAN, CTSH, TGT, ESI, WSO, TT, WYNN, BWXT, DXC, HUBS, NET, JLL, MO, AR, HPP, ALGN, BILL, PENN, AMT, SAIC, K, LIN, OKE, ST, EOG, MSGS, CCL, AM, ELS, CHDN, AVT, MCK, META, DFS, TDG, MTZ, FLT, QCOM, IVZ': Date	
2018-01-02	0.0041
2018-01-03	0.0013
2018-01-04	0.0009
2018-01-05	0.0023
2018-01-08	0.0017
...	
2018-12-24	-0.0118
2018-12-26	0.0240
2018-12-27	0.0022
2018-12-28	-0.0011
2018-12-31	0.0046
Length: 251, dtype: float64, 'Portfolio 45: PNFP, GIS, KEX, TTWO, TAP, ARMK, ULTA, KLAC, KKR, TECH, PTC, RITM, SF, RBLX, EWBC, SCHW, ROST, LSTR, CAH, GLW, FIVN, LEN, RF, SNA, SIVB, UPST, OLPX, AMP, HAL, AMD, DBX, ADBE, TXN, CMI, ACI, AGL, GD, DRVN, KMI, AOS, VIRT, PB, IR, TDC, NEU, PLD, DPZ, ESAB, VTRS, BYD': Date	
2018-01-02	0.0036
2018-01-03	0.0038
2018-01-04	0.0032
2018-01-05	0.0026
2018-01-08	0.0012


```

...
2018-12-24    -0.0084
2018-12-26     0.0228
2018-12-27     0.0023
2018-12-28    -0.0004
2018-12-31     0.0031
Length: 251, dtype: float64, 'Portfolio 46: RSG, KEX, AZTA, KHC, STLD, XRAY,
LYFT, AAPL, ADT, AYI, HSIC, CC, RITM, CSL, ITW, JPM, MO, NVR, GE, DNB, MDU, WBS,
ROL, CHTR, CTSH, TER, GPN, MMM, KKR, FLT, LKQ, PG, CMA, ZBRA, HEI, USFD, NOW,
TOL, EVR, W, XYL, LBRDA, MKSI, XEL, MOS, NEWR, DHR, MKC, FG, AMZN': Date
2018-01-02     0.0049
2018-01-03     0.0020
2018-01-04     0.0031
2018-01-05     0.0032
2018-01-08     0.0020
...
2018-12-24    -0.0109
2018-12-26     0.0241
2018-12-27     0.0043
2018-12-28     0.0002
2018-12-31     0.0029
Length: 251, dtype: float64, 'Portfolio 47: LVS, CEG, PRI, DCI, SAM, LII, TRU,
VRSK, GEN, SF, JKHY, SO, TRMB, AMED, LSXMA, FAF, NVAX, DXCM, PKI, DRI, DLR, HWM,
THC, MORN, MRCY, APA, SEE, NTRA, LYFT, ZG, TSN, TDG, TER, TPX, RPM, ICE, SLM,
JAZZ, ECL, WRB, MRO, ARE, WMB, MAR, M, ETN, PKG, WBD, CHRW, RYN': Date
2018-01-02     0.0051
2018-01-03     0.0015
2018-01-04     0.0006
2018-01-05     0.0030
2018-01-08     0.0017
...
2018-12-24    -0.0123
2018-12-26     0.0244
2018-12-27     0.0020
2018-12-28    -0.0020
2018-12-31     0.0055
Length: 251, dtype: float64, 'Portfolio 48: PSX, RYN, CMA, CHPT, LUMN, CCCS,
WYNN, EQH, IAA, LAMR, G, EPR, PLTK, UPS, CACC, CMCSA, MPWR, TPL, ATUS, JPM, DOX,
VRSN, DHR, NBIX, PATH, AFRM, GEHC, PFGC, CMG, BFAM, CINF, LDOS, CBSH, MRVI, WEN,
HWM, ALK, XEL, MU, CABO, AME, ACGL, CCK, MRTX, OGN, NYT, AVTR, LVS, MLM, PG':
Date
2018-01-02     0.0030
2018-01-03     0.0015
2018-01-04     0.0008
2018-01-05     0.0013
2018-01-08     0.0003
...
2018-12-24    -0.0103

```

2018-12-26	0.0190
2018-12-27	0.0033
2018-12-28	0.0005
2018-12-31	0.0041

Length: 251, dtype: float64, 'Portfolio 49: GRMN, SNA, EWBC, CFG, GEN, ILMN, LEA, QDEL, EQIX, CTVA, KIM, T, IR, SEB, MPW, ACHC, BLDR, CLX, WBD, DDOG, OZK, JAZZ, OLN, MOH, PEP, VLO, TRMB, RRX, XEL, AGL, CLVT, SIVB, ORLY, NWSA, IQV, CCI, JWN, CMA, LKQ, IART, ULTA, DFS, GXO, WRB, DTM, IBKR, FSLR, CBSH, ESI, GO': Date

2018-01-02	0.0042
2018-01-03	0.0015
2018-01-04	0.0015
2018-01-05	0.0017
2018-01-08	0.0010

...

2018-12-24	-0.0096
2018-12-26	0.0200
2018-12-27	0.0014
2018-12-28	-0.0002
2018-12-31	0.0040

Length: 251, dtype: float64, 'Portfolio 50: SWK, NEWR, KRC, RGA, PII, SRC, CBOE, CBSH, ESI, AON, VICI, AEE, HEI-A, AES, HPP, PINC, SPG, DNA, WHR, NVAX, COST, UNH, RYN, NTRA, CMCSA, EVA, VRT, BBWI, CSX, SCCO, SEIC, BLD, TT, LLY, HII, ICE, APD, MBC, AGNC, SNX, AMGN, AEP, CFG, VTS, FCX, HEI, TDC, MRK, TRU, GFS': Date

2018-01-02	0.0021
2018-01-03	0.0018
2018-01-04	-0.0012
2018-01-05	0.0024
2018-01-08	0.0017

...

2018-12-24	-0.0121
2018-12-26	0.0207
2018-12-27	0.0036
2018-12-28	-0.0001
2018-12-31	0.0046

Length: 251, dtype: float64, 'Portfolio 51: AFL, PARAA, GLOB, KDP, OSK, MRNA, TTWO, CMI, WAB, ABBV, KBR, LYB, CFR, CIEN, AMG, PB, TEAM, EIX, CCCS, WH, WBS, ADM, SON, FND, WWE, ESI, SSRM, QGEN, CRUS, BAC, RRX, S, WEC, SIX, FHN, USFD, WBD, LYV, PEG, HLT, MSA, DFS, NDAQ, CRWD, SRPT, SGEN, ABNB, APA, DLTR, AMC': Date

2018-01-02	0.0043
2018-01-03	0.0005
2018-01-04	0.0007
2018-01-05	0.0006
2018-01-08	0.0002

...

2018-12-24	-0.0101
2018-12-26	0.0214
2018-12-27	0.0036

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2018-12-28    -0.0008
2018-12-31     0.0052
Length: 251, dtype: float64, 'Portfolio 52: BWXT, HCA, BFAM, MCD, DLR, ETN, LYV,
NWL, GDDY, AM, OPEN, ELV, PODD, DV, HBI, FTNT, SRC, FLO, CHE, PB, CL, LYFT, TAP,
AGCO, ENTG, HUBS, MDLZ, SPOT, FRPT, PPG, NKE, NTNX, GE, PNW, CHRW, KIM, LVS,
ECL, JWN, SNOW, DKS, JLL, CMI, KO, BLK, ACI, D, DASH, ROP, CRI': Date
2018-01-02     0.0034
2018-01-03     0.0001
2018-01-04     0.0003
2018-01-05     0.0024
2018-01-08     0.0029
...
2018-12-24    -0.0104
2018-12-26     0.0204
2018-12-27     0.0026
2018-12-28    -0.0002
2018-12-31     0.0046
Length: 251, dtype: float64, 'Portfolio 53: TPX, ACGL, RF, ENPH, TXG, DNB, META,
PNFP, LEN-B, JAMF, CNA, ACN, MOS, VMC, DVN, XRAY, TOL, PNR, CAT, KKR, LITE, VMW,
DDOG, ADSK, GPN, PCTY, LSCC, EXPE, BALL, LSTR, ACHC, SPLK, VSAT, FAST, MTB,
TROW, PINC, PYPL, IDA, FWONA, LFUS, ROL, TAP, ST, MDLZ, MANH, IBKR, XEL, NYT,
NTRS': Date
2018-01-02     0.0050
2018-01-03     0.0025
2018-01-04     0.0015
2018-01-05     0.0019
2018-01-08     0.0024
...
2018-12-24    -0.0092
2018-12-26     0.0229
2018-12-27     0.0033
2018-12-28    -0.0006
2018-12-31     0.0038
Length: 251, dtype: float64, 'Portfolio 54: LSXMK, MKTX, PH, CHRW, CAR, FNB,
SWK, CHD, GWRE, DRVN, MSA, POST, IPGP, GL, PEN, BFAM, SITE, DISH, NWSA, LSXMA,
NTRS, COUP, KEYS, NVT, CNA, QGEN, SUI, WLK, CGNX, MMM, TTC, DV, UPS, NXST, GEN,
LEN, FWONA, RNG, CB, MS, ESTC, BYD, BBWI, ZBRA, GIS, SWKS, HXL, IEX, LHX, USFD':
Date
2018-01-02     0.0015
2018-01-03     0.0016
2018-01-04     0.0010
2018-01-05     0.0033
2018-01-08     0.0017
...
2018-12-24    -0.0106
2018-12-26     0.0243
2018-12-27     0.0045
2018-12-28    -0.0002

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2018-12-31    0.0048
Length: 251, dtype: float64, 'Portfolio 55: RNR, CPRT, IDA, CRUS, ROKU, DGX,
SLG, HIG, HCA, ARES, AXP, ASH, COST, OKE, LHX, AA, CMG, ALLE, AYI, TKR, LESL,
MTG, TDC, MKTX, ALGM, FCN, ERIE, VRT, JEF, STT, HUN, CMI, BK, AMGN, CFR, ELAN,
TTWO, MNST, NVT, JKHY, PCOR, CL, H, DNA, RGEN, SHW, DHI, AJG, NEM, BRX': Date
2018-01-02    0.0029
2018-01-03    0.0016
2018-01-04    0.0009
2018-01-05    0.0007
2018-01-08    0.0012
...
2018-12-24   -0.0100
2018-12-26    0.0204
2018-12-27    0.0044
2018-12-28   -0.0002
2018-12-31    0.0047
Length: 251, dtype: float64, 'Portfolio 56: EA, PARA, ESS, PSX, EQIX, HIW, CRWD,
LKQ, SPR, CAH, SLGN, DLR, IDA, SO, MAA, TRMB, KEYS, AAL, INFA, JBL, CNC, JEF,
ARES, ILMN, FISV, AL, MMM, BOH, JBLU, LSXMA, CGNX, DEI, EHC, UDR, ROKU, EPAM,
AMD, CTLT, HBI, HOLX, CSCO, NSC, CLX, OLLI, DNA, CARR, ZION, MDU, DTE, KEX':
Date
2018-01-02    0.0027
2018-01-03    0.0023
2018-01-04   -0.0002
2018-01-05    0.0008
2018-01-08    0.0021
...
2018-12-24   -0.0128
2018-12-26    0.0207
2018-12-27    0.0025
2018-12-28   -0.0002
2018-12-31    0.0048
Length: 251, dtype: float64, 'Portfolio 57: AMG, CG, MS, MMC, ALGM, SEIC, XRAY,
FOXA, USB, PFG, VIRT, ATR, NNN, HES, PWR, WCC, MDU, JWN, EIX, BBWI, SITE, IBKR,
CPA, RKT, AFRM, GPK, PAYC, TDC, GILD, HBI, NFLX, NTRS, AXON, MSM, REGN, RJF,
SNOW, BX, PG, O, BALL, MPW, MAA, NFG, TMO, NOV, SNX, UNM, ANET, JBL': Date
2018-01-02    0.0029
2018-01-03    0.0021
2018-01-04   -0.0012
2018-01-05    0.0011
2018-01-08    0.0016
...
2018-12-24   -0.0127
2018-12-26    0.0223
2018-12-27    0.0043
2018-12-28   -0.0012
2018-12-31    0.0047
Length: 251, dtype: float64, 'Portfolio 58: ZION, KBR, GRMN, MPW, RGEN, CTRA,

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BIO, EQIX, MPC, OMF, NFG, BYD, FIVE, DTE, AMCR, DOCS, THO, TW, DD, IAC, CLVT, ALGN, GME, HPE, BWXT, AMZN, EVA, STZ, TRV, TER, NWS, SRPT, COIN, SIX, GNTX, UNP, JBLU, CCI, LAD, DOCU, ESAB, RCL, ACN, CBOE, TEAM, STLD, MAT, AMED, KHC, ADBE':

Date

2018-01-02	0.0052
2018-01-03	0.0038
2018-01-04	0.0035
2018-01-05	0.0017
2018-01-08	-0.0001

...

2018-12-24	-0.0101
2018-12-26	0.0229
2018-12-27	0.0021
2018-12-28	0.0006
2018-12-31	0.0043

Length: 251, dtype: float64, 'Portfolio 59: FCX, VNO, CSX, BLK, EVR, FHB, LMT, GGG, MPWR, LYB, ESTC, LDOS, FCN, MRO, WSC, OLN, KEX, OSK, REXR, PYCR, ETR, HIG, IAA, HUBS, DKNB, A, ABNB, BDX, GEN, HII, LAD, SCCO, PINC, NTRA, CUZ, BLDR, ALNY, PPC, CSCQ, APTV, LUMN, WSM, TNDM, WST, IVZ, W, CPB, OMF, KNX, TMUS': Date

2018-01-02	0.0061
2018-01-03	0.0008
2018-01-04	0.0043
2018-01-05	0.0031
2018-01-08	0.0043

...

2018-12-24	-0.0101
2018-12-26	0.0248
2018-12-27	0.0022
2018-12-28	0.0015
2018-12-31	0.0052

Length: 251, dtype: float64, 'Portfolio 60: AXTA, MPC, AMZN, SRC, CLX, UAA, INTC, JBHT, VRSN, SPGI, WE, BKI, CDW, BURL, ULTA, MANH, DNB, PH, CE, WH, BA, OLPX, DOV, DOCS, USB, RGLD, HII, CHE, ANET, VAC, PAYX, TTEK, ODFL, EBAY, VNT, VTRS, SWKS, QGEN, ELAN, PINS, TRMB, NVAX, EFX, LKQ, NFG, WAT, MCO, FICO, SOFI, BG': Date

2018-01-02	0.0031
2018-01-03	0.0043
2018-01-04	0.0025
2018-01-05	0.0019
2018-01-08	0.0023

...

2018-12-24	-0.0094
2018-12-26	0.0212
2018-12-27	0.0035
2018-12-28	-0.0015
2018-12-31	0.0046

Length: 251, dtype: float64, 'Portfolio 61: WTW, DNA, WSC, SNOW, AVT, WDC, ZM, AGL, OMF, DELL, LW, RH, DHR, AGCO, SHC, KEYS, MTCH, TJX, LMT, FOX, CMCSA, BILL,

MAT, FWONA, SGFY, PLTK, BAH, KHC, IART, HII, LAMR, NKE, EEFT, RL, STE, BALL, ZBRA, ROL, RNG, V, POST, NWS, AGO, ACHC, RSG, EXAS, BKNG, CPT, IAA, EFX': Date

2018-01-02	0.0023
2018-01-03	0.0023
2018-01-04	0.0042
2018-01-05	0.0034
2018-01-08	-0.0001
...	
2018-12-24	-0.0112
2018-12-26	0.0187
2018-12-27	0.0027
2018-12-28	0.0015
2018-12-31	0.0050

Length: 251, dtype: float64, 'Portfolio 62: HD, NOV, PPC, NTAP, EL, SF, V, FLT, TROW, MSCI, BURL, LOW, ORLY, VICI, BEN, RGEN, TER, ELAN, SQ, AIZ, BMRN, WSO, ADP, GLPI, IEX, IPGP, PARAA, DCI, RGA, GFS, PINC, CTRA, COUP, INVH, PDCE, AWK, AWI, LEA, SPB, CBOE, DOCU, APD, LHX, PRGO, KKR, UHS, PAG, LOPE, ITW, DVA': Date

2018-01-02	0.0027
2018-01-03	0.0041
2018-01-04	0.0026
2018-01-05	0.0044
2018-01-08	0.0021
...	
2018-12-24	-0.0108
2018-12-26	0.0238
2018-12-27	0.0042
2018-12-28	-0.0010
2018-12-31	0.0039

Length: 251, dtype: float64, 'Portfolio 63: CAT, CAR, VFC, CABO, IAC, WRK, FNF, CI, CHTR, MDU, SNOW, AM, ORLY, HAL, EPR, DKS, CPA, C, WDC, SKX, ITT, CBSH, TMO, USFD, LITE, W, LVS, TW, GPN, SRE, ELS, SITE, FCN, ZION, IPGP, EMR, IART, HCA, BRX, ALK, EW, COUP, U, NCR, JAZZ, ALB, EIX, ETN, IR, CCCS': Date

2018-01-02	0.0048
2018-01-03	0.0026
2018-01-04	0.0004
2018-01-05	0.0027
2018-01-08	0.0032
...	
2018-12-24	-0.0113
2018-12-26	0.0242
2018-12-27	0.0024
2018-12-28	0.0002
2018-12-31	0.0032

Length: 251, dtype: float64, 'Portfolio 64: VRTX, TFSL, FIS, BHF, LOPE, AMBP, C, VNT, FLT, DINO, CBOE, SBAC, PNR, LSXMK, ABBV, WTRG, RYAN, BPOP, META, LW, INFA, HUBS, MCHP, IDA, CSCO, J, AGO, TMO, ZBH, GILD, SY, BA, OMF, AGNC, CPRI, A, ADP, RXO, DTE, LEN, HOLX, RE, AFRM, QCOM, KRC, CR, F, WWE, GNTX, SNV': Date

2018-01-02	0.0018
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2018-01-03	0.0022
2018-01-04	0.0047
2018-01-05	0.0033
2018-01-08	0.0004
...	
2018-12-24	-0.0115
2018-12-26	0.0202
2018-12-27	0.0028
2018-12-28	-0.0003
2018-12-31	0.0034

Length: 251, dtype: float64, 'Portfolio 65: SWN, IP, C, CTAS, ROK, DLB, ECL, VMW, LEN, JNJ, DTM, IAA, JAZZ, CPT, BLK, IBM, PCG, WTFC, HTZ, CMCSA, ALGN, DT, GLW, ACGL, GE, FOUR, BAC, CLF, DKS, TTWO, FRPT, WRK, CEG, GH, ADT, DIS, OLPX, VFC, SBAC, BDX, ADSK, UNH, FCN, OPEN, SUI, URI, AMH, BSX, ETSY, ARMK': Date

2018-01-02	0.0059
2018-01-03	0.0022
2018-01-04	0.0015
2018-01-05	0.0013
2018-01-08	0.0008
...	
2018-12-24	-0.0109
2018-12-26	0.0217
2018-12-27	0.0030
2018-12-28	-0.0000
2018-12-31	0.0034

Length: 251, dtype: float64, 'Portfolio 66: ANET, MTN, QDEL, COTY, WST, GS, TEAM, CE, PII, CAH, FISV, HAYW, QRVO, BWXT, NEU, ADBE, MU, ROK, CMS, GGG, NVR, FG, WAL, FIVE, RARE, SNDR, NKE, UMPQ, VNT, AVB, BXP, CTRA, MRTX, BLDR, CTVA, SSNC, CW, LII, ZBH, TNL, FANG, MTB, AMGN, WH, JCI, TOST, DTM, NATI, WTRG, FICO': Date

2018-01-02	0.0045
2018-01-03	0.0039
2018-01-04	0.0016
2018-01-05	0.0001
2018-01-08	0.0006
...	
2018-12-24	-0.0103
2018-12-26	0.0224
2018-12-27	0.0041
2018-12-28	-0.0004
2018-12-31	0.0049

Length: 251, dtype: float64, 'Portfolio 67: CC, WAT, FAST, CINF, SON, MBC, RPM, APH, WCC, PNFP, PB, LESL, DHR, MTB, TRIP, MTN, HEI, BOKF, WWD, FYBR, LHX, ORCL, NCLH, LYFT, TPR, XOM, IVZ, HRL, EPAM, STWD, SNOW, EXAS, PPC, FRT, KSS, CHD, HPP, IDXX, INCY, ATR, RCL, TOST, LOPE, NRG, DG, SLB, MAS, CF, PODD, CVNA': Date

2018-01-02	0.0018
2018-01-03	0.0025
2018-01-04	-0.0005

2018-01-05	0.0028
2018-01-08	0.0023
...	
2018-12-24	-0.0103
2018-12-26	0.0212
2018-12-27	0.0034
2018-12-28	-0.0007
2018-12-31	0.0048

Length: 251, dtype: float64, 'Portfolio 68: FMC, PSX, TTWO, GPN, NI, FDX, NCLH, QRV0, ABBV, OMC, SWK, PM, JPM, LVS, HES, BKR, BSY, CMA, PH, EQH, BAH, VMW, GD, ALGN, BERY, MRCY, CZR, BBY, ETSY, ROK, WDC, CHD, SMG, ENPH, CAR, PWR, BOKF, UAL, KKR, MCO, DNB, MTZ, AZO, GPC, EXP, IPGP, SJM, JAZZ, CFG, QGEN': Date

2018-01-02	0.0048
2018-01-03	0.0029
2018-01-04	0.0017
2018-01-05	0.0030
2018-01-08	0.0020
...	
2018-12-24	-0.0103
2018-12-26	0.0251
2018-12-27	0.0036
2018-12-28	-0.0012
2018-12-31	0.0032

Length: 251, dtype: float64, 'Portfolio 69: WY, PCTY, CHRW, WEX, MKTX, GFS, MAA, CSGP, UPS, QRV0, KMI, JBL, NEWR, AIRC, TWKS, GM, CDW, EMN, PKI, JHG, MNST, TDC, ENPH, GXO, FND, LYFT, IPG, HD, V, HES, FYBR, ZM, MRVL, RPRX, CNM, ELV, EGP, AXON, VLO, BEPC, PLNT, OZK, THC, FRT, DHR, MTCH, MOH, SAIC, AES, WDAY': Date

2018-01-02	0.0040
2018-01-03	0.0019
2018-01-04	0.0022
2018-01-05	0.0018
2018-01-08	0.0007
...	
2018-12-24	-0.0105
2018-12-26	0.0219
2018-12-27	0.0039
2018-12-28	-0.0012
2018-12-31	0.0035

