Dividends_Portfolio_2

September 29, 2021

1 Dividends Stocks

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

import warnings
warnings.filterwarnings("ignore")

# yahoo finance data
import yfinance as yf
yf.pdr_override()
```

[2]:
```
# input
# Online Gaming
title = "Dividends"
symbols = ['BMY', 'MED', 'ET', 'BTI', 'ABBV', 'T', 'DFS', 'JNJ', 'BEP', 'PEAK',␣
 ↪'DUK', 'NTES', 'INTC', 'MCD', 'NVS']
start = '2016-01-01'
end = '2020-06-26'
```

[3]:
```
df = pd.DataFrame()
for s in symbols:
    df[s] = yf.download(s,start,end)['Adj Close']
```

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```

[4]:
```
from datetime import datetime
from dateutil import relativedelta

d1 = datetime.strptime(start, "%Y-%m-%d")
d2 = datetime.strptime(end, "%Y-%m-%d")
delta = relativedelta.relativedelta(d2,d1)
print('How many years of investing?')
print('%s years' % delta.years)
```

```
How many years of investing?
4 years
```

[5]:
```
number_of_years = delta.years
```

[6]:
```
days = (df.index[-1] - df.index[0]).days
days
```

[6]:
```
1634
```

[7]:
```
df.head()
```

[7]:

Date	BMY	MED	ET	BTI	ABBV	T	\
2016-01-04	58.966171	25.097445	9.600537	42.963787	46.704380	26.815956	
2016-01-05	60.127369	25.483688	9.539128	43.054810	46.509811	27.003315	
2016-01-06	59.071739	25.782158	8.140328	42.967743	46.517910	26.963728	
2016-01-07	57.435497	24.983324	7.205522	41.998138	46.380096	26.528322	
2016-01-08	55.975193	24.526846	7.382930	41.424274	45.115398	26.552073	

Date	DFS	JNJ	BEP	PEAK	DUK	NTES	\
2016-01-04	47.670143	88.997742	18.515593	27.372549	58.656158	159.800079	
2016-01-05	47.561607	89.369743	18.682926	27.966824	59.076370	161.415497	
2016-01-06	46.630093	88.918037	18.428286	26.842705	59.208195	161.239090	
2016-01-07	45.761887	87.881737	17.417028	26.126715	58.664391	153.533188	
2016-01-08	45.192127	86.942871	17.162388	26.055111	58.532570	151.759918	

Date	INTC	MCD	NVS
2016-01-04	30.134039	104.540825	63.856762
2016-01-05	29.992189	105.981186	64.199318
2016-01-06	29.327276	105.269913	63.320580

```
2016-01-07  28.227942  102.833771  62.508881
2016-01-08  27.935379  102.673721  60.736530
```

[8]:
```
df.tail()
```

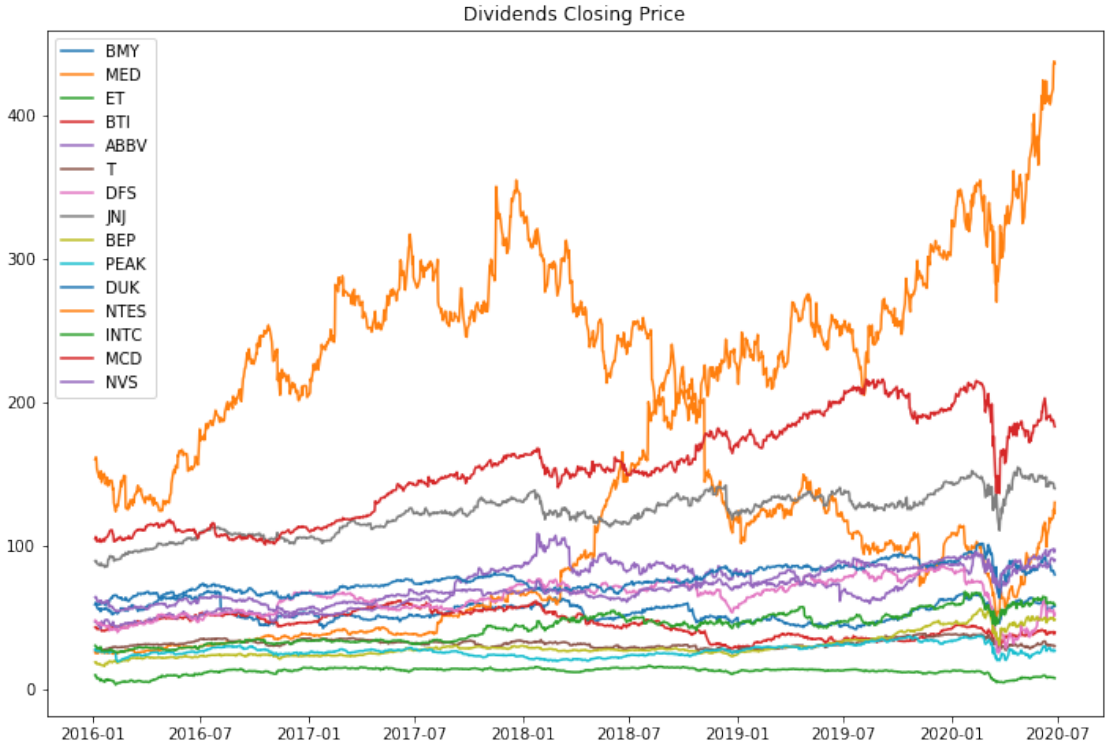
[8]:
```
                 BMY         MED    ET        BTI        ABBV          T  \
Date
2020-06-19  55.982868  117.700676  7.97  39.169998  96.709999  30.309999
2020-06-22  57.124161  119.227448  7.93  39.709999  97.269997  30.110001
2020-06-23  57.937950  124.878510  7.88  39.680000  97.309998  30.250000
2020-06-24  57.322643  121.953842  7.48  38.139999  95.139999  29.420000
2020-06-25  57.739464  129.924805  7.41  39.310001  96.989998  29.719999

                 DFS         JNJ        BEP        PEAK        DUK  \
Date
2020-06-19  53.730000  143.830002  48.970001  26.320000  82.110001
2020-06-22  54.020000  143.389999  49.570000  26.870001  82.529999
2020-06-23  54.860001  142.860001  48.980000  26.969999  81.849998
2020-06-24  50.810001  139.820007  47.580002  25.990000  80.470001
2020-06-25  52.060001  139.669998  48.290001  26.590000  79.449997