Length: 251, dtype: float64, 'Portfolio 70: PLD, RMD, MTCH, GH, AYX, BXP, DTM, VSAT, CDNS, HON, ARW, CRUS, EEFT, RTX, PHM, TROW, CLVT, CZR, WSO, GXO, HRB, PARA, AGCO, KEYS, RBLX, OTIS, QDEL, HD, BF-A, SAIC, BKNG, PVH, CHE, MKSI, LECO, T, INFA, CHPT, PAYC, AON, BWXT, DOCU, XEL, UTHR, GOOG, SSNC, DOV, AA, HAL, V': Date

2018-01-02	0.0030
2018-01-03	0.0030
2018-01-04	0.0018
2018-01-05	0.0030
2018-01-08	0.0017


```

...
2018-12-24    -0.0103
2018-12-26     0.0229
2018-12-27     0.0039
2018-12-28    -0.0000
2018-12-31     0.0044
Length: 251, dtype: float64, 'Portfolio 71: CRM, CW, NFE, EQIX, MIDD, CTSH, GO,
AXS, AFG, NTAP, KMPR, DT, HSIC, ACM, CVS, DOCU, RGLD, ALSN, PPL, G, LITE, MDU,
NDSN, ACGL, GPC, OTIS, RHI, PDCE, VTRS, PM, WDAY, FIS, LSI, FMC, MHK, DASH, SLM,
WMB, OGN, BLDR, AZEK, LAD, CNC, DAR, LVS, EPAM, GPN, FDS, SUI, EQH': Date
2018-01-02     0.0021
2018-01-03     0.0025
2018-01-04     0.0023
2018-01-05     0.0017
2018-01-08     0.0021
...
2018-12-24    -0.0094
2018-12-26     0.0189
2018-12-27     0.0038
2018-12-28     0.0000
2018-12-31     0.0044
Length: 251, dtype: float64, 'Portfolio 72: CPT, JCI, ELV, EXPE, CL, DT, CSCO,
CZR, GME, OLED, LSI, BOH, BX, CBRE, BEN, NWL, AGCO, TWKS, SRC, DTM, FSLR, COIN,
HHC, CAH, EEFT, MAR, AON, LW, GILD, TT, LULU, JKHY, PCAR, FND, ALL, ROKU, LBRDA,
BKR, NBIX, GEN, VNT, SLGN, AVGO, AFRM, NVCR, HAYW, RITM, BA, LAZ, WPC': Date
2018-01-02     0.0021
2018-01-03     0.0043
2018-01-04    -0.0000
2018-01-05     0.0011
2018-01-08     0.0026
...
2018-12-24    -0.0111
2018-12-26     0.0216
2018-12-27     0.0018
2018-12-28    -0.0003
2018-12-31     0.0035
Length: 251, dtype: float64, 'Portfolio 73: DD, CVS, NATI, ESI, WMT, NOC, HRB,
GGG, CDAY, CF, XYL, VRSN, ALSN, WFC, AAP, DE, AFRM, OLED, UNM, RNG, MSGS, RMD,
GM, WOOF, LRCX, PANW, VAC, ADBE, WSM, LEN, NEWR, LNT, ENPH, UNVR, LEN-B, SEB,
TPX, SYU, TTC, EXPE, GO, GPS, TPR, NFE, CC, DHR, KEYS, PGR, G, ZI': Date
2018-01-02     0.0050
2018-01-03     0.0036
2018-01-04     0.0014
2018-01-05     0.0024
2018-01-08     0.0014
...
2018-12-24    -0.0106
2018-12-26     0.0239

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2018-12-27    0.0049
2018-12-28   -0.0002
2018-12-31    0.0045
Length: 251, dtype: float64, 'Portfolio 74: JWN, VNO, ERIE, ALLE, BMY, PEG,
MKTX, UHS, ETR, GMED, BIIB, NEU, BSX, HXL, SCHW, ES, NCNO, SIX, LVS, UWMC, MAT,
AMAT, ENPH, DD, TYL, W, MOH, MCO, LITE, UTHR, SRC, UHAL-B, NYT, IBM, Z, JPM,
PFE, HST, RUN, ROKU, COTY, FTV, JAZZ, WM, PHM, LSCC, COLD, EGP, UBER, PH': Date
2018-01-02    0.0053
2018-01-03    0.0014
2018-01-04   -0.0014
2018-01-05    0.0018
2018-01-08    0.0011
...
2018-12-24   -0.0109
2018-12-26    0.0225
2018-12-27    0.0036
2018-12-28   -0.0007
2018-12-31    0.0051
Length: 251, dtype: float64, 'Portfolio 75: CL, AVB, ACHC, EXP, NTAP, NLY, SEB,
IONS, CB, ORLY, MBC, KO, PNFP, MAA, T, EBAY, CNA, GNRC, WBS, DLB, SYNH, AGCO,
CUZ, VVV, MTCH, VRT, BJ, SKX, BOH, IART, ESS, COO, BIIB, EXPD, PFG, PSTG, PINS,
IP, LYFT, FWONK, ATO, CACI, Z, AVY, UHAL-B, MRCY, KMX, EHAB, CRUS, JHG': Date
2018-01-02    0.0025
2018-01-03    0.0024
2018-01-04   -0.0009
2018-01-05    0.0022
2018-01-08    0.0007
...
2018-12-24   -0.0107
2018-12-26    0.0197
2018-12-27    0.0042
2018-12-28   -0.0008
2018-12-31    0.0047
Length: 251, dtype: float64, 'Portfolio 76: COLM, PATH, VIRT, MU, EOG, BX, PTON,
FOX, MRTX, RYAN, OWL, CLX, AGO, FWONK, NCR, BAH, ETSY, ZG, AM, MANH, EMN, VEEV,
TRMB, TGT, PXD, WOLF, SPB, CRWD, IR, IDXX, LLY, HIW, ARMK, EXC, ENOV, PLTR, ES,
ARW, CL, LUMN, WST, PENN, AIRC, URI, HOLX, INTC, SPLK, AGR, DG, CMI': Date
2018-01-02    0.0048
2018-01-03    0.0018
2018-01-04    0.0005
2018-01-05    0.0012
2018-01-08    0.0012
...
2018-12-24   -0.0105
2018-12-26    0.0230
2018-12-27    0.0033
2018-12-28   -0.0004
2018-12-31    0.0039

```

Length: 251, dtype: float64, 'Portfolio 77: VNO, ALLY, FAF, AGNC, HPP, AA, OC, PEP, MTG, DNB, MRVL, EXPD, IAA, ACGL, IDA, BRKR, EL, AN, CSCO, SMG, AGL, RUN, CTRA, TT, FBIN, J, MTD, NOV, ZI, SIRI, AMD, AFRM, CLVT, STZ, VZ, ROST, KD, DPZ, IAC, TFC, RGEN, BXP, EXPE, KHC, GPN, ENOV, MMM, SIVB, DDOG, UNM': Date

2018-01-02 0.0024
2018-01-03 0.0034
2018-01-04 0.0021
2018-01-05 0.0017
2018-01-08 0.0019

...

2018-12-24 -0.0106
2018-12-26 0.0207
2018-12-27 0.0027
2018-12-28 -0.0011
2018-12-31 0.0037

Length: 251, dtype: float64, 'Portfolio 78: DISH, JAZZ, SPB, PLUG, ADT, BG, SPG, SRE, ARES, XOM, IPGP, HTZ, AGL, LSI, MNST, FISV, DRVN, SNX, CRI, DFS, CCL, CLH, LITE, CNXC, AMC, CEG, CAH, HUM, ROST, ETSY, EPR, AMT, K, BHF, A, ELV, MAR, CAR, UPS, MAT, UA, J, WPC, WWE, BKI, MSI, SIX, AMH, NYCB, ERIE': Date

2018-01-02 0.0038
2018-01-03 0.0026
2018-01-04 0.0004
2018-01-05 0.0011
2018-01-08 0.0016

...

2018-12-24 -0.0103
2018-12-26 0.0226
2018-12-27 0.0015
2018-12-28 0.0001
2018-12-31 0.0017

Length: 251, dtype: float64, 'Portfolio 79: CMI, JAZZ, MSCI, C, RUN, EXP, HAYW, SITE, WAB, PINS, NDAQ, TOST, DT, TSCO, PANW, JBHT, NEU, ALNY, EQH, FIVE, TTD, LAD, LNC, EMR, DHI, IONS, XYL, WH, FLS, JAMF, MIDD, BG, NYT, LUV, SIRI, SAM, VOYA, NVCR, DXCM, WTRG, GPC, WPC, JBGS, RKT, FDS, IBM, ZTS, RS, UPST, FMC': Date

2018-01-02 0.0032
2018-01-03 0.0027
2018-01-04 -0.0000
2018-01-05 0.0015
2018-01-08 0.0009

...

2018-12-24 -0.0087
2018-12-26 0.0200
2018-12-27 0.0031
2018-12-28 -0.0001
2018-12-31 0.0053

Length: 251, dtype: float64, 'Portfolio 80: PPG, NWSA, NOW, IPG, DIS, MSFT, FOUR, RH, FIS, RRC, VAC, ACHC, CACC, RRX, ADBE, UAA, UNH, BERY, WEC, SNOW, KSS, MRK, FICO, PYCR, WAL, AM, NEE, MORN, WFC, AGCO, WAT, MU, EFX, MDLZ, CMA, RNR,

SCCO, MSI, NWL, RPRX, BEPC, AMED, TREX, RPM, NRG, SCI, EQT, PFG, DLB, MET': Date
 2018-01-02 0.0061
 2018-01-03 0.0016
 2018-01-04 0.0014
 2018-01-05 0.0021
 2018-01-08 0.0004
 ...
 2018-12-24 -0.0115
 2018-12-26 0.0232
 2018-12-27 0.0033
 2018-12-28 -0.0010
 2018-12-31 0.0045
 Length: 251, dtype: float64, 'Portfolio 81: KD, CCK, VST, EQIX, ABT, AGNC, BAC, HOG, AAP, WTRG, WCC, STWD, KMX, TAP, CHRW, KLAC, SEB, BSY, HEI, TTD, MPWR, WSM, ADM, TOL, AFG, X, KMB, VRTX, RGEN, BPOP, AXS, JBGS, AMT, TNDM, RGLD, KDP, LSI, MHK, MET, FRPT, ELAN, EXPD, FIVE, LEN, QDEL, DINO, SUI, FIS, ASH, MORN': Date
 2018-01-02 0.0044
 2018-01-03 0.0006
 2018-01-04 0.0018
 2018-01-05 0.0019
 2018-01-08 0.0030
 ...
 2018-12-24 -0.0116
 2018-12-26 0.0227
 2018-12-27 0.0040
 2018-12-28 0.0007
 2018-12-31 0.0046
 Length: 251, dtype: float64, 'Portfolio 82: ASH, PNC, BLD, ODFL, WBS, DBX, WYNN, UAA, DV, KMI, CACC, LSI, WOLF, TMO, BOKF, NET, RBLX, GIS, GDDY, DOCU, CHD, GM, PCAR, SGEN, JKHY, VICI, MLM, TNDM, ADM, PARA, CAG, AJG, PRI, KNX, FDX, LMT, MKL, MOH, MAR, NOV, VRSN, L, RGEN, WCC, FDS, DRVN, HHC, ICUI, BILL, EMN': Date
 2018-01-02 0.0031
 2018-01-03 0.0018
 2018-01-04 0.0028
 2018-01-05 0.0013
 2018-01-08 0.0028
 ...
 2018-12-24 -0.0108
 2018-12-26 0.0225
 2018-12-27 0.0028
 2018-12-28 -0.0006
 2018-12-31 0.0045
 Length: 251, dtype: float64, 'Portfolio 83: CG, GEN, SYNH, PFG, MDT, RIVN, TFX, WBA, CLH, AMC, META, PEAK, GL, HD, TOST, SUI, IEX, SAM, SITE, TW, LW, HE, NWS, CRUS, KEYS, GMED, BYD, CPA, SBAC, ON, PFGC, WY, BRK-B, JNJ, SRC, HAYW, MKL, UNM, CHK, OSK, DRVN, PLUG, INGR, MMM, MRVI, LDOS, PCAR, DHI, RPM, TWLO': Date
 2018-01-02 0.0033
 2018-01-03 0.0020

2018-01-04	-0.0013
2018-01-05	0.0021
2018-01-08	0.0008
...	
2018-12-24	-0.0109
2018-12-26	0.0217
2018-12-27	0.0025
2018-12-28	-0.0002
2018-12-31	0.0036

Length: 251, dtype: float64, 'Portfolio 84: ILMN, JEF, LSXMA, S, DBX, LMT, OLLI, COLD, LYB, LH, PII, TFX, SIX, PAG, TROW, PEGA, TJX, BKI, TRU, CFG, CRI, NEU, PRGO, BERY, TMO, SPLK, VLO, COST, ALGM, OKE, GWW, PFGC, JBGS, PFE, AZPN, OWL, LYV, FCX, AMC, CSCO, BRKR, MDLZ, AOS, ESI, IR, OHI, WAL, UPS, AAL, OLN': Date

2018-01-02	0.0050
2018-01-03	0.0014
2018-01-04	0.0021
2018-01-05	0.0032
2018-01-08	0.0007
...	
2018-12-24	-0.0105
2018-12-26	0.0239
2018-12-27	0.0042
2018-12-28	-0.0002
2018-12-31	0.0041

Length: 251, dtype: float64, 'Portfolio 85: CCK, NSA, FANG, DH, ABBV, CF, BLDR, EQR, TNL, AKAM, USB, STE, X, TRMB, KEY, DAR, CBOE, WLK, MAR, TWLO, INTU, LBRDK, ITT, CNXC, CBSH, SRE, CHPT, NBIX, IT, CNC, LYFT, UHAL-B, IVZ, IR, KLAC, OLPX, FTNT, TOL, AZTA, NUE, ILMN, NATI, TRGP, SNV, PAYX, NTRS, AXTA, PEAK, AMCR, FRPT': Date

2018-01-02	0.0049
2018-01-03	0.0038
2018-01-04	-0.0001
2018-01-05	0.0024
2018-01-08	0.0011
...	
2018-12-24	-0.0127
2018-12-26	0.0219
2018-12-27	0.0033
2018-12-28	-0.0005
2018-12-31	0.0053

Length: 251, dtype: float64, 'Portfolio 86: TRIP, DOV, AM, GH, GLW, FAST, STWD, FHN, GNRC, DOX, MHK, INVH, MPC, SYK, VAC, CAG, ZI, ST, HOOD, CPRI, LII, ACM, AVY, NVR, KMI, QRVO, PPG, TEAM, ATR, KDP, LBRDK, CHH, APA, AVGO, LYV, CI, SNV, EW, AEE, FE, EMN, CGNX, LEG, RGA, VMI, CRWD, DINO, AWK, AL, KBR': Date

2018-01-02	0.0038
2018-01-03	0.0036
2018-01-04	0.0007
2018-01-05	0.0015

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2018-01-08    0.0021
...
2018-12-24   -0.0140
2018-12-26    0.0235
2018-12-27    0.0039
2018-12-28    0.0000
2018-12-31    0.0041
Length: 251, dtype: float64, 'Portfolio 87: AA, SBUX, KMX, BKI, BX, BC, FWONK,
CIEN, PTC, EQH, MA, MORN, MSI, WOLF, SAM, FCN, PLD, COF, EXPE, PPL, EL, FISV,
SLM, UHAL-B, SO, RF, GOOG, TRV, NFG, DG, NWS, SYU, NNN, BAC, AMP, NVDA, CHPT,
JCI, AOS, COLD, R, AFG, PEN, ALGM, VIRT, FRPT, HE, ORLY, PNC, CW': Date
2018-01-02    0.0032
2018-01-03    0.0015
2018-01-04    0.0017
2018-01-05    0.0019
2018-01-08    0.0025
...
2018-12-24   -0.0106
2018-12-26    0.0219
2018-12-27    0.0030
2018-12-28   -0.0006
2018-12-31    0.0042
Length: 251, dtype: float64, 'Portfolio 88: DAR, TFX, NDAQ, GRMN, LEN, EMN, MSM,
WU, MTZ, PCTY, PLUG, XOM, PHM, SYU, CMG, GOOGL, BRO, MRTX, RKT, AGR, AXTA, JHG,
KD, CLF, FYBR, SRE, MOH, JPM, UDR, OWL, KDP, CHDN, BPOP, CHTR, YETI, TW, NTAP,
TRIP, MPC, TXN, KLAC, U, AMGN, NYCB, FIS, T, OGE, TSLA, PK, COUP': Date
2018-01-02    0.0045
2018-01-03    0.0038
2018-01-04    0.0010
2018-01-05    0.0024
2018-01-08    0.0016
...
2018-12-24   -0.0107
2018-12-26    0.0240
2018-12-27    0.0030
2018-12-28    0.0018
2018-12-31    0.0031
Length: 251, dtype: float64, 'Portfolio 89: DISH, AFG, FFIV, BERY, FHN, COP,
IBM, GD, BEPC, VTRS, CNA, ADT, AIG, FOXA, SWKS, HRL, PAYX, MKL, SNV, EPR, TDOC,
DAR, MIDD, IEX, AMT, MAS, AR, RUN, TT, CABO, AMG, LYFT, CMCSA, ISRG, BHF, ALSN,
WWD, LUMN, USB, PLUG, DRI, SEE, MAT, LFUS, VAC, CDW, BAH, MCHP, NYT, MASI': Date
2018-01-02    0.0040
2018-01-03    0.0025
2018-01-04    0.0018
2018-01-05    0.0012
2018-01-08    0.0008
...
2018-12-24   -0.0130

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2018-12-26	0.0258
2018-12-27	0.0026
2018-12-28	-0.0011
2018-12-31	0.0033
Length: 251, dtype: float64, 'Portfolio 90: MTD, GM, EW, MET, GOOGL, CPRI, FNB, VTR, ROK, NI, CUZ, UA, LLY, TECH, WWD, GME, IPGP, EIX, IAC, NBIX, PNW, NWSA, FBIN, EPAM, KMB, WY, MKSI, AVB, MA, CHRW, LSXMK, DNA, TRIP, UGI, DASH, WEN, T, SPLK, MOH, KMI, SUI, DAL, IRM, PXD, DD, BALL, D, ROP, PSA, CPT': Date	
2018-01-02	0.0038
2018-01-03	0.0030
2018-01-04	0.0004
2018-01-05	0.0028
2018-01-08	0.0027
...	
2018-12-24	-0.0143
2018-12-26	0.0212
2018-12-27	0.0038
2018-12-28	-0.0006
2018-12-31	0.0040
Length: 251, dtype: float64, 'Portfolio 91: NCLH, ENTG, HBAN, MA, SEIC, TT, IT, GO, VNT, TTWO, MP, CSL, WDAY, HUBS, AMH, LRCX, CACI, BR, JCI, JLL, NBIX, LDOS, INTU, RH, NNN, MRVI, LUMN, MSA, POST, ITT, EQR, CCK, TMO, MPW, STZ, MANH, URI, MSFT, NYT, MO, TYL, TFC, DKN, NVR, CGNX, DHI, AFG, ORI, OPEN, LPLA': Date	
2018-01-02	0.0041
2018-01-03	0.0031
2018-01-04	0.0011
2018-01-05	0.0020
2018-01-08	0.0021
...	
2018-12-24	-0.0115
2018-12-26	0.0216
2018-12-27	0.0032
2018-12-28	-0.0012
2018-12-31	0.0036
Length: 251, dtype: float64, 'Portfolio 92: MTG, LIN, MDB, KSS, TECH, CSGP, SNX, QRV0, NATI, AFRM, WOLF, IVZ, FICO, CHK, ENOV, LFUS, AEP, KEY, CMA, ALGM, RBLX, BWA, COST, MAR, BAX, CLX, LNG, NEU, BYD, RIVN, CTAS, ADT, LBRDA, AJG, COTY, KD, VTS, BEN, IEX, BAC, MKSI, REGN, USFD, HAS, OVV, CAG, NI, NEE, WMB, ROK': Date	
2018-01-02	0.0031
2018-01-03	0.0022
2018-01-04	0.0017
2018-01-05	0.0018
2018-01-08	0.0009
...	
2018-12-24	-0.0117
2018-12-26	0.0232
2018-12-27	0.0029
2018-12-28	-0.0002

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2018-12-31    0.0052
Length: 251, dtype: float64, 'Portfolio 93: ZI, HZNP, AGO, LAD, AMGN, SGEN,
AMBP, AVB, APA, AGR, X, MDB, FOXA, OGN, VLO, EQT, WTFC, ABBV, EHC, AFRM, CLF,
TPX, PNW, IBKR, KKR, BAH, ALSN, ERIE, ZBH, MSFT, GO, BF-B, IAA, A, ALK, WAT,
LMT, IVZ, UPS, PKG, FR, ARMK, GPS, CFG, LEG, SSNC, TFC, NEM, BOH, PHM': Date
2018-01-02    0.0059
2018-01-03    0.0017
2018-01-04    0.0012
2018-01-05    0.0017
2018-01-08    0.0008
...
2018-12-24   -0.0108
2018-12-26    0.0211
2018-12-27    0.0027
2018-12-28   -0.0013
2018-12-31    0.0035
Length: 251, dtype: float64, 'Portfolio 94: CRM, CL, TTEK, SGFY, GME, HES, BAX,
AXP, GE, ROK, STZ, MPC, LEA, AGL, CASY, FMC, GD, PRI, WDAY, TMO, ABC, INFA, ABT,
OTIS, NFLX, DLR, UAL, WYNN, EXR, CMA, WPC, AMAT, NYCB, EVR, LNG, CMCSA, JAZZ,
UPS, DVN, TPR, AVTR, OLED, LUV, GEHC, JAMF, WIX, INCY, SJM, BSY, CC': Date
2018-01-02    0.0055
2018-01-03    0.0032
2018-01-04    0.0025
2018-01-05    0.0020
2018-01-08    0.0017
...
2018-12-24   -0.0111
2018-12-26    0.0226
2018-12-27    0.0028
2018-12-28   -0.0001
2018-12-31    0.0042
Length: 251, dtype: float64, 'Portfolio 95: TFX, VEEV, FSLR, FTNT, MDB, MANH,
RCL, ERIE, UWMC, PCG, NSA, PAG, PYCR, MTD, WIX, FDX, LPX, GOOG, MTB, UPS, AVTR,
STT, AMCR, CBRE, VRSK, JLL, NXST, UNVR, LEG, CNA, RTX, PODD, VLO, DFS, GOOGL,
UHS, GM, BDX, MMC, HWM, VFC, WOLF, TECH, HPP, GME, PENN, LKQ, PCTY, INTC, KHC':
Date
2018-01-02    0.0035
2018-01-03    0.0019
2018-01-04    0.0022
2018-01-05    0.0016
2018-01-08    0.0037
...
2018-12-24   -0.0097
2018-12-26    0.0226
2018-12-27    0.0039
2018-12-28   -0.0000
2018-12-31    0.0044
Length: 251, dtype: float64, 'Portfolio 96: FYBR, CCK, MKSI, U, MPC, UI, JKHY,