                 NTES        INTC         MCD        NVS
Date
2020-06-19  413.209991   59.619999  186.559998  91.099998
2020-06-22  418.200012   60.090000  187.460007  90.620003
2020-06-23  435.070007   59.919998  186.619995  90.459999
2020-06-24  437.459991   59.090000  184.289993  88.800003
2020-06-25  436.059998   58.509998  182.759995  89.599998
```

[9]:
```
plt.figure(figsize=(12,8))
plt.plot(df)
plt.title(title + ' Closing Price')
plt.legend(labels=df.columns)
```

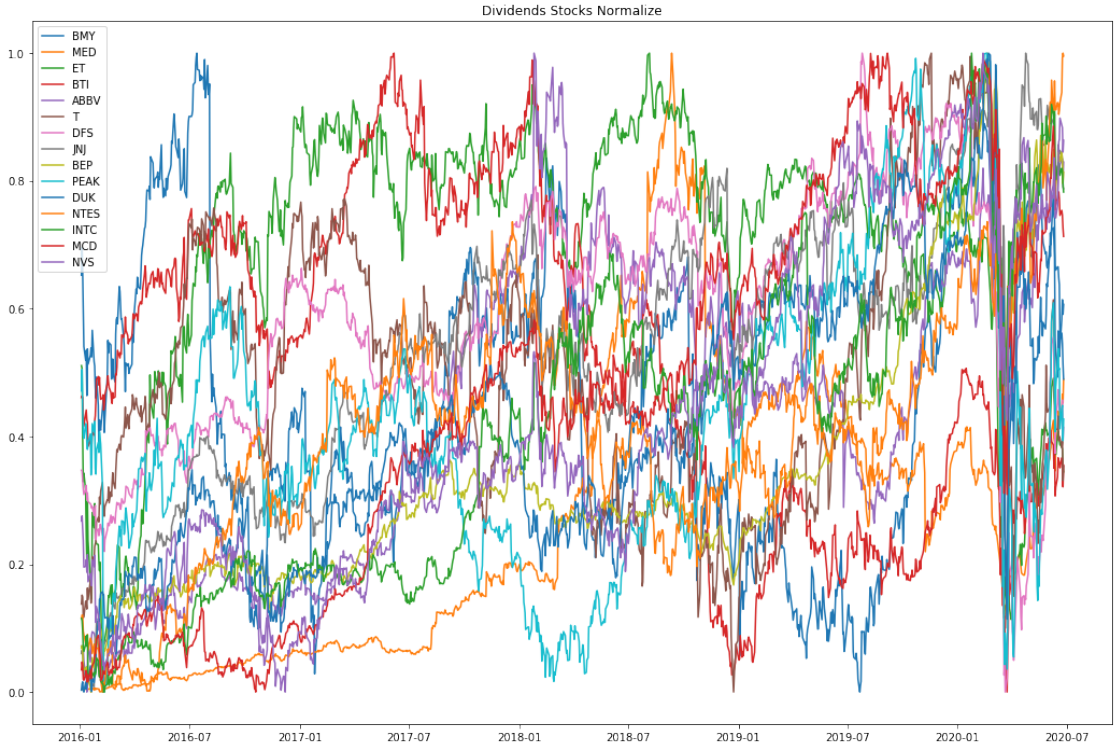
[9]:
```
<matplotlib.legend.Legend at 0x282f372ab00>
```



[10]:
```
# Normalize the data
normalize = (df - df.min())/ (df.max() - df.min())
```

[11]:
```
plt.figure(figsize=(18,12))
plt.plot(normalize)
plt.title(title + ' Stocks Normalize')
plt.legend(labels=normalize.columns)