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PNR, HAL, PFE, TTEK, NSA, CHH, REG, GNTX, PRU, FLS, AVGO, IR, INGR, WM, OLLI, CFLT, SMG, NFE, FNB, CTLT, META, GWRE, EGP, CABO, ETR, MTG, MCHP, CNP, MSI, SPGI, JBLU, HST, SLB, WE, AYX, RYN, PEAK, CLF, GFS, PPL, AZPN, MTCH, SCI': Date

2018-01-02	0.0039
2018-01-03	0.0019
2018-01-04	0.0017
2018-01-05	0.0020
2018-01-08	0.0017
...	
2018-12-24	-0.0113
2018-12-26	0.0212
2018-12-27	0.0028
2018-12-28	-0.0001
2018-12-31	0.0034

Length: 251, dtype: float64, 'Portfolio 97: HSIC, GS, AZO, CTSH, CMI, PTC, VICI, NVAX, COHR, CACI, IONS, NDAQ, AIRC, WBS, EVA, ADI, EA, OGN, DKS, IPG, RJF, ORCL, ACM, WH, F, MPC, PHM, LLY, WMT, AMAT, EQIX, ICUI, FND, MDB, LW, ATUS, NDSN, CPB, GNTX, OTIS, IBKR, NTRA, AEE, ON, NEE, HEI-A, LYFT, YUM, HAS, PPC': Date

2018-01-02	0.0028
2018-01-03	0.0035
2018-01-04	0.0017
2018-01-05	0.0031
2018-01-08	0.0028
...	
2018-12-24	-0.0115
2018-12-26	0.0221
2018-12-27	0.0018
2018-12-28	0.0000
2018-12-31	0.0047

Length: 251, dtype: float64, 'Portfolio 98: DEI, CMCSA, PHM, NOW, ARES, RPRX, MSFT, TKR, PAYC, ALL, EXPD, WAB, DRI, PRU, RHI, SQ, HUBS, HIW, VTR, TNL, TPR, MSGS, WY, BBY, UPST, DINO, ARMK, S, WWE, COST, HWM, ESTC, CHD, LECO, PEG, OMF, RMD, UHAL-B, LNT, AVY, NEWR, NATI, EW, SF, VTS, THG, TFC, HBI, SAM, ROK': Date

2018-01-02	0.0032
2018-01-03	0.0013
2018-01-04	0.0037
2018-01-05	0.0025
2018-01-08	0.0017
...	
2018-12-24	-0.0119
2018-12-26	0.0232
2018-12-27	0.0043
2018-12-28	-0.0011
2018-12-31	0.0048

Length: 251, dtype: float64, 'Portfolio 99: CACC, JKHY, AYI, HOOD, LYV, MS, NCLH, WTFC, EPAM, ACHC, MNST, DLR, TXN, ORLY, V, PACW, LII, WPC, FNB, HPQ, MORN, FRT, UWMC, TT, GPC, RF, ZG, CG, GPS, PEGA, OPEN, PSTG, CDW, EQT, THC, CSCO, MMC, ORI, ADP, UAL, NCR, CHDN, BG, AVT, NEWR, CB, APP, FRC, SEB, BAX': Date

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2018-01-02    0.0042
2018-01-03    0.0026
2018-01-04    0.0008
2018-01-05    0.0017
2018-01-08   -0.0001
...
2018-12-24   -0.0103
2018-12-26    0.0224
2018-12-27    0.0029
2018-12-28   -0.0007
2018-12-31    0.0028
Length: 251, dtype: float64, 'Portfolio 100: MKTX, INVH, IP, ALLE, PG, EMR, OVV,
AYI, DT, USB, NCLH, KEY, ABNB, FDS, KMI, PLNT, EXEL, CAT, WDC, HAYW, RYN, ARES,
WEC, LOPE, ICUI, AMH, CHK, WTM, MMM, TRU, EXPD, SNX, VRSK, LBRDA, TREX, QCOM,
LESL, MSGS, SIVB, AAP, TMUS, NTRS, NVCR, LUV, RH, AMC, HXL, OLED, STE, RJF':
Date
2018-01-02    0.0040
2018-01-03    0.0023
2018-01-04   -0.0005
2018-01-05    0.0029
2018-01-08    0.0008
...
2018-12-24   -0.0120
2018-12-26    0.0229
2018-12-27    0.0034
2018-12-28    0.0003
2018-12-31    0.0040
Length: 251, dtype: float64}
{'Portfolio 1: ZTS, KHC, EW, NET, J, RIVN, ODFL, AXP, JCI, BOH, NATI, VRT, T,
REYN, KD, IBKR, BX, CNM, NWSA, RSG, ROST, ALK, KNX, TWKS, DOW, HOG, THG, STLD,
HUBS, EXAS, TXT, BKR, CCI, EQIX, TSCO, AN, CTSB, CBRE, RKT, SBAC, AGO, CACC,
QRVO, GLW, NVCR, COLM, ESTC, EVR, CLH, FOXA': Date
2017-01-03    0.0034
2017-01-04    0.0070
2017-01-05   -0.0025
2017-01-06   -0.0006
2017-01-09    0.0004
...
2017-12-22   -0.0003
2017-12-26   -0.0007
2017-12-27    0.0004
2017-12-28    0.0014
2017-12-29   -0.0026
Length: 251, dtype: float64, 'Portfolio 2: PAYC, CRWD, SIX, CVS, TDY, HXL, LNC,
REG, KSS, APP, ROK, CHE, VRTX, WH, CG, AMZN, OVV, MTCH, NNN, AWK, OC, SLGN, AEP,
BEPC, MTN, FWONK, TNDM, WLK, MDB, FSLR, M, CRM, HAS, USFD, BXP, RNR, BLDR, ABT,
OMF, VSAT, NXST, RH, ON, DUK, TNL, MPW, XRAY, LSI, CB, JBGS': Date
2017-01-03    0.0043

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2017-01-04    0.0072
2017-01-05   -0.0033
2017-01-06   -0.0002
2017-01-09   -0.0013
...
2017-12-22   -0.0003
2017-12-26    0.0025
2017-12-27    0.0000
2017-12-28    0.0015
2017-12-29   -0.0027
Length: 251, dtype: float64, 'Portfolio 3: ZS, ALB, ALL, AMZN, NOC, INFA, FIS,
CMCSA, ETN, TRMB, FRT, LYB, LSCC, CPA, NYCB, GGG, BWXT, FNF, HHC, AVY, STZ,
COUP, ADT, LLY, CNXC, SKX, SON, MP, FCX, CARR, PTON, FIVE, DXCM, ULTA, LCID,
CTAS, FR, AVB, HUBB, SYF, IVZ, IFF, VST, IP, ATO, LRCX, SQ, CSCO, LEA, LSXMA':
Date
2017-01-03    0.0024
2017-01-04    0.0065
2017-01-05   -0.0011
2017-01-06    0.0007
2017-01-09   -0.0028
...
2017-12-22   -0.0004
2017-12-26    0.0011
2017-12-27    0.0005
2017-12-28    0.0019
2017-12-29   -0.0024
Length: 251, dtype: float64, 'Portfolio 4: PLTR, CNXC, ZI, CNP, WST, BPOP, WDAY,
NFE, AXS, ROKU, BEPC, AME, RRC, IVZ, VLO, PYCR, EHC, MS, LAMR, SWN, UTHR, Z,
PATH, ESI, SLG, CHPT, XOM, OVV, UAL, MKC, DTE, SYK, IEX, DVN, EWBC, ATUS, BILL,
GTES, LSCC, DGX, IBKR, HR, CCI, VNO, TSLA, RS, PPL, ANSS, SNDR, CDNS': Date
2017-01-03    0.0015
2017-01-04    0.0060
2017-01-05   -0.0015
2017-01-06    0.0005
2017-01-09   -0.0032
...
2017-12-22    0.0002
2017-12-26    0.0022
2017-12-27   -0.0001
2017-12-28    0.0018
2017-12-29   -0.0022
Length: 251, dtype: float64, 'Portfolio 5: LH, TW, FFIV, IR, LHX, DXC, MAT, J,
ADI, PARAA, REYN, FITB, RYN, MU, ECL, NFE, UHAL-B, NVCR, DHR, BEPC, LUV, AVB,
FTV, HUM, SAM, IBKR, NTAP, UA, NATI, WMB, NDSN, QS, PM, KBR, LVS, MGM, DISH,
BRO, HOLX, EHAB, EXP, HHC, WYNN, RXO, K, SITE, NYCB, INTU, LUMN, PLD': Date
2017-01-03    0.0031
2017-01-04    0.0055
2017-01-05   -0.0015

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2017-01-06    0.0011
2017-01-09   -0.0021
...
2017-12-22   -0.0004
2017-12-26    0.0002
2017-12-27    0.0006
2017-12-28    0.0002
2017-12-29   -0.0027
Length: 251, dtype: float64, 'Portfolio 6: HAYW, EWBC, LUMN, ROL, PAYC, L, DHR,
BK, CACI, AAP, BF-A, BBWI, LSXMA, BAC, SAIC, BEN, CPRT, FTV, BG, CTVA, TXG, TXT,
HPP, RYAN, TPR, FRT, SLM, STT, MGM, SYU, OXY, UHS, ENTG, EXR, UHAL, GPS, FISV,
CBSH, WST, VRSK, USFD, DELL, PCTY, TSCO, PTC, BMRN, OHI, PLD, SEIC, PYCR': Date
2017-01-03    0.0045
2017-01-04    0.0053
2017-01-05   -0.0030
2017-01-06    0.0010
2017-01-09   -0.0007
...
2017-12-22    0.0004
2017-12-26    0.0010
2017-12-27   -0.0007
2017-12-28    0.0011
2017-12-29   -0.0023
Length: 251, dtype: float64, 'Portfolio 7: PCG, LVS, SQ, ARES, HR, AIRC, BRKR,
NWSA, FRPT, PSTG, SLM, CDNS, TAP, NDSN, SNOW, POOL, ROL, CVNA, WPC, J, TTEK,
AOS, BXP, INFA, IRM, MS, FG, MSA, CL, HCA, MNST, WBA, LSCC, R, PH, HBAN, HII,
UGI, WU, BLD, FSLR, WMS, TMO, EPR, GGG, GEHC, BOH, CAH, IART, FHN': Date
2017-01-03    0.0038
2017-01-04    0.0069
2017-01-05   -0.0011
2017-01-06   -0.0004
2017-01-09   -0.0027
...
2017-12-22   -0.0006
2017-12-26   -0.0003
2017-12-27    0.0000
2017-12-28    0.0009
2017-12-29   -0.0027
Length: 251, dtype: float64, 'Portfolio 8: RGA, CSL, HII, AAPL, SBNY, NCNO, CNC,
BLK, RIVN, WIX, UAA, TNL, JWN, CPT, VTS, UNM, PEG, AGL, RYAN, CSGP, TECH, TPL,
NET, CLX, HAS, DXCM, CAR, ECL, M, EXPE, DOCS, ADI, LCID, HAYW, PNC, HUBB, BURL,
LYB, CHRW, SBAC, MPW, ZBRA, GWW, FICO, AXS, SPGI, ERIE, AM, OLED, NVDA': Date
2017-01-03    0.0014
2017-01-04    0.0061
2017-01-05   -0.0026
2017-01-06    0.0009
2017-01-09   -0.0019
...

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2017-12-22	0.0007
2017-12-26	0.0008
2017-12-27	0.0001
2017-12-28	0.0011
2017-12-29	-0.0022
Length: 251, dtype: float64, 'Portfolio 9: UA, JNPR, AXON, OZK, MTD, MO, CMCSA, INCY, UAL, PWR, MTZ, LVS, AZPN, INTC, AGO, ES, WBA, TDY, NWL, STT, SUI, DAR, ADI, AXTA, GIS, PODD, SOFI, ABT, BR, FLO, VAC, EQH, AR, PACW, MKC, TXT, FOX, CTVA, RARE, TYL, EIX, PSA, MOH, CACC, HWM, WST, CASY, ORCL, CHDN, WMT': Date	
2017-01-03	0.0019
2017-01-04	0.0060
2017-01-05	-0.0022
2017-01-06	0.0017
2017-01-09	-0.0021
...	
2017-12-22	0.0005
2017-12-26	0.0004
2017-12-27	0.0009
2017-12-28	0.0011
2017-12-29	-0.0032
Length: 251, dtype: float64, 'Portfolio 10: HTZ, STLD, MP, MO, WWD, WSC, EXPD, SJM, VTRS, SGFY, RBLX, LDOS, HBAN, MET, DT, EIX, COIN, AMD, LPX, PTC, CC, BOKF, TTWO, AZPN, GM, AMZN, AMCR, CERT, VAC, OKE, PPG, APP, PFE, ZBRA, BKR, PINC, IAA, F, MSFT, WDC, EVRG, WRK, EWBC, THO, VRSK, BALL, ELS, ED, CAH, SLB': Date	
2017-01-03	0.0026
2017-01-04	0.0048
2017-01-05	-0.0023
2017-01-06	0.0005
2017-01-09	-0.0013
...	
2017-12-22	0.0002
2017-12-26	-0.0002
2017-12-27	0.0004
2017-12-28	0.0013
2017-12-29	-0.0025
Length: 251, dtype: float64, 'Portfolio 11: OZK, RTX, LRCX, ULTA, WSC, OHI, MDLZ, WAT, SF, HLT, AKAM, BOKF, MBC, DT, HAL, EPR, RL, MIDD, LPLA, ACGL, H, BR, ATO, LHX, EWBC, GOOG, TNL, JEF, CI, IAC, IDXX, PRGO, WBS, MRVL, IQV, SIRI, IBM, U, QRVO, ESAB, DGX, AVB, AMG, CG, NFE, EGP, PEP, JCI, MDT, DHI': Date	
2017-01-03	0.0035
2017-01-04	0.0051
2017-01-05	-0.0007
2017-01-06	0.0021
2017-01-09	-0.0020
...	
2017-12-22	0.0007
2017-12-26	-0.0003
2017-12-27	0.0009

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2017-12-28    0.0013
2017-12-29   -0.0021
Length: 251, dtype: float64, 'Portfolio 12: NVT, AGR, RGA, QDEL, TFC, CIEN,
FBIN, FHN, KMX, NTRS, USFD, CAT, WAL, AGNC, FR, RMD, BYD, JBL, PRU, X, DOCS,
ESTC, SNV, WAB, MRVI, MPW, LSXMK, CAH, GTES, POST, EL, CGNX, MTB, APH, OLN, SPB,
TWLO, NVR, EXAS, IDXX, LAMR, EQIX, NWL, RE, CNM, OHI, FYBR, CINP, RS, VTS': Date
2017-01-03    0.0020
2017-01-04    0.0073
2017-01-05   -0.0022
2017-01-06   -0.0006
2017-01-09   -0.0000
...
2017-12-22   -0.0007
2017-12-26    0.0004
2017-12-27   -0.0003
2017-12-28    0.0021
2017-12-29   -0.0031
Length: 251, dtype: float64, 'Portfolio 13: SSNC, R, GWRE, HAL, UA, HIW, ZG,
CFG, DD, REG, UNP, HPE, TRGP, HRB, CME, CPB, WE, FTNT, MASI, TFX, WTW, MAN,
BFAM, PYPL, AM, BILL, RIVN, KEYS, DAR, CTAS, MMC, DOCU, NDSN, NOV, CVNA, NTRA,
GOOG, PNFP, NVST, PWR, DKNG, MRCY, L, MSI, NWL, CAH, LOW, RYAN, BAC, GEHC': Date
2017-01-03    0.0036
2017-01-04    0.0053
2017-01-05   -0.0023
2017-01-06    0.0015
2017-01-09   -0.0021
...
2017-12-22   -0.0004
2017-12-26    0.0000
2017-12-27   -0.0002
2017-12-28    0.0007
2017-12-29   -0.0027
Length: 251, dtype: float64, 'Portfolio 14: PEG, BKI, NCR, SSNC, UHAL-B, RITM,
ABT, KMX, BA, OMC, K, TDOC, TRIP, DNA, AMD, NDAQ, EWBC, HD, ISRG, TPL, NNN,
CTRA, PRGO, TROW, CHDN, MSCI, MP, CVNA, PNC, MRK, GDDY, MDB, ESTC, CPT, COLD,
PCG, WMS, NSC, EXC, GH, TTC, ENTG, WOOF, ELAN, AWK, SNV, AAPL, CBSH, COST, LAD':
Date
2017-01-03    0.0018
2017-01-04    0.0046
2017-01-05   -0.0003
2017-01-06    0.0013
2017-01-09   -0.0019
...
2017-12-22    0.0002
2017-12-26    0.0000
2017-12-27    0.0003
2017-12-28    0.0014
2017-12-29   -0.0022

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Length: 251, dtype: float64, 'Portfolio 15: ORCL, BRK-B, TOL, OGE, RUN, HHC, OXY, MAT, MSCI, MDT, UNVR, AOS, INCY, HR, OHI, AEE, G, ETSY, JLL, FRPT, IPG, JNJ, KD, UTHR, PNC, ACN, VMI, CBSH, TWKS, AVGO, HOLX, NVT, MSA, WSO, CR, AFL, HUN, LAD, TW, CRWD, RGA, QGEN, VTS, CPRI, NVR, FFIV, TSN, DCI, REXR, SPB': Date

2017-01-03	0.0025
2017-01-04	0.0057
2017-01-05	-0.0013
2017-01-06	0.0005
2017-01-09	-0.0022
...	
2017-12-22	-0.0009
2017-12-26	0.0004
2017-12-27	-0.0002
2017-12-28	0.0007
2017-12-29	-0.0025

Length: 251, dtype: float64, 'Portfolio 16: SWK, REG, WMT, GLW, GME, F, FBIN, SGFY, MSI, LECO, FOX, VRTX, WOOF, ALNY, BEPC, NTAP, BG, JHG, HIG, NKE, MPW, SPR, CFG, PYPL, BF-B, UTHR, FOUR, DGX, RS, ORLY, AXON, DOCS, LKQ, TROW, BIO, BALL, RGA, ABT, MAR, IBM, BBY, AMBP, BWXT, SRPT, CTLT, CSL, DRI, RUN, BRX, LNT': Date

2017-01-03	0.0037
2017-01-04	0.0063
2017-01-05	-0.0015
2017-01-06	0.0006
2017-01-09	-0.0015
...	
2017-12-22	0.0003
2017-12-26	0.0018
2017-12-27	0.0008
2017-12-28	0.0011
2017-12-29	-0.0028

Length: 251, dtype: float64, 'Portfolio 17: SLG, ALGM, AN, KMPR, BLD, MAS, TOST, NEU, GOOG, APA, MAN, EMN, ADSK, OWL, GGG, BDX, AGL, EHAB, OKTA, CNM, EHC, VLO, HE, AGO, MANH, BKI, TT, BFAM, RYN, F, SPG, CG, UWMC, BSY, NI, GILD, DRI, AOS, DOCU, WSM, CRWD, CF, ORCL, ORLY, LUMN, GS, EQIX, DNB, MHK, NTAP': Date

2017-01-03	0.0054
2017-01-04	0.0050
2017-01-05	-0.0017
2017-01-06	0.0004
2017-01-09	-0.0022
...	
2017-12-22	0.0000
2017-12-26	0.0012
2017-12-27	-0.0001
2017-12-28	0.0009
2017-12-29	-0.0020

Length: 251, dtype: float64, 'Portfolio 18: G, PFGC, TOL, SLGN, PSTG, PTON, IEX, HST, RITM, HEI-A, DRI, HE, KEX, UMPQ, ALGN, MA, QDEL, AJG, CDAY, NYT, JWN, DD, AES, IDA, CAT, KHC, MKSI, HLT, CPA, COST, CNM, WBA, GM, NOC, AXTA, BAC, RNG,

TRV, WAB, PGR, NBIX, WTM, LSCC, TNDM, FRC, SNPS, SUI, OKE, DIS, CNP': Date

2017-01-03	0.0021
2017-01-04	0.0057
2017-01-05	-0.0030
2017-01-06	0.0013
2017-01-09	-0.0023
...	
2017-12-22	-0.0000
2017-12-26	0.0004
2017-12-27	0.0002
2017-12-28	0.0019
2017-12-29	-0.0025

Length: 251, dtype: float64, 'Portfolio 19: NSA, USB, COHR, DOW, R, QRVO, FANG, AL, GGG, EMR, MO, MOS, LII, COUP, CLX, CUBE, HSY, ALNY, OTIS, GH, AYI, ENOV, ROK, OLED, COIN, TSCO, EXEL, AIZ, RPRX, RE, DRI, MRO, UAA, HLT, PPL, RYN, OVV, BALL, STLD, PM, CAT, CRWD, WMB, STT, ENPH, TWLO, NWL, W, EW, AZO': Date

2017-01-03	0.0034
2017-01-04	0.0087
2017-01-05	-0.0013
2017-01-06	0.0007
2017-01-09	-0.0022
...	
2017-12-22	0.0013
2017-12-26	0.0012
2017-12-27	0.0013
2017-12-28	0.0019
2017-12-29	-0.0039

Length: 251, dtype: float64, 'Portfolio 20: IBM, FLT, NTN, BLK, MSM, SEB, TRGP, CHD, DNB, RE, UBER, PEG, GPS, GM, QDEL, DV, FDS, MAR, DOCS, CHRW, VEEV, ANET, ATR, STE, AZTA, NEU, MSA, LSI, RTX, INCY, DAR, HE, PNR, HUN, ERIE, ESAB, SCCO, AN, WSC, BA, CI, NVST, ELV, ITT, NUE, OVV, CLVT, GEHC, BWXT, WY': Date

2017-01-03	0.0030
2017-01-04	0.0075
2017-01-05	-0.0018
2017-01-06	0.0010
2017-01-09	-0.0009
...	
2017-12-22	0.0005
2017-12-26	0.0007
2017-12-27	0.0009
2017-12-28	0.0019
2017-12-29	-0.0021

Length: 251, dtype: float64, 'Portfolio 21: BRO, APTV, EPR, GL, HAS, MIDD, KBR, ETN, ED, PKG, PEAK, PARA, DTM, BIIB, EQIX, TGT, OKTA, JEF, M, AGR, BMRN, AGNC, HXL, LPLA, NCR, BAC, WMS, RJF, ARES, ATUS, PATH, CLVT, VTS, BR, TNL, MO, RS, ATO, NATI, SBNY, VSCO, SITE, CNP, CMA, SLG, JAMF, PG, VMW, IPG, FDS': Date

2017-01-03	0.0032
2017-01-04	0.0063

2017-01-05 -0.0027
2017-01-06 0.0011
2017-01-09 -0.0028

...

2017-12-22 0.0008
2017-12-26 0.0007
2017-12-27 -0.0001
2017-12-28 0.0018
2017-12-29 -0.0014

Length: 251, dtype: float64, 'Portfolio 22: QDEL, CHDN, IDA, WMS, IBKR, TROW, REYN, APO, APD, DAL, ACN, DD, AKAM, SEIC, EQT, FSLR, UHAL, CRI, CAG, HOG, PPL, FISV, UBER, IVZ, WRK, MU, KLAC, NWL, ACGL, EXP, CIEN, FRC, AMG, KMX, BMRN, NOW, AVB, DV, MTG, URI, STE, PARA, COUP, PCOR, NDAQ, LEN, RH, UNM, USB, ARMK': Date

2017-01-03 0.0031
2017-01-04 0.0061
2017-01-05 -0.0031
2017-01-06 0.0000
2017-01-09 -0.0031

...

2017-12-22 -0.0009
2017-12-26 -0.0006
2017-12-27 -0.0005
2017-12-28 0.0015
2017-12-29 -0.0035

Length: 251, dtype: float64, 'Portfolio 23: EVRG, PHM, KSS, RXO, WSM, FND, ESAB, PEP, OC, TNL, BWA, AZEK, NOW, RYN, CPA, LKQ, MSI, PLNT, TSCO, GGG, NFE, UMPQ, ICE, SPR, FRPT, SJM, PNW, LDOS, PDCE, THG, CPRT, MPWR, BRX, FWONK, ABT, PCG, WE, AZO, C, REXR, WBS, GLW, GRMN, MSM, SPOT, RL, PEGA, UHS, CAT, ROKU': Date

2017-01-03 0.0028
2017-01-04 0.0043
2017-01-05 -0.0030
2017-01-06 0.0003
2017-01-09 -0.0032

...

2017-12-22 -0.0005
2017-12-26 0.0021
2017-12-27 0.0009
2017-12-28 0.0012
2017-12-29 -0.0027

Length: 251, dtype: float64, 'Portfolio 24: HOLX, KMPR, JPM, DECK, LNT, FCN, ADP, TDC, XPO, VTRS, RUN, CPB, SYNH, SMG, QGEN, FIS, AJG, BX, VTR, MA, BKR, RS, FITB, M, SBUX, VMC, IPG, PLTR, CPT, UBER, NATI, GLOB, TFSL, AZEK, ST, HLT, ALNY, PDCE, CHE, BSX, VST, CVS, COF, AL, AMH, AMZN, DRI, GOOGL, CVX, LMT': Date

2017-01-03 0.0038
2017-01-04 0.0072
2017-01-05 -0.0024
2017-01-06 -0.0002
2017-01-09 -0.0021

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...
2017-12-22    0.0018
2017-12-26    0.0002
2017-12-27    0.0008
2017-12-28    0.0013
2017-12-29   -0.0019
Length: 251, dtype: float64, 'Portfolio 25: STZ, QDEL, BHF, SCI, APD, GO, LMT,
FND, ARE, ODFL, AR, PXD, KKR, OZK, TW, ALK, TSCO, CASY, CMA, NCLH, RHI, VMC,
TNL, AKAM, MTD, DXCM, RNG, FRC, NLY, UMPQ, WEX, EVR, QCOM, UDR, DLB, IBKR, SPLK,
CB, DXC, ACGL, IAC, NVST, HAS, PB, HOLX, HIG, MCHP, FISV, NVCR, GOOGL': Date
2017-01-03    0.0028
2017-01-04    0.0067
2017-01-05   -0.0021
2017-01-06    0.0019
2017-01-09   -0.0016
...
2017-12-22    0.0001
2017-12-26    0.0004
2017-12-27    0.0004
2017-12-28    0.0020
2017-12-29   -0.0028
Length: 251, dtype: float64, 'Portfolio 26: CTLT, TRU, QCOM, TKR, MKTX, DOCU,
PVH, LIN, LSI, LULU, PRU, MRNA, PRI, ATR, ALLE, NATI, TPL, TROW, PFG, MAR, MMC,
AEE, FR, PNFP, TDOC, DIS, PNW, GFS, BRO, BF-A, MTG, JAZZ, WEC, TJX, SKX, SON,
MCK, IPGP, MSGS, GWW, FMC, SSRM, PEN, CPB, WSC, MRO, NTRA, NCR, EXR, AN': Date
2017-01-03    0.0046
2017-01-04    0.0067
2017-01-05   -0.0009
2017-01-06   -0.0002
2017-01-09   -0.0013
...
2017-12-22    0.0001
2017-12-26    0.0011
2017-12-27    0.0004
2017-12-28    0.0008
2017-12-29   -0.0031
Length: 251, dtype: float64, 'Portfolio 27: PEAK, PPC, LFUS, IP, EGP, CAH, CSGP,
ARMK, TDC, EXEL, NWS, SYK, TRMB, TWLO, SAM, FOXA, WBA, STWD, WDAY, MBC, GFS,
JKHY, DE, COLM, NTRS, ISRG, WRB, ETSY, WOOF, NCR, DINO, MLM, RSG, ALGM, CTSH,
BLD, CDNS, LW, PLTR, BMY, WE, VNT, AYX, VRSK, CSCO, BF-B, ZS, LUV, BRO, NFE':
Date
2017-01-03    0.0015
2017-01-04    0.0059
2017-01-05   -0.0006
2017-01-06   -0.0003
2017-01-09   -0.0016
...
2017-12-22    0.0007

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2017-12-26    0.0012
2017-12-27    0.0000
2017-12-28    0.0009
2017-12-29   -0.0019
Length: 251, dtype: float64, 'Portfolio 28: AWI, WDAY, DD, AM, LW, AMC, WMT,
LEN, BA, NNN, APA, SGEN, TEAM, EXC, ICE, WHR, WSC, MAS, BIO, EXR, AAL, GDDY,
WWD, GOOGL, FYBR, AWK, NKE, LNT, SGFY, UBER, UGI, UA, EVRG, BAH, BERY, TFSL, ZM,
CLF, EVA, AGR, KHC, SLB, TTEK, LVS, ETN, DFS, IRM, PCG, MKTX, TRGP': Date
2017-01-03    0.0033
2017-01-04    0.0052
2017-01-05   -0.0016
2017-01-06    0.0017
2017-01-09   -0.0027

...
2017-12-22    0.0004
2017-12-26   -0.0005
2017-12-27   -0.0000
2017-12-28    0.0018
2017-12-29   -0.0017
Length: 251, dtype: float64, 'Portfolio 29: PCAR, PINS, EHAB, FWONK, LII, DECK,
ESTC, ETSY, KEX, MAT, FOUR, AFL, TRMB, MPWR, ERIE, HZNP, VRTX, CFG, SPR, BEPC,
FG, WSO, MCD, TWKS, FRPT, PEN, TKR, NTNX, SSNC, RXO, VOYA, SNV, LDOS, ENTG,
EXPE, MRVI, UPS, HOOD, XOM, RTX, HUBB, GNRC, LESL, NEU, TTC, LHX, RARE, LLY,
CTVA, PNR': Date
2017-01-03    0.0038
2017-01-04    0.0056
2017-01-05   -0.0007
2017-01-06    0.0017
2017-01-09   -0.0022

...
2017-12-22   -0.0008
2017-12-26    0.0001
2017-12-27   -0.0006
2017-12-28    0.0003
2017-12-29   -0.0021
Length: 251, dtype: float64, 'Portfolio 30: CMS, LULU, DV, UTHR, OWL, WOLF,
BKNG, RSG, HOG, TROW, ESTC, NCLH, HBAN, FCNCA, PPL, TMO, TFC, OC, PENN, TRMB,
REXR, HCA, X, BKI, FOUR, FIS, LESL, EHAB, WRB, MDU, BMRN, ACGL, AGNC, RPRX, CAT,
HLT, PEP, LYFT, ATR, ICE, PB, AWI, TER, DKNG, S, J, AJG, AAPL, BR, YUM': Date
2017-01-03    0.0031
2017-01-04    0.0064
2017-01-05   -0.0023
2017-01-06   -0.0000
2017-01-09   -0.0029

...
2017-12-22   -0.0003
2017-12-26    0.0000
2017-12-27    0.0006

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2017-12-28    0.0018
2017-12-29   -0.0024
Length: 251, dtype: float64, 'Portfolio 31: CGNX, WY, CAH, ALL, TRGP, AEE, HTZ,
NVCR, ABNB, NCLH, AMH, OC, BKR, THO, GD, SMG, IDXX, IPG, APTV, ITT, XRAY, PCTY,
RGEN, DFS, WBA, BURL, CLF, FAF, AIZ, HAYW, WTM, HSY, SPLK, KEYS, OZK, CVS, CSL,
KSS, TRV, DDOG, TXT, TXG, KD, ICUI, CLVT, PKG, TEAM, PCAR, CBRE, ST': Date
2017-01-03    0.0034
2017-01-04    0.0064
2017-01-05   -0.0038
2017-01-06   -0.0006
2017-01-09   -0.0014
...
2017-12-22   -0.0000
2017-12-26    0.0003
2017-12-27   -0.0004
2017-12-28    0.0018
2017-12-29   -0.0018
Length: 251, dtype: float64, 'Portfolio 32: ETN, WY, BSX, OMC, MP, DISH, OLN,
PPG, DLB, DOCS, KMI, ETR, TTC, WAB, WEX, AMCR, NKE, SWKS, ZTS, GTES, TWKS, HUBB,
VICI, LOW, SJM, AXTA, FRT, CMA, LH, DAL, BRK-B, BC, VNT, PRU, MAR, HPP, RGEN,
SLM, ELAN, WOLF, AFG, CFR, MAN, HIW, EQIX, EXC, TDY, CSCO, PEAK, SMG': Date
2017-01-03    0.0037
2017-01-04    0.0049
2017-01-05   -0.0011
2017-01-06    0.0008
2017-01-09   -0.0025
...
2017-12-22   -0.0003
2017-12-26    0.0008
2017-12-27    0.0005
2017-12-28    0.0016
2017-12-29   -0.0012
Length: 251, dtype: float64, 'Portfolio 33: EGP, SLB, HRL, VIRT, AMD, APH, DE,
GIS, DTM, BG, UAA, MTD, BA, ED, IT, SBAC, AVY, RIVN, MKC, INFA, ABBV, TRGP, DIS,
ANSS, ARES, VRSK, GD, AFG, GWW, BRX, LNG, HAYW, ALGN, BAC, TDG, CL, CRL, PRI,
EXR, KLAC, BKR, NTNX, MET, FBIN, FANG, MSA, UNM, LHX, GILD, HR': Date
2017-01-03    0.0035
2017-01-04    0.0057
2017-01-05   -0.0032
2017-01-06    0.0028
2017-01-09   -0.0035
...
2017-12-22    0.0008
2017-12-26    0.0008
2017-12-27    0.0008
2017-12-28    0.0012
2017-12-29   -0.0028
Length: 251, dtype: float64, 'Portfolio 34: BOKF, LPX, AJG, FOUR, SWKS, MMC, OC,

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WOLF, MPWR, NWL, IAC, AMGN, LW, NXST, WRB, KEX, MKC, ATR, DG, CAH, ALGM, EGP, JNPR, CMS, NWSA, MSM, HII, RTX, ATUS, ZTS, EHC, RF, GIS, LBRDK, OTIS, V, WMS, UUMC, SPOT, WPC, VMI, DDOG, VAC, SCHW, HTZ, SITE, CL, MHK, CCL, MNST': Date

2017-01-03	0.0039
2017-01-04	0.0050
2017-01-05	-0.0012
2017-01-06	0.0001
2017-01-09	-0.0029
...	
2017-12-22	0.0008
2017-12-26	-0.0003
2017-12-27	0.0002
2017-12-28	0.0015
2017-12-29	-0.0019

Length: 251, dtype: float64, 'Portfolio 35: MORN, DNB, NOC, TRGP, HWM, DG, ECL, EW, QGEN, FHN, BWA, NNN, CTSH, DIS, DTM, PFE, ADM, V, RL, T, DLB, LFUS, COF, HOLX, OKE, CTAS, BIO, RGEN, PARA, SNV, REYN, CIEN, UTHR, MMC, KSS, CAG, WIX, RITM, PTON, LYB, BALL, TPL, DELL, CZR, TWKS, BIIB, IEX, LITE, NVCR, ABC': Date

2017-01-03	0.0045
2017-01-04	0.0062
2017-01-05	-0.0023
2017-01-06	0.0001
2017-01-09	-0.0024
...	
2017-12-22	0.0001
2017-12-26	0.0005
2017-12-27	0.0005
2017-12-28	0.0005
2017-12-29	-0.0023

Length: 251, dtype: float64, 'Portfolio 36: RGEN, CHE, AGO, SJM, WWE, POOL, IDA, TRIP, LCID, BALL, PCG, ALLE, SGFY, FFIV, NFG, RL, TXT, DRI, JBL, HWM, CVX, FHN, GO, RHI, AMD, SBAC, MAS, JNPR, DKNR, WTRG, INTC, BG, LW, FSLR, FTV, VMI, VTRS, MSI, JEF, NCR, VRSN, BMRN, CB, ATUS, MCW, PINC, FAF, HTZ, ICE, DVN': Date

2017-01-03	0.0048
2017-01-04	0.0045
2017-01-05	-0.0019
2017-01-06	0.0001
2017-01-09	-0.0022
...	
2017-12-22	-0.0009
2017-12-26	-0.0003
2017-12-27	0.0007
2017-12-28	0.0014
2017-12-29	-0.0014

Length: 251, dtype: float64, 'Portfolio 37: GME, SLG, WEC, FSLR, FYBR, GPC, NEM, MANH, THG, JBL, PNR, WTM, VNT, CBRE, SPR, WOLF, LSCC, HR, CHRW, TTC, WH, GXO, MSFT, ZS, AMAT, LBRDA, MCD, CHK, ACN, ATUS, CPRT, DNA, VMW, KKR, NBIX, WBA, HCA, FCN, WHR, ABC, H, DD, ATVI, SPB, FWNK, MPWR, SYU, AJG, WRB, UDR': Date

2017-01-03	0.0027
2017-01-04	0.0055
2017-01-05	-0.0010
2017-01-06	-0.0003
2017-01-09	-0.0022
...	
2017-12-22	0.0001
2017-12-26	-0.0005
2017-12-27	0.0005
2017-12-28	0.0017
2017-12-29	-0.0014

Length: 251, dtype: float64, 'Portfolio 38: CLH, GPS, LLY, VRSN, AA, KKR, CMI, SBUX, FSLR, SPOT, ATVI, WST, PEAK, DVA, GWRE, TRIP, ASH, PNFP, MSM, STE, GOOG, EXR, DT, JNPR, ABC, HXL, RIVN, WM, UMPQ, FWONA, CSGP, CASY, EOG, MIDD, FNF, AWK, UHS, AMH, VRT, WLK, HPP, RH, ARW, TECH, PFG, PNC, CSCO, KMPR, CVS, ERIE': Date

2017-01-03	0.0048
2017-01-04	0.0064
2017-01-05	-0.0010
2017-01-06	0.0012
2017-01-09	-0.0028
...	
2017-12-22	-0.0005
2017-12-26	-0.0004
2017-12-27	0.0002
2017-12-28	0.0022
2017-12-29	-0.0024

Length: 251, dtype: float64, 'Portfolio 39: BKI, PNR, AWI, APP, STLD, LAMR, HCA, NTNX, ETSY, MRNA, JHG, CPT, MCW, BKR, AAL, GGG, SEB, OZK, GE, ZTS, GDDY, NDSN, NI, TDOC, AGR, BDX, TRGP, TER, BALL, REGN, EA, OWL, COHR, JNPR, NCR, CABO, EW, ITT, GLW, AOS, AVT, CACI, EHC, CR, CPB, HOOD, ETR, DH, FYBR, CUBE': Date

2017-01-03	0.0030
2017-01-04	0.0054
2017-01-05	-0.0033
2017-01-06	0.0003
2017-01-09	-0.0017
...	
2017-12-22	-0.0002
2017-12-26	0.0004
2017-12-27	-0.0003
2017-12-28	0.0012
2017-12-29	-0.0017

Length: 251, dtype: float64, 'Portfolio 40: STLD, DAR, HON, NEE, TDG, VSAT, CME, DE, NEM, HOG, AMGN, DVN, ROL, MP, CHK, SNA, JAMF, HUBS, SOFI, APTV, BERY, JWN, NWSA, OLN, LVS, TSN, IPG, DRVN, FFIV, DOV, DASH, AZO, MKC, QDEL, IBM, BIIB, SYU, RUN, NEWR, SEIC, NCNO, AGL, CTRA, AAL, DNA, ABBV, CPRT, VTR, VZ, LEG': Date

2017-01-03	0.0033
2017-01-04	0.0055
2017-01-05	-0.0009

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2017-01-06    0.0005
2017-01-09   -0.0022
...
2017-12-22   -0.0003
2017-12-26    0.0012
2017-12-27    0.0001
2017-12-28    0.0013
2017-12-29   -0.0023
Length: 251, dtype: float64, 'Portfolio 41: NVCR, NTNX, WSC, SLG, HUN, STE,
NTRA, SPG, CNP, FHN, TXT, APO, HHC, AVTR, NRG, ADT, SNA, HSIC, NKE, NTAP, UWMC,
LYB, SF, JBLU, BILL, MAN, MBC, PWR, WPC, UTHR, SLGN, BPOP, IP, PSX, PEGA, MMM,
FR, JBL, VST, WBD, SWN, BHF, CRWD, UNH, MS, DEI, EQIX, ES, MKSI, AMCR': Date
2017-01-03    0.0017
2017-01-04    0.0071
2017-01-05   -0.0028
2017-01-06    0.0011
2017-01-09   -0.0023
...
2017-12-22    0.0003
2017-12-26    0.0016
2017-12-27   -0.0003
2017-12-28    0.0016
2017-12-29   -0.0023
Length: 251, dtype: float64, 'Portfolio 42: AEP, MOS, SMG, VEEV, AON, VSAT, R,
PLUG, GH, ECL, NYT, GPK, HUN, ZBH, PLTR, LAZ, PCG, ETR, CVS, VRT, REYN, CDAY,
UNH, STZ, EXPD, ISRG, POST, RE, WBD, MRVL, BA, WSM, TREX, HRB, MCK, PEP, HE,
PXD, TNDM, PYPL, COO, MCHP, S, LEG, WAL, WRK, LSCC, ARE, H, YUM': Date
2017-01-03    0.0036
2017-01-04    0.0058
2017-01-05   -0.0035
2017-01-06    0.0009
2017-01-09   -0.0009
...
2017-12-22   -0.0003
2017-12-26    0.0001
2017-12-27    0.0006
2017-12-28    0.0015
2017-12-29   -0.0024
Length: 251, dtype: float64, 'Portfolio 43: NVDA, LDOS, KRC, CAR, NEM, PATH,
GLOB, GPS, PODD, TGT, CBSH, SRCL, DECK, ARW, BAX, LOPE, BEN, EQIX, VRSN, DDOG,
NLY, IVZ, DV, BA, ENTG, TPR, GFS, FNF, BDX, CNXC, PACW, PEN, QS, HIG, PGR, LW,
LHX, EW, NEWR, SNX, DVA, SKX, SF, SWK, MS, MTG, LIN, MCK, OSK, JBL': Date
2017-01-03    0.0040
2017-01-04    0.0058
2017-01-05   -0.0028
2017-01-06    0.0017
2017-01-09   -0.0018
...