```

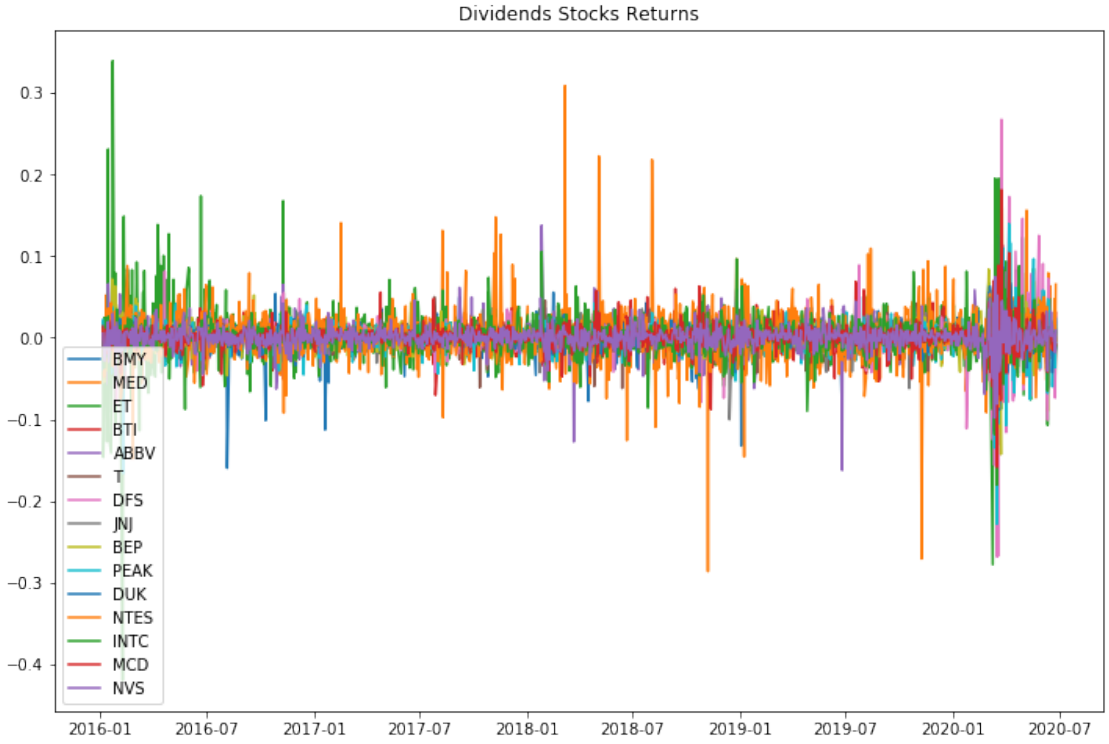
[11]: <matplotlib.legend.Legend at 0x282f37636a0>



[12]:
```
stock_rets = df.pct_change().dropna()
```

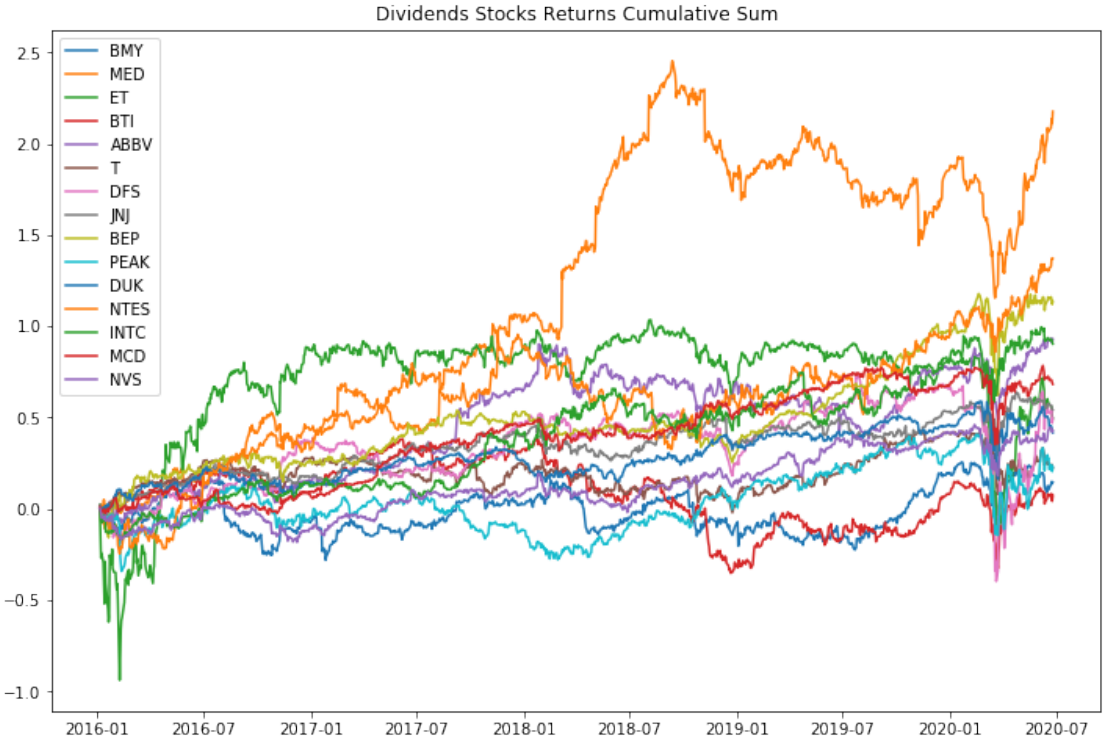
[13]:
```
plt.figure(figsize=(12,8))
plt.plot(stock_rets)
plt.title(title + ' Stocks Returns')
plt.legend(labels=stock_rets.columns)
```

[13]: <matplotlib.legend.Legend at 0x282f37e37b8>



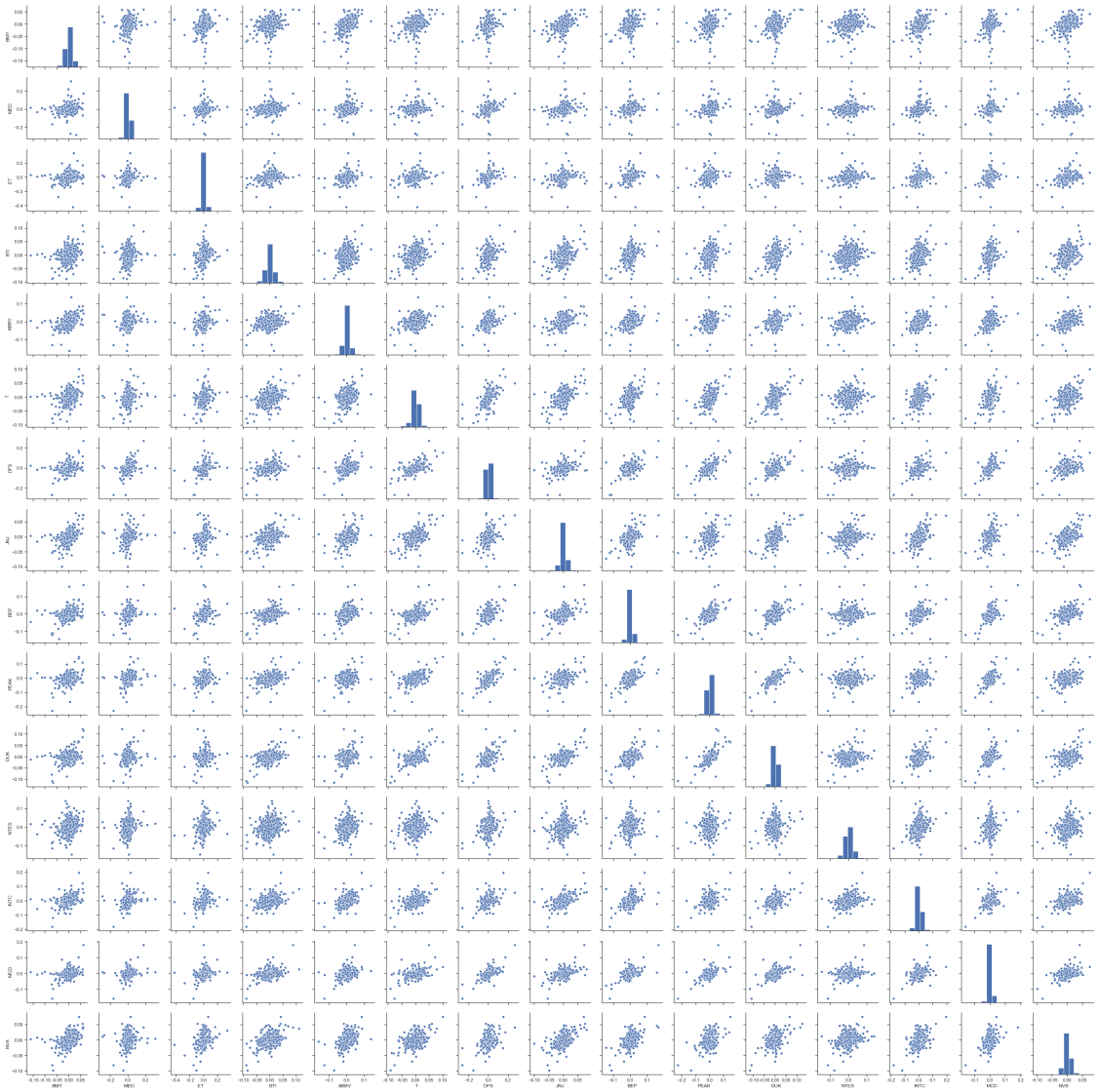
[14]:
```
plt.figure(figsize=(12,8))
plt.plot(stock_rets.cumsum())
plt.title(title + ' Stocks Returns Cumulative Sum')
plt.legend(labels=stock_rets.columns)
```

[14]: <matplotlib.legend.Legend at 0x282f39c2048>

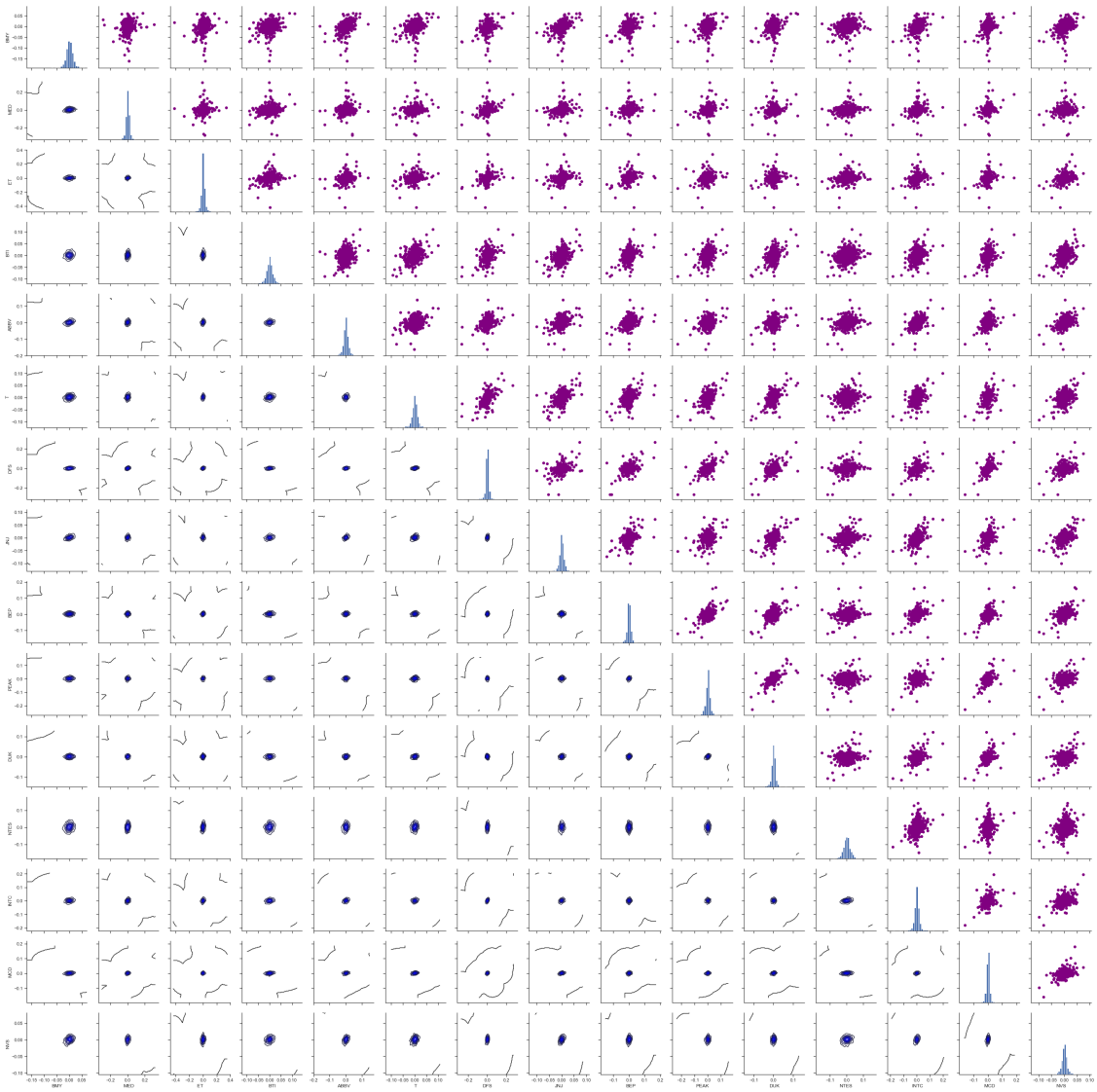


[15]:
```
sns.set(style='ticks')
ax = sns.pairplot(stock_rets, diag_kind='hist')