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2017-12-22	-0.0003
2017-12-26	-0.0001
2017-12-27	0.0002
2017-12-28	0.0009
2017-12-29	-0.0020
Length: 251, dtype: float64, 'Portfolio 44: AAL, REG, RGA, MOH, RSG, MSI, NWL, CPRT, TFX, WMS, STZ, ELAN, CTSH, TGT, ESI, WSO, TT, WYNN, BWXT, DXC, HUBS, NET, JLL, MO, AR, HPP, ALGN, BILL, PENN, AMT, SAIC, K, LIN, OKE, ST, EOG, MSGS, CCL, AM, ELS, CHDN, AVT, MCK, META, DFS, TDG, MTZ, FLT, QCOM, IVZ': Date	
2017-01-03	0.0019
2017-01-04	0.0067
2017-01-05	-0.0014
2017-01-06	0.0004
2017-01-09	-0.0026
...	
2017-12-22	-0.0007
2017-12-26	0.0010
2017-12-27	0.0009
2017-12-28	0.0021
2017-12-29	-0.0020
Length: 251, dtype: float64, 'Portfolio 45: PNFP, GIS, KEX, TTWO, TAP, ARMK, ULTA, KLAC, KKR, TECH, PTC, RITM, SF, RBLX, EWBC, SCHW, ROST, LSTR, CAH, GLW, FIVN, LEN, RF, SNA, SIVB, UPST, OLPX, AMP, HAL, AMD, DBX, ADBE, TXN, CMI, ACI, AGL, GD, DRVN, KMI, AOS, VIRT, PB, IR, TDC, NEU, PLD, DPZ, ESAB, VTRS, BYD': Date	
2017-01-03	0.0031
2017-01-04	0.0061
2017-01-05	-0.0025
2017-01-06	0.0021
2017-01-09	-0.0017
...	
2017-12-22	-0.0002
2017-12-26	-0.0008
2017-12-27	-0.0002
2017-12-28	0.0011
2017-12-29	-0.0025
Length: 251, dtype: float64, 'Portfolio 46: RSG, KEX, AZTA, KHC, STLD, XRAY, LYFT, AAPL, ADT, AYI, HSIC, CC, RITM, CSL, ITW, JPM, MO, NVR, GE, DNB, MDU, WBS, ROL, CHTR, CTSH, TER, GPN, MMM, KKR, FLT, LKQ, PG, CMA, ZBRA, HEI, USFD, NOW, TOL, EVR, W, XYL, LBRDA, MKSI, XEL, MOS, NEWR, DHR, MKC, FG, AMZN': Date	
2017-01-03	0.0022
2017-01-04	0.0068
2017-01-05	-0.0006
2017-01-06	0.0012
2017-01-09	-0.0024
...	
2017-12-22	-0.0001
2017-12-26	-0.0001


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2017-12-27    -0.0001
2017-12-28     0.0017
2017-12-29    -0.0020
Length: 251, dtype: float64, 'Portfolio 47: LVS, CEG, PRI, DCI, SAM, LII, TRU,
VRSK, GEN, SF, JKHY, SO, TRMB, AMED, LSXMA, FAF, NVAX, DXCM, PKI, DRI, DLR, HWM,
THC, MORN, MRCY, APA, SEE, NTRA, LYFT, ZG, TSN, TDG, TER, TPX, RPM, ICE, SLM,
JAZZ, ECL, WRB, MRO, ARE, WMB, MAR, M, ETN, PKG, WBD, CHRW, RYN': Date
2017-01-03     0.0035
2017-01-04     0.0075
2017-01-05    -0.0030
2017-01-06     0.0009
2017-01-09    -0.0020
...
2017-12-22    -0.0000
2017-12-26     0.0018
2017-12-27    -0.0001
2017-12-28     0.0017
2017-12-29    -0.0036
Length: 251, dtype: float64, 'Portfolio 48: PSX, RYN, CMA, CHPT, LUMN, CCCS,
WYNN, EQH, IAA, LAMR, G, EPR, PLTK, UPS, CACC, CMCSA, MPWR, TPL, ATUS, JPM, DOX,
VRSN, DHR, NBIX, PATH, AFRM, GEHC, PFGC, CMG, BFAM, CINF, LDOS, CBSH, MRVI, WEN,
HWM, ALK, XEL, MU, CABO, AME, ACGL, CCK, MRTX, OGN, NYT, AVTR, LVS, MLM, PG':
Date
2017-01-03     0.0033
2017-01-04     0.0052
2017-01-05     0.0007
2017-01-06     0.0001
2017-01-09    -0.0012
...
2017-12-22     0.0009
2017-12-26     0.0008
2017-12-27     0.0009
2017-12-28     0.0007
2017-12-29    -0.0017
Length: 251, dtype: float64, 'Portfolio 49: GRMN, SNA, EWBC, CFG, GEN, ILMN,
LEA, QDEL, EQIX, CTVA, KIM, T, IR, SEB, MPW, ACHC, BLDR, CLX, WBD, DDOG, OZK,
JAZZ, OLN, MOH, PEP, VLO, TRMB, RRX, XEL, AGL, CLVT, SIVB, ORLY, NWSA, IQV, CCI,
JWN, CMA, LKQ, IART, ULTA, DFS, GXO, WRB, DTM, IBKR, FSLR, CBSH, ESI, GO': Date
2017-01-03     0.0038
2017-01-04     0.0076
2017-01-05    -0.0032
2017-01-06     0.0003
2017-01-09    -0.0018
...
2017-12-22     0.0000
2017-12-26     0.0001
2017-12-27     0.0001
2017-12-28     0.0015

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2017-12-29    -0.0028
Length: 251, dtype: float64, 'Portfolio 50: SWK, NEWR, KRC, RGA, PII, SRC, CBOE,
CBSH, ESI, AON, VICI, AEE, HEI-A, AES, HPP, PINC, SPG, DNA, WHR, NVAX, COST,
UNH, RYN, NTRA, CMCSA, EVA, VRT, BBWI, CSX, SCCO, SEIC, BLD, TT, LLY, HII, ICE,
APD, MBC, AGNC, SNX, AMGN, AEP, CFG, VTS, FCX, HEI, TDC, MRK, TRU, GFS': Date
2017-01-03     0.0042
2017-01-04     0.0066
2017-01-05    -0.0009
2017-01-06     0.0023
2017-01-09    -0.0022
...
2017-12-22    -0.0004
2017-12-26     0.0012
2017-12-27     0.0008
2017-12-28     0.0016
2017-12-29    -0.0024
Length: 251, dtype: float64, 'Portfolio 51: AFL, PARAA, GLOB, KDP, OSK, MRNA,
TTWO, CMI, WAB, ABBV, KBR, LYB, CFR, CIEN, AMG, PB, TEAM, EIX, CCCS, WH, WBS,
ADM, SON, FND, WWE, ESI, SSRM, QGEN, CRUS, BAC, RRX, S, WEC, SIX, FHN, USFD,
WBD, LYV, PEG, HLT, MSA, DFS, NDAQ, CRWD, SRPT, SGEN, ABNB, APA, DLTR, AMC':
Date
2017-01-03     0.0036
2017-01-04     0.0057
2017-01-05    -0.0026
2017-01-06    -0.0002
2017-01-09    -0.0016
...
2017-12-22    -0.0007
2017-12-26    -0.0007
2017-12-27     0.0010
2017-12-28     0.0018
2017-12-29    -0.0026
Length: 251, dtype: float64, 'Portfolio 52: BWXT, HCA, BFAM, MCD, DLR, ETN, LYV,
NWL, GDDY, AM, OPEN, ELV, PODD, DV, HBI, FTNT, SRC, FLO, CHE, PB, CL, LYFT, TAP,
AGCO, ENTG, HUBS, MDLZ, SPOT, FRPT, PPG, NKE, NTNX, GE, PNW, CHRW, KIM, LVS,
ECL, JWN, SNOW, DKS, JLL, CMI, KO, BLK, ACI, D, DASH, ROP, CRI': Date
2017-01-03     0.0024
2017-01-04     0.0066
2017-01-05    -0.0014
2017-01-06     0.0014
2017-01-09    -0.0019
...
2017-12-22     0.0001
2017-12-26     0.0015
2017-12-27    -0.0005
2017-12-28     0.0012
2017-12-29    -0.0013
Length: 251, dtype: float64, 'Portfolio 53: TPX, ACGL, RF, ENPH, TXG, DNB, META,

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PNFP, LEN-B, JAMF, CNA, ACN, MOS, VMC, DVN, XRAY, TOL, PNR, CAT, KKR, LITE, VMW, DDOG, ADSK, GPN, PCTY, LSCC, EXPE, BALL, LSTR, ACHC, SPLK, VSAT, FAST, MTB, TROW, PINC, PYPL, IDA, FWONA, LFUS, ROL, TAP, ST, MDLZ, MANH, IBKR, XEL, NYT, NTRS': Date

2017-01-03	0.0036
2017-01-04	0.0081
2017-01-05	-0.0019
2017-01-06	0.0008
2017-01-09	-0.0026

...

2017-12-22	-0.0001
2017-12-26	-0.0012
2017-12-27	0.0008
2017-12-28	0.0021
2017-12-29	-0.0023

Length: 251, dtype: float64, 'Portfolio 54: LSXMK, MKTX, PH, CHRW, CAR, FNB, SWK, CHD, GWRE, DRVN, MSA, POST, IPGP, GL, PEN, BFAM, SITE, DISH, NWSA, LSXMA, NTRS, COUP, KEYS, NVT, CNA, QGEN, SUI, WLK, CGNX, MMM, TTC, DV, UPS, NXST, GEN, LEN, FWONA, RNG, CB, MS, ESTC, BYD, BBWI, ZBRA, GIS, SWKS, HXL, IEX, LHX, USFD': Date

2017-01-03	0.0034
2017-01-04	0.0047
2017-01-05	-0.0028
2017-01-06	0.0006
2017-01-09	-0.0025

...

2017-12-22	-0.0003
2017-12-26	0.0001
2017-12-27	-0.0002
2017-12-28	0.0010
2017-12-29	-0.0022

Length: 251, dtype: float64, 'Portfolio 55: RNR, CPRT, IDA, CRUS, ROKU, DGX, SLG, HIG, HCA, ARES, AXP, ASH, COST, OKE, LHX, AA, CMG, ALLE, AYI, TKR, LESL, MTG, TDC, MKTX, ALGM, FCN, ERIE, VRT, JEF, STT, HUN, CMI, BK, AMGN, CFR, ELAN, TTWO, MNST, NVT, JKHY, PCOR, CL, H, DNA, RGEN, SHW, DHI, AJG, NEM, BRX': Date

2017-01-03	0.0037
2017-01-04	0.0066
2017-01-05	-0.0003
2017-01-06	0.0005
2017-01-09	-0.0053

...

2017-12-22	-0.0002
2017-12-26	0.0011
2017-12-27	0.0007
2017-12-28	0.0014
2017-12-29	-0.0015

Length: 251, dtype: float64, 'Portfolio 56: EA, PARA, ESS, PSX, EQIX, HIW, CRWD, LKQ, SPR, CAH, SLGN, DLR, IDA, SO, MAA, TRMB, KEYS, AAL, INFA, JBL, CNC, JEF,

ARES, ILMN, FISV, AL, MMM, BOH, JBLU, LSXMA, CGNX, DEI, EHC, UDR, ROKU, EPAM, AMD, CTLT, HBI, HOLX, CSCO, NSC, CLX, OLLI, DNA, CARR, ZION, MDU, DTE, KEX':

Date

2017-01-03	0.0016
2017-01-04	0.0065
2017-01-05	-0.0022
2017-01-06	0.0006
2017-01-09	-0.0032

...

2017-12-22	-0.0000
2017-12-26	0.0006
2017-12-27	0.0005
2017-12-28	0.0016
2017-12-29	-0.0024

Length: 251, dtype: float64, 'Portfolio 57: AMG, CG, MS, MMC, ALGM, SEIC, XRAY, FOXA, USB, PFG, VIRT, ATR, NNN, HES, PWR, WCC, MDU, JWN, EIX, BBWI, SITE, IBKR, CPA, RKT, AFRM, GPK, PAYC, TDC, GILD, HBI, NFLX, NTRS, AXON, MSM, REGN, RJF, SNOW, BX, PG, O, BALL, MPW, MAA, NFG, TMO, NOV, SNX, UNM, ANET, JBL':

Date	
2017-01-03	0.0051
2017-01-04	0.0076
2017-01-05	-0.0024
2017-01-06	0.0002
2017-01-09	-0.0041

...

2017-12-22	0.0009
2017-12-26	0.0012
2017-12-27	0.0004
2017-12-28	0.0021
2017-12-29	-0.0023

Length: 251, dtype: float64, 'Portfolio 58: ZION, KBR, GRMN, MPW, RGEN, CTRA, BIO, EQIX, MPC, OMF, NFG, BYD, FIVE, DTE, AMCR, DOCS, THO, TW, DD, IAC, CLVT, ALGN, GME, HPE, BWXT, AMZN, EVA, STZ, TRV, TER, NWS, SRPT, COIN, SIX, GNTX, UNP, JBLU, CCI, LAD, DOCU, ESAB, RCL, ACN, CBOE, TEAM, STLD, MAT, AMED, KHC, ADBE':

Date

2017-01-03	0.0036
2017-01-04	0.0064
2017-01-05	-0.0011
2017-01-06	-0.0013
2017-01-09	-0.0017

...

2017-12-22	0.0001
2017-12-26	0.0009
2017-12-27	0.0002
2017-12-28	0.0008
2017-12-29	-0.0025

Length: 251, dtype: float64, 'Portfolio 59: FCX, VNO, CSX, BLK, EVR, FHB, LMT, GGG, MPWR, LYB, ESTC, LDOS, FCN, MRO, WSC, OLN, KEX, OSK, REXR, PYCR, ETR, HIG, IAA, HUBS, DKNB, A, ABNB, BDX, GEN, HII, LAD, SCCO, PINC, NTRA, CUZ, BLDR, ALNY,

PPC, CSCQ, APTV, LUMN, WSM, TNDM, WST, IVZ, W, CPB, OMF, KNX, TMUS': Date

2017-01-03	0.0058
2017-01-04	0.0087
2017-01-05	-0.0021
2017-01-06	0.0008
2017-01-09	-0.0019
...	
2017-12-22	-0.0002
2017-12-26	0.0014
2017-12-27	0.0001
2017-12-28	0.0013
2017-12-29	-0.0037

Length: 251, dtype: float64, 'Portfolio 60: AXTA, MPC, AMZN, SRC, CLX, UAA, INTC, JBHT, VRSN, SPGI, WE, BKI, CDW, BURL, ULTA, MANH, DNB, PH, CE, WH, BA, OLPX, DOV, DOCS, USB, RGLD, HII, CHE, ANET, VAC, PAYX, TTEK, ODFL, EBAY, VNT, VTRS, SWKS, QGEN, ELAN, PINS, TRMB, NVAX, EFX, LKQ, NFG, WAT, MCO, FICO, SOFI, BG': Date

2017-01-03	0.0040
2017-01-04	0.0043
2017-01-05	-0.0001
2017-01-06	0.0008
2017-01-09	-0.0028
...	
2017-12-22	0.0005
2017-12-26	0.0002
2017-12-27	0.0013
2017-12-28	0.0013
2017-12-29	-0.0034

Length: 251, dtype: float64, 'Portfolio 61: WTW, DNA, WSC, SNOW, AVT, WDC, ZM, AGL, OMF, DELL, LW, RH, DHR, AGCO, SHC, KEYS, MTCH, TJX, LMT, FOX, CMCSA, BILL, MAT, FWONA, SGFY, PLTK, BAH, KHC, IART, HII, LAMR, NKE, EEFT, RL, STE, BALL, ZBRA, ROL, RNG, V, POST, NWS, AGO, ACHC, RSG, EXAS, BKNG, CPT, IAA, EFX': Date

2017-01-03	0.0035
2017-01-04	0.0060
2017-01-05	0.0004
2017-01-06	0.0008
2017-01-09	0.0015
...	
2017-12-22	-0.0012
2017-12-26	-0.0007
2017-12-27	0.0000
2017-12-28	0.0009
2017-12-29	-0.0024

Length: 251, dtype: float64, 'Portfolio 62: HD, NOV, PPC, NTAP, EL, SF, V, FLT, TROW, MSCI, BURL, LOW, ORLY, VICI, BEN, RGEN, TER, ELAN, SQ, AIZ, BMRN, WSO, ADP, GLPI, IEX, IPGP, PARAA, DCI, RGA, GFS, PINC, CTRA, COUP, INVH, PDCE, AWK, AWI, LEA, SPB, CBOE, DOCU, APD, LHX, PRGO, KKR, UHS, PAG, LOPE, ITW, DVA': Date

2017-01-03	0.0030
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2017-01-04    0.0062
2017-01-05   -0.0018
2017-01-06    0.0006
2017-01-09   -0.0026
...
2017-12-22   -0.0003
2017-12-26    0.0004
2017-12-27    0.0007
2017-12-28    0.0007
2017-12-29   -0.0018
Length: 251, dtype: float64, 'Portfolio 63: CAT, CAR, VFC, CABO, IAC, WRK, FNF,
CI, CHTR, MDU, SNOW, AM, ORLY, HAL, EPR, DKS, CPA, C, WDC, SKX, ITT, CBSH, TMO,
USFD, LITE, W, LVS, TW, GPN, SRE, ELS, SITE, FCN, ZION, IPGP, EMR, IART, HCA,
BRX, ALK, EW, COUP, U, NCR, JAZZ, ALB, EIX, ETN, IR, CCCS': Date
2017-01-03    0.0036
2017-01-04    0.0061
2017-01-05   -0.0016
2017-01-06    0.0001
2017-01-09   -0.0007
...
2017-12-22    0.0004
2017-12-26    0.0006
2017-12-27   -0.0004
2017-12-28    0.0009
2017-12-29   -0.0023
Length: 251, dtype: float64, 'Portfolio 64: VRTX, TFSL, FIS, BHF, LOPE, AMBP, C,
VNT, FLT, DINO, CBOE, SBAC, PNR, LSXMK, ABBV, WTRG, RYAN, BPOP, META, LW, INFA,
HUBS, MCHP, IDA, CSCO, J, AGO, TMO, ZBH, GILD, SYY, BA, OMF, AGNC, CPRI, A, ADP,
RXO, DTE, LEN, HOLX, RE, AFRM, QCOM, KRC, CR, F, WWE, GNTX, SNV': Date
2017-01-03    0.0045
2017-01-04    0.0061
2017-01-05   -0.0019
2017-01-06    0.0009
2017-01-09   -0.0014
...
2017-12-22   -0.0011
2017-12-26   -0.0003
2017-12-27    0.0006
2017-12-28    0.0016
2017-12-29   -0.0021
Length: 251, dtype: float64, 'Portfolio 65: SWN, IP, C, CTAS, ROK, DLB, ECL,
VMW, LEN, JNJ, DTM, IAA, JAZZ, CPT, BLK, IBM, PCG, WTFC, HTZ, CMCSA, ALGN, DT,
GLW, ACGL, GE, FOUR, BAC, CLF, DKS, TTWO, FRPT, WRK, CEG, GH, ADT, DIS, OLPX,
VFC, SBAC, BDX, ADSK, UNH, FCN, OPEN, SUI, URI, AMH, BSX, ETSY, ARMK': Date
2017-01-03    0.0021
2017-01-04    0.0047
2017-01-05   -0.0012
2017-01-06    0.0007

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2017-01-09    -0.0031
...
2017-12-22    -0.0004
2017-12-26     0.0002
2017-12-27    -0.0004
2017-12-28     0.0013
2017-12-29    -0.0023
Length: 251, dtype: float64, 'Portfolio 66: ANET, MTN, QDEL, COTY, WST, GS,
TEAM, CE, PII, CAH, FISV, HAYW, QRVO, BWXT, NEU, ADBE, MU, ROK, CMS, GGG, NVR,
FG, WAL, FIVE, RARE, SNDR, NKE, UMPQ, VNT, AVB, BXP, CTRA, MRTX, BLDR, CTVA,
SSNC, CW, LII, ZBH, TNL, FANG, MTB, AMGN, WH, JCI, TOST, DTM, NATI, WTRG, FICO':
Date
2017-01-03     0.0040
2017-01-04     0.0068
2017-01-05    -0.0004
2017-01-06     0.0007
2017-01-09    -0.0034
...
2017-12-22     0.0007
2017-12-26    -0.0001
2017-12-27     0.0005
2017-12-28     0.0018
2017-12-29    -0.0033
Length: 251, dtype: float64, 'Portfolio 67: CC, WAT, FAST, CINF, SON, MBC, RPM,
APH, WCC, PNFP, PB, LESL, DHR, MTB, TRIP, MTN, HEI, BOKF, WWD, FYBR, LHX, ORCL,
NCLH, LYFT, TPR, XOM, IVZ, HRL, EPAM, STWD, SNOW, EXAS, PPC, FRT, KSS, CHD, HPP,
IDXX, INCY, ATR, RCL, TOST, LOPE, NRG, DG, SLB, MAS, CF, PODD, CVNA': Date
2017-01-03     0.0025
2017-01-04     0.0071
2017-01-05    -0.0038
2017-01-06     0.0018
2017-01-09     0.0003
...
2017-12-22    -0.0001
2017-12-26     0.0009
2017-12-27    -0.0005
2017-12-28     0.0013
2017-12-29    -0.0028
Length: 251, dtype: float64, 'Portfolio 68: FMC, PSX, TTWO, GPN, NI, FDX, NCLH,
QRVO, ABBV, OMC, SWK, PM, JPM, LVS, HES, BKR, BSY, CMA, PH, EQH, BAH, VMW, GD,
ALGN, BERY, MRCY, CZR, BBY, ETSY, ROK, WDC, CHD, SMG, ENPH, CAR, PWR, BOKF, UAL,
KKR, MCO, DNB, MTZ, AZO, GPC, EXP, IPGP, SJM, JAZZ, CFG, QGEN': Date
2017-01-03     0.0029
2017-01-04     0.0065
2017-01-05    -0.0029
2017-01-06     0.0015
2017-01-09    -0.0016
...

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2017-12-22	0.0004
2017-12-26	-0.0011
2017-12-27	0.0007
2017-12-28	0.0007
2017-12-29	-0.0024
Length: 251, dtype: float64, 'Portfolio 69: WY, PCTY, CHRW, WEX, MKTX, GFS, MAA, CSGP, UPS, QRVO, KMI, JBL, NEWR, AIRC, TWKS, GM, CDW, EMN, PKI, JHG, MNST, TDC, ENPH, GXO, FND, LYFT, IPG, HD, V, HES, FYBR, ZM, MRVL, RPRX, CNM, ELV, EGP, AXON, VLO, BEPC, PLNT, OZK, THC, FRT, DHR, MTCH, MOH, SAIC, AES, WDAY': Date	
2017-01-03	0.0043
2017-01-04	0.0060
2017-01-05	-0.0008
2017-01-06	0.0012
2017-01-09	-0.0005
...	
2017-12-22	0.0004
2017-12-26	-0.0004
2017-12-27	0.0015
2017-12-28	0.0012
2017-12-29	-0.0021
Length: 251, dtype: float64, 'Portfolio 70: PLD, RMD, MTCH, GH, AYX, BXP, DTM, VSAT, CDNS, HON, ARW, CRUS, EEFT, RTX, PHM, TROW, CLVT, CZR, WSO, GXO, HRB, PARA, AGCO, KEYS, RBLX, OTIS, QDEL, HD, BF-A, SAIC, BKNG, PVH, CHE, MKSI, LECO, T, INFA, CHPT, PAYC, AON, BWXT, DOCU, XEL, UTHR, GOOG, SSNC, DOV, AA, HAL, V': Date	
2017-01-03	0.0026
2017-01-04	0.0048
2017-01-05	-0.0002
2017-01-06	0.0007
2017-01-09	-0.0022
...	
2017-12-22	-0.0004
2017-12-26	0.0009
2017-12-27	0.0015
2017-12-28	0.0009
2017-12-29	-0.0023
Length: 251, dtype: float64, 'Portfolio 71: CRM, CW, NFE, EQIX, MIDD, CTSH, GO, AXS, AFG, NTAP, KMPR, DT, HSIC, ACM, CVS, DOCU, RGLD, ALSN, PPL, G, LITE, MDU, NDSN, ACGL, GPC, OTIS, RHI, PDCE, VTRS, PM, WDAY, FIS, LSI, FMC, MHK, DASH, SLM, WMB, OGN, BLDR, AZEK, LAD, CNC, DAR, LVS, EPAM, GPN, FDS, SUI, EQH': Date	
2017-01-03	0.0043
2017-01-04	0.0067
2017-01-05	-0.0014
2017-01-06	0.0007
2017-01-09	-0.0017
...	
2017-12-22	0.0006
2017-12-26	0.0002