nplot = len(stock_rets.columns)
for i in range(nplot) :
    for j in range(nplot) :
        ax.axes[i, j].locator_params(axis='x', nbins=6, tight=True)
```



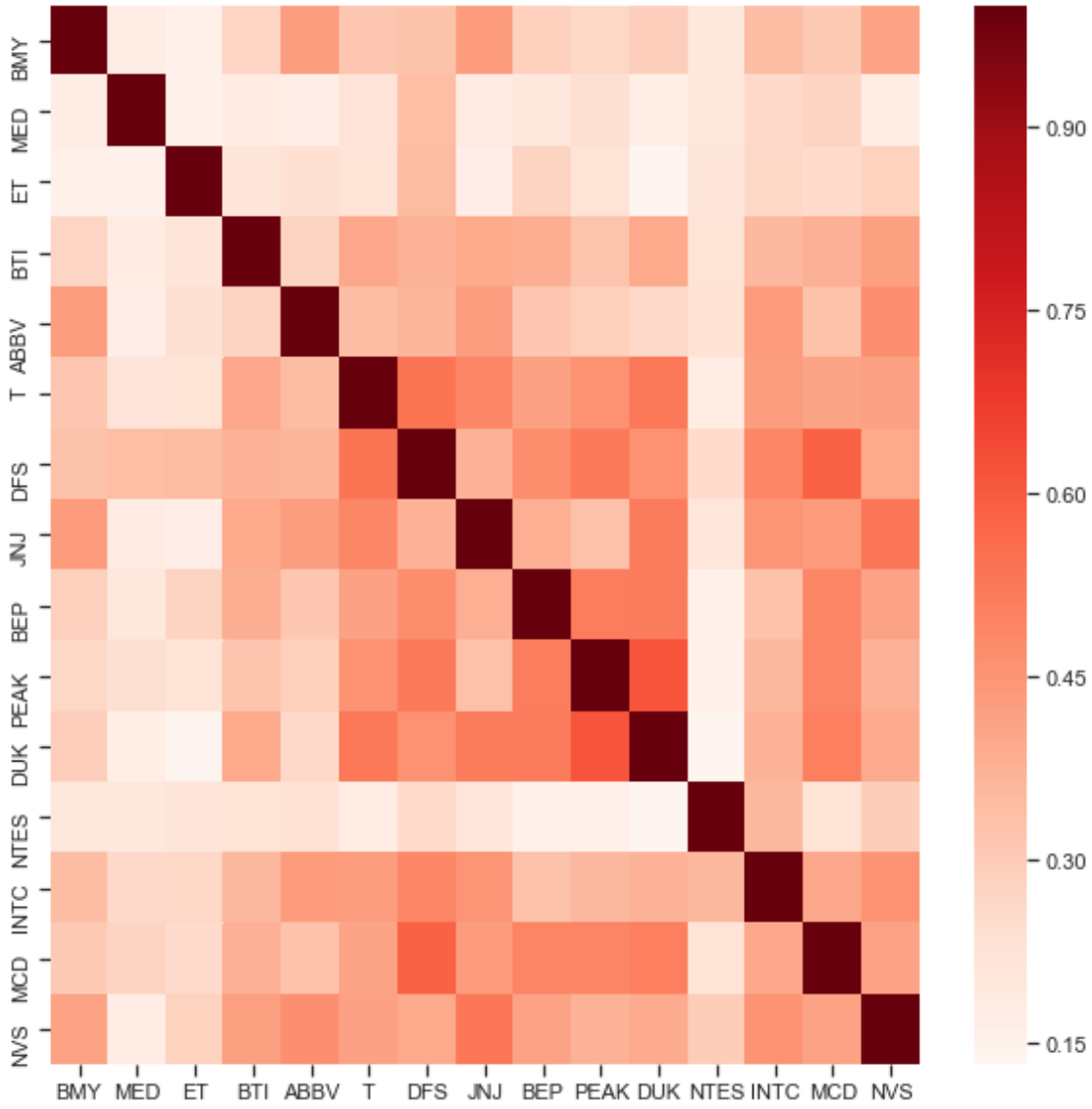
[16]:
```
ax = sns.PairGrid(stock_rets)
ax.map_upper(plt.scatter, color='purple')
ax.map_lower(sns.kdeplot, color='blue')
ax.map_diag(plt.hist, bins=30)
for i in range(nplot) :
    for j in range(nplot) :
        ax.axes[i, j].locator_params(axis='x', nbins=6, tight=True)
```



[17]:
```
plt.figure(figsize=(10,10))
corr = stock_rets.corr()

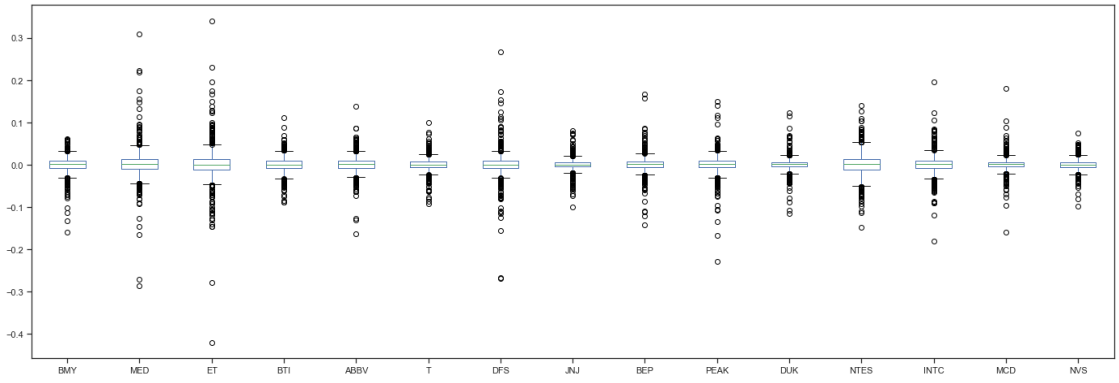
# plot the heatmap
sns.heatmap(corr,
        xticklabels=corr.columns,
        yticklabels=corr.columns,
            cmap="Reds")
```

[17]: <matplotlib.axes._subplots.AxesSubplot at 0x282f06d8ac8>



[18]:
```
# Box plot
stock_rets.plot(kind='box',figsize=(24,8))
```

[18]: <matplotlib.axes._subplots.AxesSubplot at 0x282fd2dce48>

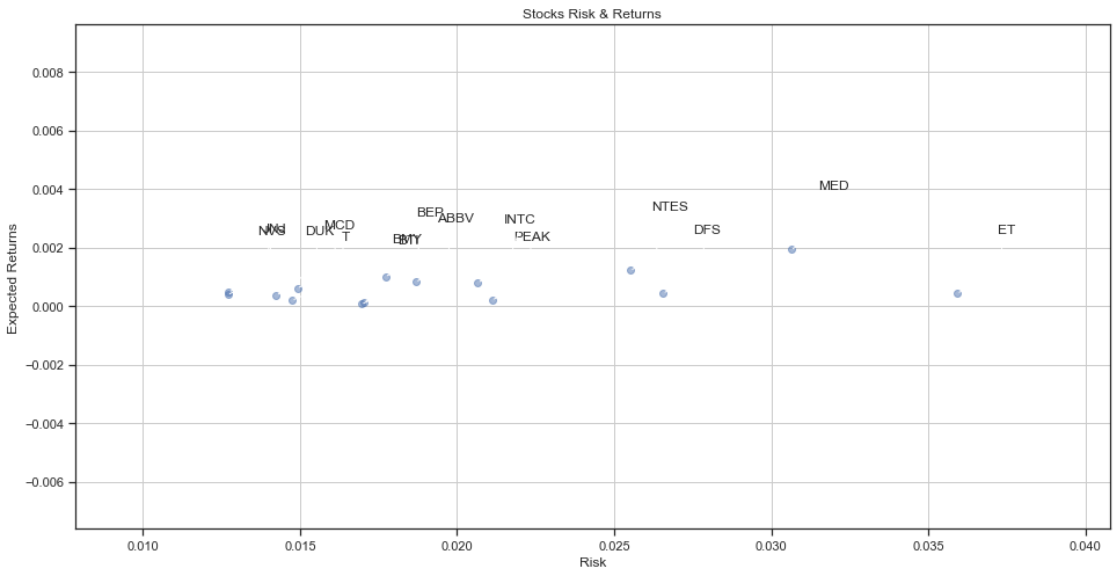


[19]:
```
rets = stock_rets.dropna()