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2017-12-27    0.0002
2017-12-28    0.0002
2017-12-29   -0.0017
Length: 251, dtype: float64, 'Portfolio 72: CPT, JCI, ELV, EXPE, CL, DT, CSCQ,
CZR, GME, OLED, LSI, BOH, BX, CBRE, BEN, NWL, AGCO, TWKS, SRC, DTM, FSLR, COIN,
HHC, CAH, EEFT, MAR, AON, LW, GILD, TT, LULU, JKHY, PCAR, FND, ALL, ROKU, LBRDA,
BKR, NBIX, GEN, VNT, SLGN, AVGO, AFRM, NVCR, HAYW, RITM, BA, LAZ, WPC': Date
2017-01-03    0.0032
2017-01-04    0.0069
2017-01-05   -0.0015
2017-01-06    0.0005
2017-01-09   -0.0020
...
2017-12-22   -0.0003
2017-12-26    0.0002
2017-12-27    0.0020
2017-12-28    0.0009
2017-12-29   -0.0022
Length: 251, dtype: float64, 'Portfolio 73: DD, CVS, NATI, ESI, WMT, NOC, HRB,
GGG, CDAY, CF, XYL, VRSN, ALSN, WFC, AAP, DE, AFRM, OLED, UNM, RNG, MSGS, RMD,
GM, WOOF, LRCX, PANW, VAC, ADBE, WSM, LEN, NEWR, LNT, ENPH, UNVR, LEN-B, SEB,
TPX, SYU, TTC, EXPE, GO, GPS, TPR, NFE, CC, DHR, KEYS, PGR, G, ZI': Date
2017-01-03    0.0040
2017-01-04    0.0076
2017-01-05   -0.0020
2017-01-06   -0.0001
2017-01-09   -0.0008
...
2017-12-22   -0.0005
2017-12-26    0.0003
2017-12-27    0.0008
2017-12-28    0.0011
2017-12-29   -0.0033
Length: 251, dtype: float64, 'Portfolio 74: JWN, VNO, ERIE, ALLE, BMY, PEG,
MKTX, UHS, ETR, GMED, BIIB, NEU, BSX, HXL, SCHW, ES, NCNO, SIX, LVS, UWMC, MAT,
AMAT, ENPH, DD, TYL, W, MOH, MCO, LITE, UTHR, SRC, UHAL-B, NYT, IBM, Z, JPM,
PFE, HST, RUN, ROKU, COTY, FTV, JAZZ, WM, PHM, LSCC, COLD, EGP, UBER, PH': Date
2017-01-03    0.0037
2017-01-04    0.0074
2017-01-05   -0.0013
2017-01-06   -0.0003
2017-01-09   -0.0011
...
2017-12-22   -0.0005
2017-12-26    0.0011
2017-12-27    0.0005
2017-12-28    0.0010
2017-12-29   -0.0030

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Length: 251, dtype: float64, 'Portfolio 75: CL, AVB, ACHC, EXP, NTAP, NLY, SEB, IONS, CB, ORLY, MBC, KO, PNFP, MAA, T, EBAY, CNA, GNRC, WBS, DLB, SYNH, AGCO, CUZ, VVV, MTCH, VRT, BJ, SKX, BOH, IART, ESS, COO, BIIB, EXPD, PFG, PSTG, PINS, IP, LYFT, FWONK, ATO, CACI, Z, AVY, UHAL-B, MRCY, KMX, EHAB, CRUS, JHG': Date

2017-01-03	0.0019
2017-01-04	0.0059
2017-01-05	-0.0023
2017-01-06	0.0009
2017-01-09	-0.0013
...	
2017-12-22	-0.0002
2017-12-26	-0.0002
2017-12-27	-0.0002
2017-12-28	0.0013
2017-12-29	-0.0022

Length: 251, dtype: float64, 'Portfolio 76: COLM, PATH, VIRT, MU, EOG, BX, PTON, FOX, MRTX, RYAN, OWL, CLX, AGO, FWONK, NCR, BAH, ETSY, ZG, AM, MANH, EMN, VEEV, TRMB, TGT, PXD, WOLF, SPB, CRWD, IR, IDXX, LLY, HIW, ARMK, EXC, ENOV, PLTR, ES, ARW, CL, LUMN, WST, PENN, AIRC, URI, HOLX, INTC, SPLK, AGR, DG, CMI': Date

2017-01-03	0.0057
2017-01-04	0.0052
2017-01-05	-0.0005
2017-01-06	0.0007
2017-01-09	-0.0043
...	
2017-12-22	0.0004
2017-12-26	-0.0005
2017-12-27	-0.0005
2017-12-28	0.0015
2017-12-29	-0.0018

Length: 251, dtype: float64, 'Portfolio 77: VNO, ALLY, FAF, AGNC, HPP, AA, OC, PEP, MTG, DNB, MRVL, EXPD, IAA, ACGL, IDA, BRKR, EL, AN, CSCO, SMG, AGL, RUN, CTRA, TT, FBIN, J, MTD, NOV, ZI, SIRI, AMD, AFRM, CLVT, STZ, VZ, ROST, KD, DPZ, IAC, TFC, RGEN, BXP, EXPE, KHC, GPN, ENOV, MMM, SIVB, DDOG, UNM': Date

2017-01-03	0.0037
2017-01-04	0.0064
2017-01-05	-0.0014
2017-01-06	0.0012
2017-01-09	-0.0029
...	
2017-12-22	0.0001
2017-12-26	-0.0001
2017-12-27	0.0008
2017-12-28	0.0023
2017-12-29	-0.0019

Length: 251, dtype: float64, 'Portfolio 78: DISH, JAZZ, SPB, PLUG, ADT, BG, SPG, SRE, ARES, XOM, IPGP, HTZ, AGL, LSI, MNST, FISV, DRVN, SNX, CRI, DFS, CCL, CLH, LITE, CNXC, AMC, CEG, CAH, HUM, ROST, ETSY, EPR, AMT, K, BHF, A, ELV, MAR, CAR,

UPS, MAT, UA, J, WPC, WWE, BKI, MSI, SIX, AMH, NYCB, ERIE': Date

2017-01-03	0.0028
2017-01-04	0.0049
2017-01-05	-0.0014
2017-01-06	0.0003
2017-01-09	-0.0032
...	
2017-12-22	-0.0007
2017-12-26	-0.0005
2017-12-27	0.0003
2017-12-28	0.0011
2017-12-29	-0.0019

Length: 251, dtype: float64, 'Portfolio 79: CMI, JAZZ, MSCI, C, RUN, EXP, HAYW, SITE, WAB, PINS, NDAQ, TOST, DT, TSCO, PANW, JBHT, NEU, ALNY, EQH, FIVE, TTD, LAD, LNC, EMR, DHI, IONS, XYL, WH, FLS, JAMF, MIDD, BG, NYT, LUV, SIRI, SAM, VOYA, NVCR, DXCM, WTRG, GPC, WPC, JBGS, RKT, FDS, IBM, ZTS, RS, UPST, FMC': Date

2017-01-03	0.0034
2017-01-04	0.0080
2017-01-05	-0.0018
2017-01-06	-0.0001
2017-01-09	-0.0018
...	
2017-12-22	0.0002
2017-12-26	0.0017
2017-12-27	0.0007
2017-12-28	0.0014
2017-12-29	-0.0022

Length: 251, dtype: float64, 'Portfolio 80: PPG, NWSA, NOW, IPG, DIS, MSFT, FOUR, RH, FIS, RRC, VAC, ACHC, CACC, RRX, ADBE, UAA, UNH, BERY, WEC, SNOW, KSS, MRK, FICO, PYCR, WAL, AM, NEE, MORN, WFC, AGCO, WAT, MU, EFX, MDLZ, CMA, RNR, SCCO, MSI, NWL, RPRX, BEPC, AMED, TREX, RPM, NRG, SCI, EQT, PFG, DLB, MET': Date

2017-01-03	0.0037
2017-01-04	0.0075
2017-01-05	-0.0046
2017-01-06	0.0011
2017-01-09	-0.0015
...	
2017-12-22	-0.0013
2017-12-26	0.0002
2017-12-27	-0.0003
2017-12-28	0.0020
2017-12-29	-0.0034

Length: 251, dtype: float64, 'Portfolio 81: KD, CCK, VST, EQIX, ABT, AGNC, BAC, HOG, AAP, WTRG, WCC, STWD, KMX, TAP, CHRW, KLAC, SEB, BSY, HEI, TTD, MPWR, WSM, ADM, TOL, AFG, X, KMB, VRTX, RGEN, BPOP, AXS, JBGS, AMT, TNDM, RGLD, KDP, LSI, MHK, MET, FRPT, ELAN, EXPD, FIVE, LEN, QDEL, DINO, SUI, FIS, ASH, MORN': Date

2017-01-03	0.0032
2017-01-04	0.0076

2017-01-05	-0.0012
2017-01-06	-0.0013
2017-01-09	-0.0031
...	
2017-12-22	0.0003
2017-12-26	0.0011
2017-12-27	0.0001
2017-12-28	0.0005
2017-12-29	-0.0020

Length: 251, dtype: float64, 'Portfolio 82: ASH, PNC, BLD, ODFL, WBS, DBX, WYNN, UAA, DV, KMI, CACC, LSI, WOLF, TMO, BOKF, NET, RBLX, GIS, GDDY, DOCU, CHD, GM, PCAR, SGEN, JKHY, VICI, MLM, TNDM, ADM, PARA, CAG, AJG, PRI, KNX, FDX, LMT, MKL, MOH, MAR, NOV, VRSN, L, RGEN, WCC, FDS, DRVN, HHC, ICUI, BILL, EMN': Date

2017-01-03	0.0030
2017-01-04	0.0068
2017-01-05	-0.0020
2017-01-06	0.0002
2017-01-09	-0.0019
...	
2017-12-22	0.0000
2017-12-26	0.0011
2017-12-27	0.0007
2017-12-28	0.0007
2017-12-29	-0.0025

Length: 251, dtype: float64, 'Portfolio 83: CG, GEN, SYNH, PFG, MDT, RIVN, TFX, WBA, CLH, AMC, META, PEAK, GL, HD, TOST, SUI, IEX, SAM, SITE, TW, LW, HE, NWS, CRUS, KEYS, GMED, BYD, CPA, SBAC, ON, PFGC, WY, BRK-B, JNJ, SRC, HAYW, MKL, UNM, CHK, OSK, DRVN, PLUG, INGR, MMM, MRVI, LDOS, PCAR, DHI, RPM, TWLO': Date

2017-01-03	0.0016
2017-01-04	0.0053
2017-01-05	-0.0011
2017-01-06	0.0011
2017-01-09	-0.0020
...	
2017-12-22	-0.0004
2017-12-26	0.0001
2017-12-27	0.0006
2017-12-28	0.0019
2017-12-29	-0.0019

Length: 251, dtype: float64, 'Portfolio 84: ILMN, JEF, LSXMA, S, DBX, LMT, OLLI, COLD, LYB, LH, PII, TFX, SIX, PAG, TROW, PEGA, TJX, BKI, TRU, CFG, CRI, NEU, PRGO, BERY, TMO, SPLK, VLO, COST, ALGM, OKE, GWW, PFGC, JBGS, PFE, AZPN, OWL, LYV, FCX, AMC, CSCO, BRKR, MDLZ, AOS, ESI, IR, OHI, WAL, UPS, AAL, OLN': Date

2017-01-03	0.0046
2017-01-04	0.0055
2017-01-05	-0.0016
2017-01-06	0.0007
2017-01-09	-0.0011

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...
2017-12-22    -0.0008
2017-12-26     0.0010
2017-12-27     0.0000
2017-12-28     0.0021
2017-12-29    -0.0017
Length: 251, dtype: float64, 'Portfolio 85: CCK, NSA, FANG, DH, ABBV, CF, BLDR,
EQR, TNL, AKAM, USB, STE, X, TRMB, KEY, DAR, CBOE, WLK, MAR, TWLO, INTU, LBRDK,
ITT, CNXC, CBSH, SRE, CHPT, NBIX, IT, CNC, LYFT, UHAL-B, IVZ, IR, KLAC, OLPX,
FTNT, TOL, AZTA, NUE, ILMN, NATI, TRGP, SNV, PAYX, NTRS, AXTA, PEAK, AMCR,
FRPT': Date
2017-01-03     0.0026
2017-01-04     0.0081
2017-01-05    -0.0018
2017-01-06     0.0020
2017-01-09    -0.0020
...
2017-12-22     0.0005
2017-12-26     0.0002
2017-12-27     0.0005
2017-12-28     0.0020
2017-12-29    -0.0023
Length: 251, dtype: float64, 'Portfolio 86: TRIP, DOV, AM, GH, GLW, FAST, STWD,
FHN, GNRC, DOX, MHK, INVH, MPC, SYK, VAC, CAG, ZI, ST, HOOD, CPRI, LII, ACM,
AVY, NVR, KMI, QRVO, PPG, TEAM, ATR, KDP, LBRDK, CHH, APA, AVGO, LYV, CI, SNV,
EW, AEE, FE, EMN, CGNX, LEG, RGA, VMI, CRWD, DINO, AWK, AL, KBR': Date
2017-01-03     0.0040
2017-01-04     0.0048
2017-01-05    -0.0031
2017-01-06    -0.0005
2017-01-09    -0.0030
...
2017-12-22    -0.0004
2017-12-26     0.0004
2017-12-27     0.0001
2017-12-28     0.0025
2017-12-29    -0.0023
Length: 251, dtype: float64, 'Portfolio 87: AA, SBUX, KMX, BKI, BX, BC, FWONK,
CIEN, PTC, EQH, MA, MORN, MSI, WOLF, SAM, FCN, PLD, COF, EXPE, PPL, EL, FISV,
SLM, UHAL-B, SO, RF, GOOG, TRV, NFG, DG, NWS, SYU, NNN, BAC, AMP, NVDA, CHPT,
JCI, AOS, COLD, R, AFG, PEN, ALGM, VIRT, FRPT, HE, ORLY, PNC, CW': Date
2017-01-03     0.0029
2017-01-04     0.0068
2017-01-05    -0.0021
2017-01-06     0.0010
2017-01-09    -0.0025
...
2017-12-22    -0.0000

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2017-12-26    -0.0003
2017-12-27     0.0001
2017-12-28     0.0013
2017-12-29    -0.0027
Length: 251, dtype: float64, 'Portfolio 88: DAR, TFX, NDAQ, GRMN, LEN, EMN, MSM,
WU, MTZ, PCTY, PLUG, XOM, PHM, SYU, CMG, GOOGL, BRO, MRTX, RKT, AGR, AXTA, JHG,
KD, CLF, FYBR, SRE, MOH, JPM, UDR, OWL, KDP, CHDN, BPOP, CHTR, YETI, TW, NTAP,
TRIP, MPC, TXN, KLAC, U, AMGN, NYCB, FIS, T, OGE, TSLA, PK, COUP': Date
2017-01-03     0.0031
2017-01-04     0.0061
2017-01-05    -0.0013
2017-01-06     0.0008
2017-01-09    -0.0023
...
2017-12-22     0.0011
2017-12-26    -0.0007
2017-12-27    -0.0003
2017-12-28     0.0023
2017-12-29    -0.0033
Length: 251, dtype: float64, 'Portfolio 89: DISH, AFG, FFIV, BERY, FHN, COP,
IBM, GD, BEPC, VTRS, CNA, ADT, AIG, FOXA, SWKS, HRL, PAYX, MKL, SNV, EPR, TDOC,
DAR, MIDD, IEX, AMT, MAS, AR, RUN, TT, CABO, AMG, LYFT, CMCSA, ISRG, BHF, ALSN,
WWD, LUMN, USB, PLUG, DRI, SEE, MAT, LFUS, VAC, CDW, BAH, MCHP, NYT, MASI': Date
2017-01-03     0.0040
2017-01-04     0.0051
2017-01-05    -0.0022
2017-01-06    -0.0005
2017-01-09    -0.0021
...
2017-12-22    -0.0004
2017-12-26     0.0002
2017-12-27    -0.0001
2017-12-28     0.0014
2017-12-29    -0.0032
Length: 251, dtype: float64, 'Portfolio 90: MTD, GM, EW, MET, GOOGL, CPRI, FNB,
VTR, ROK, NI, CUZ, UA, LLY, TECH, WWD, GME, IPGP, EIX, IAC, NBIX, PNW, NWSA,
FBIN, EPAM, KMB, WY, MKSI, AVB, MA, CHRW, LSXMK, DNA, TRIP, UGI, DASH, WEN, T,
SPLK, MOH, KMI, SUI, DAL, IRM, PXD, DD, BALL, D, ROP, PSA, CPT': Date
2017-01-03     0.0038
2017-01-04     0.0063
2017-01-05    -0.0009
2017-01-06     0.0024
2017-01-09    -0.0020
...
2017-12-22     0.0009
2017-12-26     0.0001
2017-12-27     0.0006
2017-12-28     0.0017

```

2017-12-29 -0.0023
 Length: 251, dtype: float64, 'Portfolio 91: NCLH, ENTG, HBAN, MA, SEIC, TT, IT, GO, VNT, TTWO, MP, CSL, WDAY, HUBS, AMH, LRCX, CACI, BR, JCI, JLL, NBIX, LDOS, INTU, RH, NNN, MRVI, LUMN, MSA, POST, ITT, EQR, CCK, TMO, MPW, STZ, MANH, URI, MSFT, NYT, MO, TYL, TFC, DKNQ, NVR, CGNX, DHI, AFG, ORI, OPEN, LPLA': Date
 2017-01-03 0.0040
 2017-01-04 0.0072
 2017-01-05 -0.0027
 2017-01-06 0.0018
 2017-01-09 -0.0022
 ...
 2017-12-22 -0.0012
 2017-12-26 -0.0005
 2017-12-27 0.0003
 2017-12-28 0.0018
 2017-12-29 -0.0021
 Length: 251, dtype: float64, 'Portfolio 92: MTG, LIN, MDB, KSS, TECH, CSGP, SNX, QRV0, NATI, AFRM, WOLF, IVZ, FICO, CHK, ENOV, LFUS, AEP, KEY, CMA, ALGM, RBLX, BWA, COST, MAR, BAX, CLX, LNG, NEU, BYD, RIVN, CTAS, ADT, LBRDA, AJG, COTY, KD, VTS, BEN, IEX, BAC, MKSI, REGN, USFD, HAS, OVV, CAG, NI, NEE, WMB, ROK': Date
 2017-01-03 0.0035
 2017-01-04 0.0063
 2017-01-05 -0.0028
 2017-01-06 -0.0006
 2017-01-09 -0.0035
 ...
 2017-12-22 -0.0003
 2017-12-26 0.0005
 2017-12-27 -0.0002
 2017-12-28 0.0020
 2017-12-29 -0.0022
 Length: 251, dtype: float64, 'Portfolio 93: ZI, HZNP, AGO, LAD, AMGN, SGEN, AMBP, AVB, APA, AGR, X, MDB, FOXA, OGN, VLO, EQT, WTFC, ABBV, EHC, AFRM, CLF, TPX, PNW, IBKR, KKR, BAH, ALSN, ERIE, ZBH, MSFT, GO, BF-B, IAA, A, ALK, WAT, LMT, IVZ, UPS, PKG, FR, ARMK, GPS, CFG, LEG, SSNC, TFC, NEM, BOH, PHM': Date
 2017-01-03 0.0040
 2017-01-04 0.0064
 2017-01-05 -0.0023
 2017-01-06 0.0007
 2017-01-09 -0.0016
 ...
 2017-12-22 -0.0001
 2017-12-26 0.0005
 2017-12-27 -0.0001
 2017-12-28 0.0023
 2017-12-29 -0.0032
 Length: 251, dtype: float64, 'Portfolio 94: CRM, CL, TTEK, SGFY, GME, HES, BAX, AXP, GE, ROK, STZ, MPC, LEA, AGL, CASY, FMC, GD, PRI, WDAY, TMO, ABC, INFA, ABT,

OTIS, NFLX, DLR, UAL, WYNN, EXR, CMA, WPC, AMAT, NYCB, EVR, LNG, CMCSA, JAZZ, UPS, DVN, TPR, AVTR, OLED, LUV, GEHC, JAMF, WIX, INCY, SJM, BSY, CC': Date

2017-01-03	0.0051
2017-01-04	0.0062
2017-01-05	-0.0004
2017-01-06	0.0011
2017-01-09	-0.0003
...	
2017-12-22	0.0003
2017-12-26	0.0012
2017-12-27	0.0001
2017-12-28	0.0010
2017-12-29	-0.0027

Length: 251, dtype: float64, 'Portfolio 95: TFX, VEEV, FSLR, FTNT, MDB, MANH, RCL, ERIE, UWMC, PCG, NSA, PAG, PYCR, MTD, WIX, FDX, LPX, GOOG, MTB, UPS, AVTR, STT, AMCR, CBRE, VRSK, JLL, NXST, UNVR, LEG, CNA, RTX, PODD, VLO, DFS, GOOGL, UHS, GM, BDX, MMC, HWM, VFC, WOLF, TECH, HPP, GME, PENN, LKQ, PCTY, INTC, KHC': Date

2017-01-03	0.0041
2017-01-04	0.0056
2017-01-05	-0.0024
2017-01-06	0.0008
2017-01-09	-0.0020
...	
2017-12-22	-0.0009
2017-12-26	0.0010
2017-12-27	0.0004
2017-12-28	0.0017
2017-12-29	-0.0026

Length: 251, dtype: float64, 'Portfolio 96: FYBR, CCK, MKSI, U, MPC, UI, JKHY, PNR, HAL, PFE, TTEK, NSA, CHH, REG, GNTX, PRU, FLS, AVGO, IR, INGR, WM, OLLI, CFLT, SMG, NFE, FNB, CTLT, META, GWRE, EGP, CABO, ETR, MTG, MCHP, CNP, MSI, SPGI, JBLU, HST, SLB, WE, AYX, RYN, PEAK, CLF, GFS, PPL, AZPN, MTCH, SCI': Date

2017-01-03	0.0035
2017-01-04	0.0042
2017-01-05	-0.0023
2017-01-06	0.0003
2017-01-09	-0.0023
...	
2017-12-22	-0.0004
2017-12-26	0.0002
2017-12-27	0.0005
2017-12-28	0.0015
2017-12-29	-0.0018

Length: 251, dtype: float64, 'Portfolio 97: HSIC, GS, AZO, CTSH, CMI, PTC, VICI, NVAX, COHR, CACI, IONS, NDAQ, AIRC, WBS, EVA, ADI, EA, OGN, DKS, IPG, RJF, ORCL, ACM, WH, F, MPC, PHM, LLY, WMT, AMAT, EQIX, ICUI, FND, MDB, LW, ATUS, NDSN, CPB, GNTX, OTIS, IBKR, NTRA, AEE, ON, NEE, HEI-A, LYFT, YUM, HAS, PPC': Date

2017-01-03	0.0031
2017-01-04	0.0054
2017-01-05	-0.0029
2017-01-06	0.0005
2017-01-09	-0.0008
...	
2017-12-22	-0.0005
2017-12-26	0.0000
2017-12-27	0.0015
2017-12-28	0.0018
2017-12-29	-0.0035

Length: 251, dtype: float64, 'Portfolio 98: DEI, CMCSA, PHM, NOW, ARES, RPRX, MSFT, TKR, PAYC, ALL, EXPD, WAB, DRI, PRU, RHI, SQ, HUBS, HIW, VTR, TNL, TPR, MSGS, WY, BBY, UPST, DINO, ARMK, S, WWE, COST, HWM, ESTC, CHD, LECO, PEG, OMF, RMD, UHAL-B, LNT, AVY, NEWR, NATI, EW, SF, VTS, THG, TFC, HBI, SAM, ROK': Date

2017-01-03	0.0038
2017-01-04	0.0069
2017-01-05	-0.0016
2017-01-06	0.0011
2017-01-09	-0.0022
...	
2017-12-22	-0.0011
2017-12-26	0.0014
2017-12-27	0.0016
2017-12-28	0.0012
2017-12-29	-0.0018

Length: 251, dtype: float64, 'Portfolio 99: CACC, JKHY, AYI, HOOD, LYV, MS, NCLH, WFTC, EPAM, ACHC, MNST, DLR, TXN, ORLY, V, PACW, LII, WPC, FNB, HPQ, MORN, FRT, UWMC, TT, GPC, RF, ZG, CG, GPS, PEGA, OPEN, PSTG, CDW, EQT, THC, CSCO, MMC, ORI, ADP, UAL, NCR, CHDN, BG, AVT, NEWR, CB, APP, FRC, SEB, BAX': Date

2017-01-03	0.0040
2017-01-04	0.0071
2017-01-05	-0.0022
2017-01-06	0.0009
2017-01-09	-0.0036
...	
2017-12-22	-0.0012
2017-12-26	0.0007
2017-12-27	0.0006
2017-12-28	0.0018
2017-12-29	-0.0016

Length: 251, dtype: float64, 'Portfolio 100: MKTX, INVH, IP, ALLE, PG, EMR, OVV, AYI, DT, USB, NCLH, KEY, ABNB, FDS, KMI, PLNT, EXEL, CAT, WDC, HAYW, RYN, ARES, WEC, LOPE, ICUI, AMH, CHK, WTM, MMM, TRU, EXPD, SNX, VRSK, LBRDA, TREX, QCOM, LESL, MSGS, SIVB, AAP, TMUS, NTRS, NVCR, LUV, RH, AMC, HXL, OLED, STE, RJF': Date

2017-01-03	0.0035
2017-01-04	0.0070