plt.figure(figsize=(16,8))
plt.scatter(rets.std(), rets.mean(),alpha = 0.5)

plt.title('Stocks Risk & Returns')
plt.xlabel('Risk')
plt.ylabel('Expected Returns')
plt.grid(which='major')

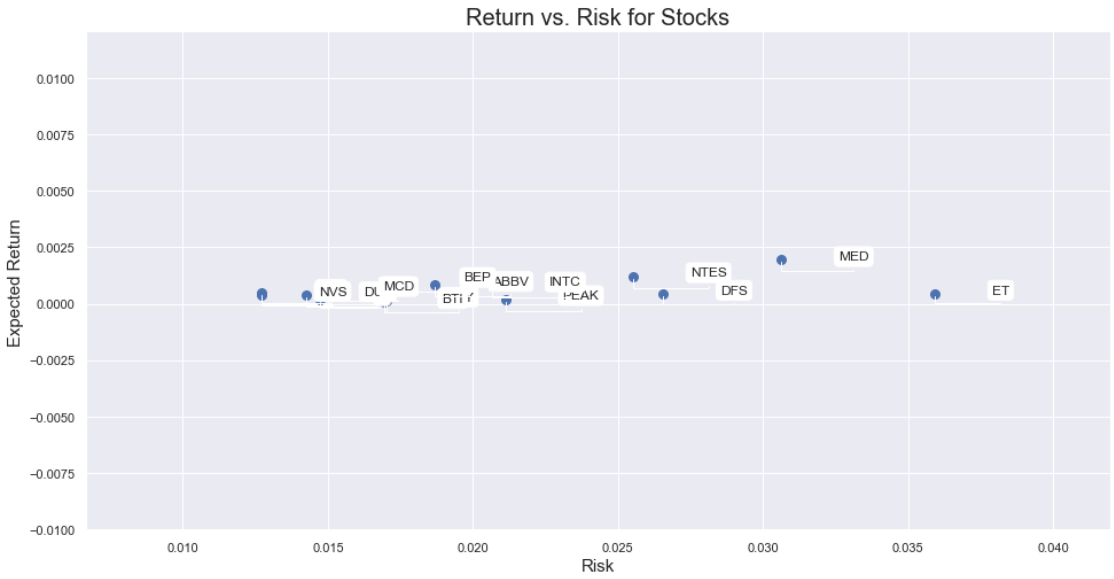
for label, x, y in zip(rets.columns, rets.std(), rets.mean()):
    plt.annotate(
        label,
        xy = (x, y), xytext = (50, 50),
        textcoords = 'offset points', ha = 'right', va = 'bottom',
        arrowprops = dict(arrowstyle = '-', connectionstyle = 'arc3,rad=-0.3'))
```



[20]:
```
rets = stock_rets.dropna()
area = np.pi*20.0

sns.set(style='darkgrid')
plt.figure(figsize=(16,8))
plt.scatter(rets.std(), rets.mean(), s=area)
plt.xlabel("Risk", fontsize=15)
plt.ylabel("Expected Return", fontsize=15)
plt.title("Return vs. Risk for Stocks", fontsize=20)

for label, x, y in zip(rets.columns, rets.std(), rets.mean()) :
    plt.annotate(label, xy=(x,y), xytext=(50, 0), textcoords='offset points',
                 arrowprops=dict(arrowstyle='-',␣
 ↪connectionstyle='bar,angle=180,fraction=-0.2'),
                 bbox=dict(boxstyle="round", fc="w"))
```



[21]:
```
def annual_risk_return(stock_rets):
    tradeoff = stock_rets.agg(["mean", "std"]).T
    tradeoff.columns = ["Return", "Risk"]
    tradeoff.Return = tradeoff.Return*252
    tradeoff.Risk = tradeoff.Risk * np.sqrt(252)
    return tradeoff
```

[22]:
```
tradeoff = annual_risk_return(stock_rets)
tradeoff
```

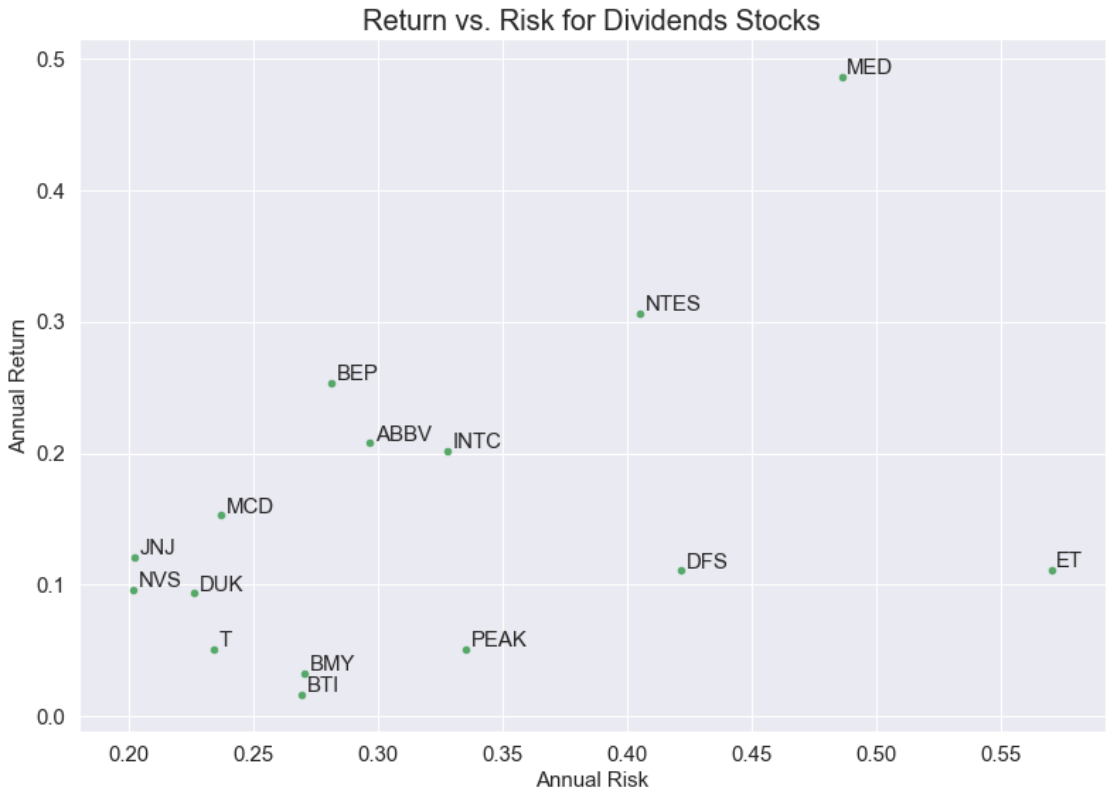
[22]:

	Return	Risk
BMY	0.032710	0.270447
MED	0.486789	0.486225
ET	0.111224	0.570211
BTI	0.016424	0.269174
ABBV	0.207893	0.296661
T	0.050530	0.234043
DFS	0.110700	0.421576
JNJ	0.121264	0.202031
BEP	0.253928	0.281216
PEAK	0.051073	0.335242
DUK	0.093416	0.226076
NTES	0.306611	0.405058
INTC	0.202170	0.327964
MCD	0.152898	0.236772
NVS	0.096132	0.201556

[23]:
```
import itertools