```

2017-01-05    -0.0025
2017-01-06    -0.0012
2017-01-09    -0.0020
...
2017-12-22    -0.0006
2017-12-26    -0.0004
2017-12-27     0.0007
2017-12-28     0.0023
2017-12-29    -0.0026
Length: 251, dtype: float64}

```

```

[39]: # Portfolio in year t=2017
portfolio_ret_df_t = pd.DataFrame.from_dict(portfolio_returns_dict_t,
orient='index', columns=None).T.loc['2017-01-01':'2018-01-01']
portfolio_ret_df_t.columns = [f'Portfolio {i+1}' for i in range(num_portfolio)]
portfolio_ret_df_t.index = pd.to_datetime(portfolio_ret_df_t.index)
portfolio_ret_df_t

```

```

[39]:
Portfolio 1  Portfolio 2  Portfolio 3  Portfolio 4  Portfolio 5  \
2017-01-03    0.0034    0.0043    0.0024    0.0015    0.0031
2017-01-04    0.0070    0.0072    0.0065    0.0060    0.0055
2017-01-05   -0.0025   -0.0033   -0.0011   -0.0015   -0.0015
2017-01-06   -0.0006   -0.0002    0.0007    0.0005    0.0011
2017-01-09    0.0004   -0.0013   -0.0028   -0.0032   -0.0021
...
2017-12-22   -0.0003   -0.0003   -0.0004    0.0002   -0.0004
2017-12-26   -0.0007    0.0025    0.0011    0.0022    0.0002
2017-12-27    0.0004    0.0000    0.0005   -0.0001    0.0006
2017-12-28    0.0014    0.0015    0.0019    0.0018    0.0002
2017-12-29   -0.0026   -0.0027   -0.0024   -0.0022   -0.0027

Portfolio 6  Portfolio 7  Portfolio 8  Portfolio 9  Portfolio 10  \
2017-01-03    0.0045    0.0038    0.0014    0.0019    0.0026
2017-01-04    0.0053    0.0069    0.0061    0.0060    0.0048
2017-01-05   -0.0030   -0.0011   -0.0026   -0.0022   -0.0023
2017-01-06    0.0010   -0.0004    0.0009    0.0017    0.0005
2017-01-09   -0.0007   -0.0027   -0.0019   -0.0021   -0.0013
...
2017-12-22    0.0004   -0.0006    0.0007    0.0005    0.0002
2017-12-26    0.0010   -0.0003    0.0008    0.0004   -0.0002
2017-12-27   -0.0007    0.0000    0.0001    0.0009    0.0004
2017-12-28    0.0011    0.0009    0.0011    0.0011    0.0013
2017-12-29   -0.0023   -0.0027   -0.0022   -0.0032   -0.0025

... Portfolio 91  Portfolio 92  Portfolio 93  Portfolio 94  \
2017-01-03 ...    0.0040    0.0035    0.0040    0.0051
2017-01-04 ...    0.0072    0.0063    0.0064    0.0062

```

2017-01-05	...	-0.0027	-0.0028	-0.0023	-0.0004
2017-01-06	...	0.0018	-0.0006	0.0007	0.0011
2017-01-09	...	-0.0022	-0.0035	-0.0016	-0.0003
...
2017-12-22	...	-0.0012	-0.0003	-0.0001	0.0003
2017-12-26	...	-0.0005	0.0005	0.0005	0.0012
2017-12-27	...	0.0003	-0.0002	-0.0001	0.0001
2017-12-28	...	0.0018	0.0020	0.0023	0.0010
2017-12-29	...	-0.0021	-0.0022	-0.0032	-0.0027

	Portfolio 95	Portfolio 96	Portfolio 97	Portfolio 98	\
2017-01-03	0.0041	0.0035	0.0031	0.0038	
2017-01-04	0.0056	0.0042	0.0054	0.0069	
2017-01-05	-0.0024	-0.0023	-0.0029	-0.0016	
2017-01-06	0.0008	0.0003	0.0005	0.0011	
2017-01-09	-0.0020	-0.0023	-0.0008	-0.0022	
...	
2017-12-22	-0.0009	-0.0004	-0.0005	-0.0011	
2017-12-26	0.0010	0.0002	0.0000	0.0014	
2017-12-27	0.0004	0.0005	0.0015	0.0016	
2017-12-28	0.0017	0.0015	0.0018	0.0012	
2017-12-29	-0.0026	-0.0018	-0.0035	-0.0018	

	Portfolio 99	Portfolio 100
2017-01-03	0.0040	0.0035
2017-01-04	0.0071	0.0070
2017-01-05	-0.0022	-0.0025
2017-01-06	0.0009	-0.0012
2017-01-09	-0.0036	-0.0020
...
2017-12-22	-0.0012	-0.0006
2017-12-26	0.0007	-0.0004
2017-12-27	0.0006	0.0007
2017-12-28	0.0018	0.0023
2017-12-29	-0.0016	-0.0026

[251 rows x 100 columns]

```
[40]: # Portfolio in year t+1 = 2018
portfolio_ret_df_t_1 = pd.DataFrame.from_dict(portfolio_returns_dict_t_1,
orient='index', columns=None).T.loc['2018-01-01':'2019-01-01']
portfolio_ret_df_t_1.columns = [f'Portfolio {i+1}' for i in
range(num_portfolio)]
portfolio_ret_df_t_1.index = pd.to_datetime(portfolio_ret_df_t_1.index)
portfolio_ret_df_t_1
```

[40]:

	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	\
2018-01-02	0.0025	0.0048	0.0040	0.0040	0.0039	
2018-01-03	0.0025	0.0001	0.0032	0.0019	0.0015	
2018-01-04	0.0030	0.0011	0.0001	-0.0008	0.0018	
2018-01-05	0.0012	0.0018	0.0027	-0.0008	0.0017	
2018-01-08	0.0002	0.0042	-0.0001	0.0019	-0.0001	
...	
2018-12-24	-0.0080	-0.0119	-0.0094	-0.0117	-0.0098	
2018-12-26	0.0191	0.0255	0.0221	0.0224	0.0198	
2018-12-27	0.0016	0.0033	0.0043	0.0020	0.0020	
2018-12-28	0.0010	0.0004	-0.0005	-0.0012	0.0003	
2018-12-31	0.0040	0.0045	0.0044	0.0029	0.0044	
	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9	Portfolio 10	\
2018-01-02	0.0029	0.0026	0.0027	0.0050	0.0050	
2018-01-03	0.0004	0.0006	0.0028	0.0010	0.0026	
2018-01-04	0.0009	0.0007	-0.0002	0.0015	0.0036	
2018-01-05	0.0016	0.0039	0.0018	0.0019	0.0019	
2018-01-08	0.0005	0.0031	0.0031	0.0030	0.0020	
...	
2018-12-24	-0.0116	-0.0100	-0.0092	-0.0110	-0.0102	
2018-12-26	0.0197	0.0196	0.0214	0.0219	0.0182	
2018-12-27	0.0030	0.0029	0.0032	0.0030	0.0022	
2018-12-28	-0.0001	-0.0005	0.0000	-0.0006	0.0017	
2018-12-31	0.0045	0.0038	0.0032	0.0058	0.0033	
...	Portfolio 91	Portfolio 92	Portfolio 93	Portfolio 94	\	
2018-01-02	0.0041	0.0031	0.0059	0.0055		
2018-01-03	0.0031	0.0022	0.0017	0.0032		
2018-01-04	0.0011	0.0017	0.0012	0.0025		
2018-01-05	0.0020	0.0018	0.0017	0.0020		
2018-01-08	0.0021	0.0009	0.0008	0.0017		
...		
2018-12-24	-0.0115	-0.0117	-0.0108	-0.0111		
2018-12-26	0.0216	0.0232	0.0211	0.0226		
2018-12-27	0.0032	0.0029	0.0027	0.0028		
2018-12-28	-0.0012	-0.0002	-0.0013	-0.0001		
2018-12-31	0.0036	0.0052	0.0035	0.0042		
	Portfolio 95	Portfolio 96	Portfolio 97	Portfolio 98	\	
2018-01-02	0.0035	0.0039	0.0028	0.0032		
2018-01-03	0.0019	0.0019	0.0035	0.0013		
2018-01-04	0.0022	0.0017	0.0017	0.0037		
2018-01-05	0.0016	0.0020	0.0031	0.0025		
2018-01-08	0.0037	0.0017	0.0028	0.0017		
...		
2018-12-24	-0.0097	-0.0113	-0.0115	-0.0119		

2018-12-26	0.0226	0.0212	0.0221	0.0232
2018-12-27	0.0039	0.0028	0.0018	0.0043
2018-12-28	-0.0000	-0.0001	0.0000	-0.0011
2018-12-31	0.0044	0.0034	0.0047	0.0048

	Portfolio 99	Portfolio 100
2018-01-02	0.0042	0.0040
2018-01-03	0.0026	0.0023
2018-01-04	0.0008	-0.0005
2018-01-05	0.0017	0.0029
2018-01-08	-0.0001	0.0008
...
2018-12-24	-0.0103	-0.0120
2018-12-26	0.0224	0.0229
2018-12-27	0.0029	0.0034
2018-12-28	-0.0007	0.0003
2018-12-31	0.0028	0.0040

[251 rows x 100 columns]

```
[41]: # We have defined the returns for FY 2017 and FY 2018 using .loc[] method.
# We have taken np.random.seed() which makes the random numbers predictable.
# We have created a dictionary of key-value pairs for the portfolios in year t
      ↪ (FY2017) and year t+1 (FY2018). Their outputs are given above.
```

2.4.1 Task 7: Does volatility in year t predict mean returns in year $t + 1$?

```
[42]: # Calculating Volatility for portfolio at t=2017
portfolio_2017 = portfolio_ret_df_t.loc['2017-01-01':'2018-01-01']
std = portfolio_2017.std().dropna()
std
```

```
[42]: Portfolio 1      0.0024
Portfolio 2      0.0027
Portfolio 3      0.0022
Portfolio 4      0.0022
Portfolio 5      0.0022
...
Portfolio 96     0.0024
Portfolio 97     0.0025
Portfolio 98     0.0024
Portfolio 99     0.0028
Portfolio 100    0.0027
Length: 100, dtype: float64
```

```
[43]: # Calculating Mean Return for portfolio at t+1 = 2018
mean = portfolio_ret_df_t_1.mean()
mean
```

```
[43]: Portfolio 1      -0.0000
Portfolio 2       0.0001
Portfolio 3      -0.0001
Portfolio 4      -0.0001
Portfolio 5      -0.0001
...
Portfolio 96     -0.0000
Portfolio 97      0.0000
Portfolio 98      0.0001
Portfolio 99     -0.0000
Portfolio 100    -0.0001
Length: 100, dtype: float64
```

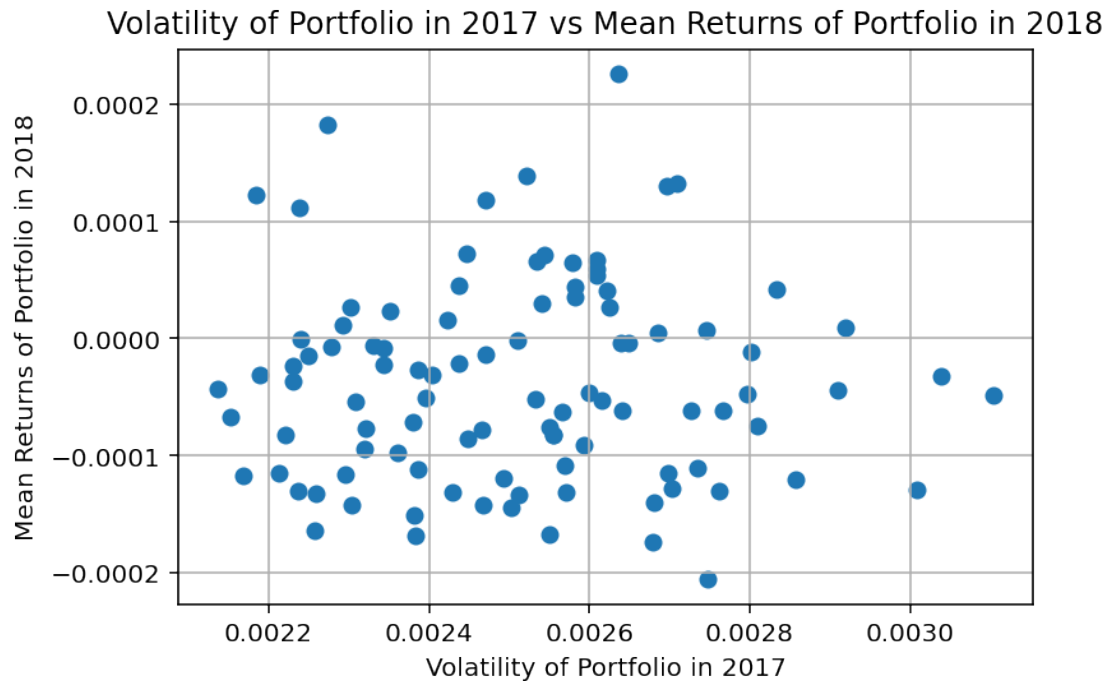
```
[44]: # Combinig Volatility and mean returns for years t & t+1
Vol_return_df = pd.concat([std, mean], axis=1).dropna()
Vol_return_df.columns = ["std_2017", "mean_ret_2018"]
Vol_return_df
```

```
[44]:          std_2017  mean_ret_2018
Portfolio 1      0.0024      -0.0000
Portfolio 2      0.0027       0.0001
Portfolio 3      0.0022      -0.0001
Portfolio 4      0.0022      -0.0001
Portfolio 5      0.0022      -0.0001
...
Portfolio 96      0.0024      -0.0000
Portfolio 97      0.0025       0.0000
Portfolio 98      0.0024       0.0001
Portfolio 99      0.0028      -0.0000
Portfolio 100     0.0027      -0.0001
```

[100 rows x 2 columns]

```
[45]: # Plotting of the graph
plt.scatter(std, mean)
plt.xlabel('Volatility of Portfolio in 2017')
plt.ylabel('Mean Returns of Portfolio in 2018')
plt.title('Volatility of Portfolio in 2017 vs Mean Returns of Portfolio in 2018')
plt.grid()
plt.show
```

```
[45]: <function matplotlib.pyplot.show(close=None, block=None)>
```



```
[46]: # Correlation between Volatility and Mean returns
correlation_vol_ret_portfolio = Vol_return_df.corr()
correlation_vol_ret_portfolio
```

```
[46]:          std_2017  mean_ret_2018
std_2017          1.0000      0.0007
mean_ret_2018      0.0007      1.0000
```

```
[47]: # We have calculated the volatility of portfolio for FY 2017 and the mean
      ↪ returns for portfolio for FY 2018.
# Then we have merged the two data frames using pd.concat() and printed the
      ↪ result out.
# We have used scatter plot to determine the relationship between the two data
      ↪ frames. The distance between the datapoints depicts the strength of
      ↪ relationship between them.
# To predict if volatility of the portfolio in year predicts the mean returns
      ↪ for the portfolio in year +1, we have used correlation (Vol_return_df.
      ↪ corr()) as a parameter to perform the analysis.
# A correlation coefficient of 0.0007 (practically zero correlation) means that
      ↪ the volatility for portfolio and the mean returns for portfolio for FY2017
      ↪ and FY2018, respectively, shows no linear relationship i.e. a change in the
      ↪ volatility of the year 't' will have a NULL effect on the mean returns for
      ↪ the year 't+1'
```

2.4.2 Task 8: Does CAPM beta in year t predict *mean returns* in year $t + 1$?

```
[48]: # CAPM Beta for year t
CAPM_beta_2017 = portfolio_ret_df_t.apply(beta)
CAPM_beta_2017
```

```
[48]: Portfolio 1      0.4577
      Portfolio 2      0.5055
      Portfolio 3      0.4332
      Portfolio 4      0.3989
      Portfolio 5      0.4338
      ...
      Portfolio 96     0.4740
      Portfolio 97     0.4847
      Portfolio 98     0.4864
      Portfolio 99     0.5458
      Portfolio 100    0.5291
      Length: 100, dtype: float64
```

```
[49]: # Mean return for t+1 year
mean = portfolio_ret_df_t_1.mean()
mean
```

```
[49]: Portfolio 1      -0.0000
      Portfolio 2       0.0001
      Portfolio 3     -0.0001
      Portfolio 4     -0.0001
      Portfolio 5     -0.0001
      ...
      Portfolio 96     -0.0000
      Portfolio 97       0.0000
      Portfolio 98       0.0001
      Portfolio 99     -0.0000
      Portfolio 100    -0.0001
      Length: 100, dtype: float64
```

```
[50]: # Combined data for CAPM beta in year t and Mean Return in year t+1
CAPM_Beta_return_df = pd.concat([CAPM_beta_2017, mean], axis=1).dropna()
CAPM_Beta_return_df.columns = ["CAPM_2017", "mean_ret_2018"]
CAPM_Beta_return_df
```

```
[50]:          CAPM_2017  mean_ret_2018
Portfolio 1      0.4577      -0.0000
Portfolio 2      0.5055       0.0001
Portfolio 3      0.4332     -0.0001
Portfolio 4      0.3989     -0.0001
Portfolio 5      0.4338     -0.0001
```



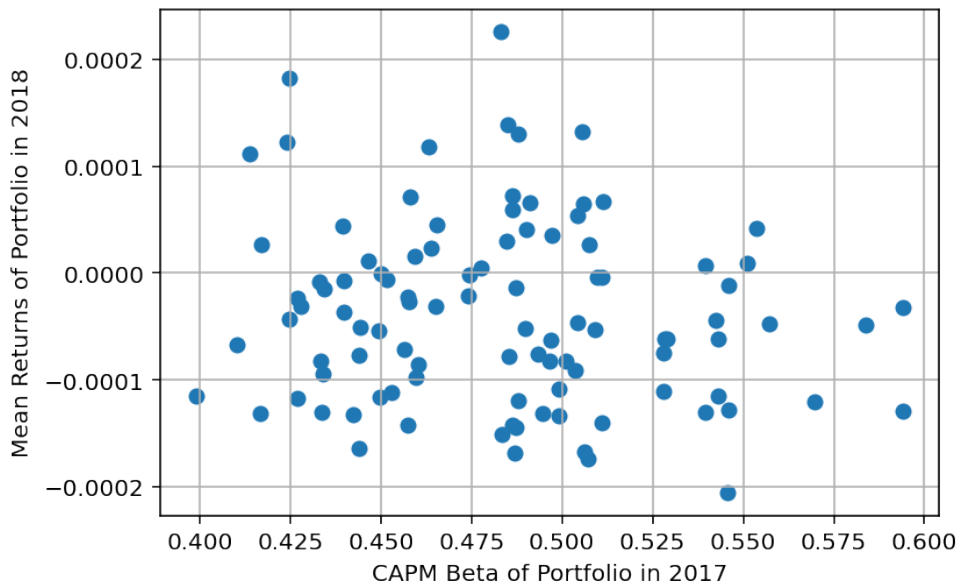
```
...
Portfolio 96      0.4740      -0.0000
Portfolio 97      0.4847       0.0000
Portfolio 98      0.4864       0.0001
Portfolio 99      0.5458      -0.0000
Portfolio 100     0.5291      -0.0001
```

[100 rows x 2 columns]

```
[51]: # Plotting of the graph
plt.scatter(CAPM_beta_2017, mean)
plt.xlabel('CAPM Beta of Portfolio in 2017')
plt.ylabel('Mean Returns of Portfolio in 2018')
plt.title('Portfolio CAPM Beta FY 2017 vs Portfolio Mean Return FY 2018 of_
↳Russell 1000')
plt.grid()
plt.show
```

```
[51]: <function matplotlib.pyplot.show(close=None, block=None)>
```

Portfolio CAPM Beta FY 2017 vs Portfolio Mean Return FY 2018 of Russell 1000



```
[52]: # Correlation between CAPM Beta and Mean Returns in years t & t+1
correlation_CAPM_beta_ret_portfolio = CAPM_Beta_return_df.corr()
correlation_CAPM_beta_ret_portfolio
```

```
[52]:
CAPM_2017      CAPM_2017  mean_ret_2018
CAPM_2017      1.0000      -0.1349
```

mean_ret_2018 -0.1349 1.0000

```
[53]: # We have calculated the CAPM betas of portfolio for FY 2017 and the mean
      ↪ returns for portfolio for FY 2018.
      # Then we have merged the two data frames using pd.concat() and printed the
      ↪ result out.
      # We have used scatter plot to determine the relationship between the two data
      ↪ frames. The distance between the datapoints depicts the strength of
      ↪ relationship between them.
      # To predict if CAPM betas of the portfolio in year t predicts the mean returns
      ↪ for the portfolio in year t+1, we have used correlation (CAPM_Beta_return_df.
      ↪ corr()) as a parameter to perform the analysis.
      # A correlation coefficient of -0.1349 means that the CAPM betas for portfolio
      ↪ and the mean returns for portfolio for FY2017 and FY2018, respectively, shows
      ↪ negative correlation i.e. a change in the CAPM betas of the portfolio for
      ↪ the year 't' will have a weak downhill linear relationship on the mean
      ↪ returns for the portfolio for the year 't+1'
```

2.5 Portfolios II

Calculate monthly volatility and total return for *every stock* and *every month* in **returns**. Drop stock-months with fewer than 15 returns. Each month, assign these stocks to one of five portfolios based on their volatility during the previous month. Equally weight these portfolios and rebalance them monthly.

2.5.1 Task 9: Do high volatility portfolios have high mean returns and Sharpe Ratios?

```
[54]: # Monthly returns, volatility, min and max values for all the stocks in the
      ↪ portfolio Russell 1000 for FY 2017
agg_2017 = (
    returns
    .loc['2017-01-01' : '2018-01-01']
    .pct_change()
    .groupby(pd.Grouper(freq='M'))
    .agg(['mean', 'std', 'min', 'max'])
    .rename_axis(columns=['Ticker', 'Variable'])
)

# Monthly returns, volatility, min and max values for all the stocks in the
↪ portfolio Russell 1000 for FY 2018
agg_2018 = (
    returns
    .loc['2018-01-01' : '2019-01-01']
    .pct_change()
    .groupby(pd.Grouper(freq='M'))
    .agg(['mean', 'std', 'min', 'max'])
    .rename_axis(columns=['Ticker', 'Variable'])
)
```

)

```
mean_std_df_m = pd.concat([agg_2017, agg_2018]).dropna(axis=1)
mean_std_df_m
```

[54]:

Ticker	A				AA		AAL	\
Variable	mean	std	min	max	min	max	min	
Date								
2017-01-31	-3.4398	9.5760	-29.7769	10.5034	-40.9558	11.3421	-4.3639	
2017-02-28	-2.2617	3.9224	-14.0113	3.5071	-9.6071	19.7885	-13.2387	
2017-03-31	-0.4606	8.0014	-8.9113	34.9818	-59.0292	23.0489	-32.1680	
2017-04-30	0.8537	7.3597	-6.1581	28.9887	-39.0101	47.3031	-21.3207	
2017-05-31	-3.2786	11.4767	-52.6534	4.3398	-33.7471	6.8548	-61.0334	
2017-06-30	-1.9567	3.2211	-14.0030	2.4491	-inf	10.6844	-3.7366	
2017-07-31	-3.0911	4.3681	-16.5148	-0.1081	-18.2259	7.6979	-3.5052	
2017-08-31	-0.7462	4.0837	-12.5465	12.6616	-inf	7.7593	-13.4110	
2017-09-30	-2.3369	5.9881	-24.3094	6.5177	-8.0194	28.9871	-10.4683	
2017-10-31	1.7297	10.0595	-6.0864	44.9814	-3.2196	inf	-9.5927	
2017-11-30	-0.9227	10.1558	-26.6019	23.4167	-11.4712	11.1960	-18.4776	
2017-12-31	-0.9008	4.1400	-7.4876	12.6554	-6.4445	6.4924	-10.6088	
2018-01-31	4.8006	20.8057	-4.5016	91.9995	-6.2500	2.4758	-35.0276	
2018-02-28	-0.0810	6.7941	-16.1289	16.8060	-13.1827	22.0097	-13.6727	
2018-03-31	1.6247	6.3759	-2.5501	24.3539	-9.7411	12.4224	-23.2197	
2018-04-30	3.4134	21.2679	-9.7951	95.0593	-5.5549	35.9982	-19.4655	
2018-05-31	-1.3108	10.3713	-38.9959	27.0536	-10.5581	4.2647	-10.5175	
2018-06-30	0.7111	4.2018	-4.5987	11.4974	-13.1834	3.9542	-35.9913	
2018-07-31	-2.1026	5.8797	-24.2171	8.4386	-14.5230	105.8002	-4.6719	
2018-08-31	-0.2942	2.3115	-3.5434	6.2434	-inf	9.2298	-70.9536	
2018-09-30	-0.8218	4.2224	-10.4045	12.2395	-5.9973	6.2432	-21.0279	
2018-10-31	0.3971	6.9404	-6.4064	29.4768	-inf	3.1571	-10.2096	
2018-11-30	2.0131	8.6093	-9.7782	31.5406	-246.7899	3.5444	-4.3915	
2018-12-31	-1.2264	2.7659	-9.2681	1.9431	-28.9769	6.3349	-14.3886	

Ticker	AAP			...	ZBH		ZBRA	\
Variable	max	mean	std	...	min	max	min	max
Date				...				
2017-01-31	3.5053	0.7702	6.3433	...	-45.4966	202.5796	-53.9824	9.1354
2017-02-28	5.3792	-0.3177	3.1997	...	-8.6072	2.0002	-23.0118	7.7942
2017-03-31	84.9388	-1.2358	8.1679	...	-76.0711	32.5228	-inf	32.9962
2017-04-30	10.5760	-0.8190	7.9029	...	-16.9977	3.5141	-inf	15.1353
2017-05-31	10.3365	-0.4882	3.6761	...	-3.3623	63.5703	-3.9282	inf
2017-06-30	inf	-1.6828	7.4467	...	-48.0844	26.0068	-18.0165	3.7608
2017-07-31	39.9818	-1.1121	4.0919	...	-21.1750	45.6041	-17.9642	103.0674
2017-08-31	20.6864	-1.2195	4.8733	...	-6.9933	5.6205	-25.5866	7.8557
2017-09-30	5.0986	-0.0698	4.0561	...	-16.4592	5.2939	-11.8211	8.9100
2017-10-31	inf	3.2302	17.0647	...	-16.8964	7.6357	-9.7592	2.9970

2017-11-30	40.3033	1.2086	8.3915	...	-25.1315	inf	-52.9943	8.8803
2017-12-31	8.0459	0.6427	5.7535	...	-9.6410	33.9878	-22.2418	7.7265
2018-01-31	25.0099	-0.6754	10.7201	...	-9.4431	1.2140	-57.5185	7.3522
2018-02-28	6.5512	-1.9420	3.8516	...	-5.5326	26.4990	-2.5579	52.0551
2018-03-31	76.0423	-1.4745	3.7372	...	-73.7627	149.0626	-17.2525	5.5886
2018-04-30	8.9218	-6.9329	28.3532	...	-4.1728	3.4906	-10.1707	11.4934
2018-05-31	0.7453	-1.3478	2.5065	...	-5.4511	6.1701	-41.9935	4.4939
2018-06-30	10.9690	0.7843	5.7430	...	-10.3386	1.8351	-5.9634	5.1145
2018-07-31	15.7119	-1.2130	3.1599	...	-303.9210	7.4459	-84.8718	inf
2018-08-31	1.0380	0.1693	5.5455	...	-7.8056	20.9853	-273.0260	2.5435
2018-09-30	4.8556	-7.1890	25.4130	...	-23.0087	35.4895	-6.8159	1.5985
2018-10-31	13.6516	-2.8198	12.2196	...	-7.6282	58.4714	-10.9990	6.0139
2018-11-30	11.7998	0.3708	6.5366	...	-13.1681	311.2174	-180.0713	5.4669
2018-12-31	6.4114	-0.4969	3.0010	...	-14.4441	6.7108	-7.5353	13.4308

Ticker	ZG		ZION		ZTS	
Variable	min	max	min	max	min	max
Date						
2017-01-31	-7.7578	25.0115	-3.6173	3.4143	-6.0777	30.0276
2017-02-28	-15.8187	13.6918	-4.8633	3.3491	-inf	9.4139
2017-03-31	-8.4118	36.2955	-19.4902	51.9810	-10.8709	5.9974
2017-04-30	-inf	1.1373	-75.9897	6.3063	-inf	4.9937
2017-05-31	-5.1359	11.4940	-54.9926	9.2442	-12.6585	inf
2017-06-30	-111.0018	50.5212	-4.5916	11.3442	-74.9803	inf
2017-07-31	-3.6739	34.4387	-62.9799	2.0680	-16.4314	5.3454
2017-08-31	-60.7083	7.2697	-11.3874	125.9587	-101.9786	5.3400
2017-09-30	-20.3172	7.0039	-5.1398	7.5632	-inf	5.6133
2017-10-31	-34.9975	inf	-6.9323	8.0056	-inf	16.9882
2017-11-30	-3.1245	8.2314	-40.0031	inf	-5.0947	3.0144
2017-12-31	-3.5944	7.1025	-5.5769	7.8221	-129.0786	4.8371
2018-01-31	-4.2557	7.8212	-43.9881	0.6877	-2.3633	7.1835
2018-02-28	-14.3171	3.3360	-28.6585	8.4848	-4.9513	23.3763
2018-03-31	-3.9789	inf	-26.6752	2.7226	-3.9497	15.1276
2018-04-30	-13.4904	inf	-37.2110	6.0404	-45.5127	5.3455
2018-05-31	-22.9009	6.6566	-7.6611	7.7909	-3.5156	42.7933
2018-06-30	-4.0136	23.1708	-5.4439	0.6514	-61.0523	20.0344
2018-07-31	-8.2119	442.9759	-70.9821	5.7238	-5.6779	9.2465
2018-08-31	-13.6373	24.4838	-25.9825	4.4540	-inf	33.5917
2018-09-30	-4.3662	112.5466	-10.5598	8.4607	-10.8138	7.3892
2018-10-31	-7.4786	5.3556	-10.6702	3.2978	-4.7090	8.9812
2018-11-30	-36.8674	16.0324	-16.9791	4.4722	-137.7599	59.7257
2018-12-31	-3.9168	35.0531	-inf	8.3105	-31.9899	13.5261

[24 rows x 1910 columns]

```
[55]: # define a function to filter values
def filter_values(x):
```

```

    if x <= 15:
        return float('nan')
    else:
        return x

# apply the function to each element of the DataFrame
filtered_df = pd.DataFrame(mean_std_df_m.applymap(filter_values))

filtered_df

```

```

[55]: Ticker      A      AA      AAL      AAP      \
Variable  mean    std min    max min    max min    max mean    std
Date
2017-01-31  NaN    NaN NaN    NaN NaN    NaN NaN    NaN NaN    NaN
2017-02-28  NaN    NaN NaN    NaN NaN    19.7885 NaN    NaN NaN    NaN
2017-03-31  NaN    NaN NaN    34.9818 NaN    23.0489 NaN    84.9388 NaN    NaN
2017-04-30  NaN    NaN NaN    28.9887 NaN    47.3031 NaN    NaN NaN    NaN
2017-05-31  NaN    NaN NaN    NaN NaN    NaN NaN    NaN NaN    NaN
2017-06-30  NaN    NaN NaN    NaN NaN    NaN NaN    inf NaN    NaN
2017-07-31  NaN    NaN NaN    NaN NaN    NaN NaN    39.9818 NaN    NaN
2017-08-31  NaN    NaN NaN    NaN NaN    NaN NaN    20.6864 NaN    NaN
2017-09-30  NaN    NaN NaN    NaN NaN    28.9871 NaN    NaN NaN    NaN
2017-10-31  NaN    NaN NaN    44.9814 NaN    inf NaN    inf NaN    17.0647
2017-11-30  NaN    NaN NaN    23.4167 NaN    NaN NaN    40.3033 NaN    NaN
2017-12-31  NaN    NaN NaN    NaN NaN    NaN NaN    NaN NaN    NaN
2018-01-31  NaN    20.8057 NaN    91.9995 NaN    NaN NaN    25.0099 NaN    NaN
2018-02-28  NaN    NaN NaN    16.8060 NaN    22.0097 NaN    NaN NaN    NaN
2018-03-31  NaN    NaN NaN    24.3539 NaN    NaN NaN    76.0423 NaN    NaN
2018-04-30  NaN    21.2679 NaN    95.0593 NaN    35.9982 NaN    NaN NaN    28.3532
2018-05-31  NaN    NaN NaN    27.0536 NaN    NaN NaN    NaN NaN    NaN
2018-06-30  NaN    NaN NaN    NaN NaN    NaN NaN    NaN NaN    NaN
2018-07-31  NaN    NaN NaN    NaN NaN    105.8002 NaN    15.7119 NaN    NaN
2018-08-31  NaN    NaN NaN    NaN NaN    NaN NaN    NaN NaN    NaN
2018-09-30  NaN    NaN NaN    NaN NaN    NaN NaN    NaN NaN    25.4130
2018-10-31  NaN    NaN NaN    29.4768 NaN    NaN NaN    NaN NaN    NaN
2018-11-30  NaN    NaN NaN    31.5406 NaN    NaN NaN    NaN NaN    NaN
2018-12-31  NaN    NaN NaN    NaN NaN    NaN NaN    NaN NaN    NaN

Ticker      ... ZBH      ZBRA      ZG      ZION      ZTS  \
Variable  ... min      max min      max min      max min      max min
Date      ...
2017-01-31  ... NaN    202.5796 NaN    NaN NaN    25.0115 NaN    NaN NaN
2017-02-28  ... NaN      NaN NaN    NaN NaN    NaN NaN    NaN NaN
2017-03-31  ... NaN    32.5228 NaN    32.9962 NaN    36.2955 NaN    51.9810 NaN
2017-04-30  ... NaN      NaN NaN    15.1353 NaN    NaN NaN    NaN NaN
2017-05-31  ... NaN    63.5703 NaN    inf NaN    NaN NaN    NaN NaN
2017-06-30  ... NaN    26.0068 NaN    NaN NaN    50.5212 NaN    NaN NaN

```

2017-07-31	...	NaN	45.6041	NaN	103.0674	NaN	34.4387	NaN	NaN	NaN
2017-08-31	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	125.9587	NaN
2017-09-30	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2017-10-31	...	NaN	NaN	NaN	NaN	NaN	inf	NaN	NaN	NaN
2017-11-30	...	NaN	inf	NaN	NaN	NaN	NaN	NaN	inf	NaN
2017-12-31	...	NaN	33.9878	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2018-01-31	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2018-02-28	...	NaN	26.4990	NaN	52.0551	NaN	NaN	NaN	NaN	NaN
2018-03-31	...	NaN	149.0626	NaN	NaN	NaN	inf	NaN	NaN	NaN
2018-04-30	...	NaN	NaN	NaN	NaN	NaN	inf	NaN	NaN	NaN
2018-05-31	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2018-06-30	...	NaN	NaN	NaN	NaN	NaN	23.1708	NaN	NaN	NaN
2018-07-31	...	NaN	NaN	NaN	inf	NaN	442.9759	NaN	NaN	NaN
2018-08-31	...	NaN	20.9853	NaN	NaN	NaN	24.4838	NaN	NaN	NaN
2018-09-30	...	NaN	35.4895	NaN	NaN	NaN	112.5466	NaN	NaN	NaN
2018-10-31	...	NaN	58.4714	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2018-11-30	...	NaN	311.2174	NaN	NaN	NaN	16.0324	NaN	NaN	NaN
2018-12-31	...	NaN	NaN	NaN	NaN	NaN	35.0531	NaN	NaN	NaN

Ticker

Variable max

Date

2017-01-31	30.0276
2017-02-28	NaN
2017-03-31	NaN
2017-04-30	NaN
2017-05-31	inf
2017-06-30	inf
2017-07-31	NaN
2017-08-31	NaN
2017-09-30	NaN
2017-10-31	16.9882
2017-11-30	NaN
2017-12-31	NaN
2018-01-31	NaN
2018-02-28	23.3763
2018-03-31	15.1276
2018-04-30	NaN
2018-05-31	42.7933
2018-06-30	20.0344
2018-07-31	NaN
2018-08-31	33.5917
2018-09-30	NaN
2018-10-31	NaN
2018-11-30	59.7257
2018-12-31	NaN

[24 rows x 1910 columns]

```
[56]: # Risk-free rate in t & t+1
rf = ff['RF'].loc['2017':'2018']
rf_mean = rf.mean()
rf.head()
```

```
[56]: Date
2017-01-03    0.0000
2017-01-04    0.0000
2017-01-05    0.0000
2017-01-06    0.0000
2017-01-09    0.0000
Name: RF, dtype: float64
```

```
[57]: # Annualized return for year t & t+1
ann_ret = returns.loc['2017-01-01':'2019-01-01'].mean(skipna=True) * 252

# Annualized volatility for year t & t+1
ann_vol = returns.loc['2017-01-01':'2019-01-01'].std(skipna=True) * np.sqrt(252)

# Sharpe Ratio for year t * t+1
sharpe_ratio = (ann_ret - rf_mean) / ann_vol

sr_ret_df = pd.concat([sharpe_ratio, ann_ret], axis=1).dropna()
sr_ret_df.columns = ["SR", "Mean_ret"]
sr_ret_df
```

```
[57]:
```

	SR	Mean_ret
A	1.0306	0.2315
AA	0.1427	0.0592
AAL	-0.3388	-0.1179
AAP	0.0882	0.0319
AAPL	0.8342	0.1990
...
ZBRA	1.0947	0.3650
ZG	0.0495	0.0212
ZION	0.0658	0.0157
ZS	0.6549	0.4480
ZTS	1.3313	0.2611

[901 rows x 2 columns]

```
[58]: # Correlation between Volatility and Mean Return of portfolio
correl_mean_std_m = mean_std_df_m.corr()
correl_mean_std_m
```

```

[58]: Ticker      A      AA      AAL \
Variable      mean      std      min      max      min      max      min
Ticker Variable
A      mean      1.0000  0.5826  0.6231  0.8437 -0.1489 -0.0911 -0.1385
      std      0.5826  1.0000 -0.1447  0.8913  0.0198  0.0315 -0.1068
      min      0.6231 -0.1447  1.0000  0.2882 -0.0589 -0.0843  0.0351
      max      0.8437  0.8913  0.2882  1.0000 -0.0017  0.0176 -0.0625
AA      min      -0.1489  0.0198 -0.0589 -0.0017  1.0000  0.1344 -0.1515
...      ...      ...      ...      ...      ...      ...
ZG      max      -0.1972 -0.1387 -0.0986 -0.1665  0.0962  0.8277  0.1835
ZION      min      -0.0538 -0.2580  0.1546 -0.1414 -0.0418 -0.5424  0.1970
      max      -0.0727 -0.1516  0.0296 -0.0669 -0.1019 -0.0595  0.0259
ZTS      min      -0.1305  0.2464 -0.3071  0.0901  0.5919  0.2025 -0.2484
      max      0.0629 -0.0331 -0.1936 -0.0824 -0.7009 -0.2502 -0.0321

Ticker      AAP      ...      ZBH      ZBRA \
Variable      max      mean      std      ...      min      max      min      max
Ticker Variable
A      mean      0.1573 -0.1547  0.4834 ...  0.1946  0.0273 -0.1264 -0.2864
      std      0.0504 -0.2036  0.4730 ...  0.1176  0.0274  0.0923 -0.1025
      min      0.2198 -0.0852  0.2984 ...  0.1022 -0.0609 -0.1539 -0.0979
      max      0.1441 -0.2711  0.6062 ...  0.1426 -0.0548  0.0240 -0.1712
AA      min      -0.0134 -0.1554  0.1235 ... -0.0463 -0.7899  0.8360  0.0517
...      ...      ...      ...      ...      ...      ...
ZG      max      0.0089 -0.2217  0.0196 ... -0.9565 -0.1077 -0.1078 -0.0034
ZION      min      -0.1689  0.0954  0.0709 ...  0.3809  0.1328  0.1109 -0.5172
      max      0.2456 -0.0332 -0.0795 ...  0.0305 -0.1455  0.0811 -0.0174
ZTS      min      0.2301 -0.2042  0.0504 ... -0.2234 -0.2710  0.3583  0.2302
      max      -0.2846  0.2380 -0.2389 ...  0.1221  0.6415 -0.5898 -0.1820

Ticker      ZG      ZION      ZTS
Variable      min      max      min      max      min      max
Ticker Variable
A      mean      0.0605 -0.1972 -0.0538 -0.0727 -0.1305  0.0629
      std      0.1874 -0.1387 -0.2580 -0.1516  0.2464 -0.0331
      min      -0.0433 -0.0986  0.1546  0.0296 -0.3071 -0.1936
      max      0.1149 -0.1665 -0.1414 -0.0669  0.0901 -0.0824
AA      min      0.5067  0.0962 -0.0418 -0.1019  0.5919 -0.7009
...      ...      ...      ...      ...      ...
ZG      max      0.0643  1.0000 -0.3834 -0.0834  0.1931 -0.1211
ZION      min      -0.3505 -0.3834  1.0000  0.1491 -0.3970  0.2900
      max      -0.3697 -0.0834  0.1491  1.0000 -0.3020 -0.2142
ZTS      min      0.4677  0.1931 -0.3970 -0.3020  1.0000 -0.2639
      max      -0.2955 -0.1211  0.2900 -0.2142 -0.2639  1.0000

```

[1910 rows x 1910 columns]


```
[59]: # Correlation between Mean Return and Sharpe Ratio of portfolio
correl_vol_sharpe = sr_ret_df.corr()
correl_vol_sharpe
```

```
[59]:          SR  Mean_ret
SR      1.0000    0.8656
Mean_ret 0.8656    1.0000
```

2.6 Discussion

2.6.1 Task 10: Discuss and explain any limitations of your analysis above

```
[60]: # Limitations:
# 1. Correlation:
#     A) Why?: It is a statistical term describing the degree to which two
#           variables under consideration move in coordination with each other.
#           It plays an important role in Finance as they are used to
#           forecast future trends and to manage the risks within a portfolio.
#     B) Limitation: It can be sometimes misinterpreted. A small sample size may
#           yield uncorrelated findings when two variables are, in fact, linked. It is
#           often skewed when an outlier is present.
#           It may not clearly identify how an single datapoint can
#           impact the correlation coefficient. Sometimes two variables may still be
#           correlated with a more complex relationship.
# 2. NaN values: Due to the presence of a number of undefined values, our
#           predictive model may not be robust to its limit.
# 3. Scatter plots: the issue with scatter plots come from characteristics of
#           the data, mainly when the decimal places are rounded off or measurements are
#           not accurate enough. The above can cause overplotting problems which will
#           tamper our analysis of data using the scatter plots.
```

3 Criteria

1. All tasks are worth ten points
2. Discuss and explain your findings for all ten tasks
3. Here are a few more tips
 1. ***Your goal is to convince me of your calculations and conclusions***
 2. I typically find figures most convincing
 3. If you use correlations, consider how a handful of outliers may affect your findings
 4. Remove unnecessary code, outputs, and print statements
 5. Write functions for calculations that you expect to use more than once
 6. ***I will not penalize code style, but I will penalize submissions that are difficult to follow or do not follow these instructions***
4. How to submit your project
 1. Restart your kernel, run all cells, and save your notebook
 2. Export your notebook to PDF (File > Save And Export Notebook As ... > PDF in

JupyterLab)

1. If this export does not work, you can either (1) Install MikTeX on your laptop with the default settings or (2) use DataCamp Workspace to export your notebook to PDF
2. You do not need to re-run your notebook to export it because notebooks store output cells
3. Upload your notebook and PDF to Canvas
4. Upload your PDF only to Gradescope and tag your teammates
5. Gradescope helps me give better feedback more quickly, but I do not consider it reliable for sharing and storing your submission files