colors = itertools.cycle(["r", "b", "g"])

tradeoff.plot(x = "Risk", y = "Return", kind = "scatter", figsize = (13,9), s =␣
↪20, fontsize = 15, c='g')
for i in tradeoff.index:
    plt.annotate(i, xy=(tradeoff.loc[i, "Risk"]+0.002, tradeoff.loc[i,␣
↪"Return"]+0.002), size = 15)
plt.xlabel("Annual Risk", fontsize = 15)
plt.ylabel("Annual Return", fontsize = 15)
plt.title("Return vs. Risk for " + title + " Stocks", fontsize = 20)
plt.show()
```



[24]:
```
rest_rets = rets.corr()
pair_value = rest_rets.abs().unstack()
pair_value.sort_values(ascending = False)
```

[24]:
```
NVS   NVS     1.000000
MCD   MCD     1.000000
MED   MED     1.000000
ET    ET      1.000000
BTI   BTI     1.000000
ABBV  ABBV    1.000000
T     T       1.000000
DFS   DFS     1.000000
BEP   BEP     1.000000
PEAK  PEAK    1.000000
DUK   DUK     1.000000
NTES  NTES    1.000000
INTC  INTC    1.000000
JNJ   JNJ     1.000000
BMY   BMY     1.000000
DUK   PEAK    0.615049
PEAK  DUK     0.615049
MCD   DFS     0.584761
```

```
DFS   MCD     0.584761
      T       0.538436
T     DFS     0.538436
NVS   JNJ     0.532011
JNJ   NVS     0.532011
T     DUK     0.528277
DUK   T       0.528277
PEAK  DFS     0.522560
DFS   PEAK    0.522560
DUK   BEP     0.517638
BEP   DUK     0.517638
DUK   JNJ     0.515478
                …
NTES  MED     0.198824
MED   NTES    0.198824
      BTI     0.185314
BTI   MED     0.185314
JNJ   MED     0.184951
MED   JNJ     0.184951
T     NTES    0.181377
NTES  T       0.181377
MED   BMY     0.176019
BMY   MED     0.176019
MED   NVS     0.175026
NVS   MED     0.175026
MED   DUK     0.170286
DUK   MED     0.170286
MED   ABBV    0.169227
ABBV  MED     0.169227
JNJ   ET      0.167954
ET    JNJ     0.167954
NTES  PEAK    0.157801
PEAK  NTES    0.157801
ET    BMY     0.156688
BMY   ET      0.156688
BEP   NTES    0.153414
NTES  BEP     0.153414
MED   ET      0.148256
ET    MED     0.148256
DUK   NTES    0.135846
NTES  DUK     0.135846
DUK   ET      0.132593
ET    DUK     0.132593
Length: 225, dtype: float64
```

[25]:
```
# Normalized Returns Data
Normalized_Value = ((rets[:] - rets[:].min()) /(rets[:].max() - rets[:].min()))
```

```
Normalized_Value.head()
```

[25]:

Date	BMY	MED	ET	BTI	ABBV	T	DFS	JNJ	BEP	PEAK	DUK	NTES	INTC	MCD	NVS
2016-01-05	0.812202	0.507112	0.544536	0.455302	0.527513	0.515990	0.496509	0.579734	0.490655	0.662871	0.513318	0.547433	0.467771	0.507434	0.598767
2016-01-06	0.643698	0.500935	0.359797	0.434527	0.541971	0.472109	0.464210	0.528534	0.417512	0.498766	0.492596	0.508655	0.421283	0.447172	0.488666
2016-01-07	0.597816	0.429222	0.401689	0.331459	0.531522	0.395893	0.466014	0.491939	0.284418	0.534609	0.444635	0.346997	0.380510	0.398848	0.493686
2016-01-08	0.608103	0.450574	0.585396	0.376120	0.450557	0.484367	0.477524	0.497324	0.414315	0.598053	0.473781	0.472456	0.452711	0.462334	0.403912
2016-01-11	0.676908	0.569031	0.488437	0.524241	0.435441	0.543179	0.520176	0.523231	0.471068	0.646842	0.529940	0.413538	0.526771	0.497728	0.573435

[26]:
```
Normalized_Value.corr()
```

[26]:

	BMY	MED	ET	BTI	ABBV	T	DFS
BMY	1.000000	0.176019	0.156688	0.274713	0.428229	0.315677	0.329028
MED	0.176019	1.000000	0.148256	0.185314	0.169227	0.221331	0.341120
ET	0.156688	0.148256	1.000000	0.215051	0.239781	0.225168	0.347858
BTI	0.274713	0.185314	0.215051	1.000000	0.278377	0.400323	0.375725
ABBV	0.428229	0.169227	0.239781	0.278377	1.000000	0.344304	0.366218
T	0.315677	0.221331	0.225168	0.400323	0.344304	1.000000	0.538436
DFS	0.329028	0.341120	0.347858	0.375725	0.366218	0.538436	1.000000
JNJ	0.433536	0.184951	0.167954	0.398718	0.429556	0.486676	0.374964
BEP	0.285307	0.203276	0.281581	0.383593	0.315016	0.420033	0.470334
PEAK	0.266100	0.242135	0.226392	0.324905	0.291593	0.459280	0.522560
DUK	0.294208	0.170286	0.132593	0.399913	0.264189	0.528277	0.459353
NTES	0.202021	0.198824	0.214664	0.225768	0.233399	0.181377	0.256752
INTC	0.344809	0.261545	0.266627	0.353805	0.431927	0.428237	0.488283
MCD	0.307445	0.277890	0.257210	0.377765	0.331932	0.413158	0.584761
NVS	0.417191	0.175026	0.284873	0.423170	0.465002	0.420342	0.397743

	JNJ	BEP	PEAK	DUK	NTES	INTC	MCD
BMY	0.433536	0.285307	0.266100	0.294208	0.202021	0.344809	0.307445

```
MED   0.184951  0.203276  0.242135  0.170286  0.198824  0.261545  0.277890
ET    0.167954  0.281581  0.226392  0.132593  0.214664  0.266627  0.257210
BTI   0.398718  0.383593  0.324905  0.399913  0.225768  0.353805  0.377765
ABBV  0.429556  0.315016  0.291593  0.264189  0.233399  0.431927  0.331932
T     0.486676  0.420033  0.459280  0.528277  0.181377  0.428237  0.413158
DFS   0.374964  0.470334  0.522560  0.459353  0.256752  0.488283  0.584761
JNJ   1.000000  0.383020  0.333879  0.515478  0.210772  0.448071  0.433855
BEP   0.383020  1.000000  0.513561  0.517638  0.153414  0.330229  0.492364
PEAK  0.333879  0.513561  1.000000  0.615049  0.157801  0.358384  0.492864
DUK   0.515478  0.517638  0.615049  1.000000  0.135846  0.372912  0.506710
NTES  0.210772  0.153414  0.157801  0.135846  1.000000  0.357841  0.226957
INTC  0.448071  0.330229  0.358384  0.372912  0.357841  1.000000  0.401970
MCD   0.433855  0.492364  0.492864  0.506710  0.226957  0.401970  1.000000
NVS   0.532011  0.415699  0.376026  0.390120  0.296903  0.451947  0.416880

           NVS
BMY   0.417191
MED   0.175026
ET    0.284873
BTI   0.423170
ABBV  0.465002
T     0.420342
DFS   0.397743
JNJ   0.532011
BEP   0.415699
PEAK  0.376026
DUK   0.390120
NTES  0.296903
INTC  0.451947
MCD   0.416880
NVS   1.000000
```

[27]:
```
normalized_rets = Normalized_Value.corr()
normalized_pair_value = normalized_rets.abs().unstack()
normalized_pair_value.sort_values(ascending = False)
```

[27]:
```
NVS   NVS     1.000000
MCD   MCD     1.000000
MED   MED     1.000000
ET    ET      1.000000
BTI   BTI     1.000000
ABBV  ABBV    1.000000
T     T       1.000000
DFS   DFS     1.000000
BEP   BEP     1.000000
PEAK  PEAK    1.000000
DUK   DUK     1.000000
```

NTES	NTES	1.000000
INTC	INTC	1.000000
JNJ	JNJ	1.000000
BMY	BMY	1.000000
DUK	PEAK	0.615049
PEAK	DUK	0.615049
MCD	DFS	0.584761
DFS	MCD	0.584761
	T	0.538436
T	DFS	0.538436
NVS	JNJ	0.532011
JNJ	NVS	0.532011
T	DUK	0.528277
DUK	T	0.528277
PEAK	DFS	0.522560
DFS	PEAK	0.522560
DUK	BEP	0.517638
BEP	DUK	0.517638
DUK	JNJ	0.515478
		…
NTES	MED	0.198824
MED	NTES	0.198824
	BTI	0.185314
BTI	MED	0.185314
JNJ	MED	0.184951
MED	JNJ	0.184951
T	NTES	0.181377
NTES	T	0.181377
MED	BMY	0.176019
BMY	MED	0.176019
MED	NVS	0.175026
NVS	MED	0.175026
MED	DUK	0.170286
DUK	MED	0.170286
MED	ABBV	0.169227
ABBV	MED	0.169227
JNJ	ET	0.167954
ET	JNJ	0.167954
NTES	PEAK	0.157801
PEAK	NTES	0.157801
ET	BMY	0.156688
BMY	ET	0.156688
BEP	NTES	0.153414
NTES	BEP	0.153414
MED	ET	0.148256
ET	MED	0.148256
DUK	NTES	0.135846

```
NTES  DUK     0.135846
DUK   ET      0.132593
ET    DUK     0.132593
Length: 225, dtype: float64
```

[28]:
```
print("Stock returns: ")
print(rets.mean())
print('-' * 50)
print("Stock risks:")
print(rets.std())
```

```
Stock returns:
BMY     0.000130
MED     0.001932
ET      0.000441
BTI     0.000065
ABBV    0.000825
T       0.000201
DFS     0.000439
JNJ     0.000481
BEP     0.001008
PEAK    0.000203
DUK     0.000371
NTES    0.001217
INTC    0.000802
MCD     0.000607
NVS     0.000381
dtype: float64
--------------------------------------------------
Stock risks:
BMY     0.017037
MED     0.030629
ET      0.035920
BTI     0.016956
ABBV    0.018688
T       0.014743
DFS     0.026557
JNJ     0.012727
BEP     0.017715
PEAK    0.021118
DUK     0.014241
NTES    0.025516
INTC    0.020660
MCD     0.014915
NVS     0.012697
dtype: float64
```

[29]:
```
table = pd.DataFrame()
table['Returns'] = rets.mean()
table['Risk'] = rets.std()
table.sort_values(by='Returns')
```

[29]:

	Returns	Risk
BTI	0.000065	0.016956
BMY	0.000130	0.017037
T	0.000201	0.014743
PEAK	0.000203	0.021118
DUK	0.000371	0.014241
NVS	0.000381	0.012697
DFS	0.000439	0.026557
ET	0.000441	0.035920
JNJ	0.000481	0.012727
MCD	0.000607	0.014915
INTC	0.000802	0.020660
ABBV	0.000825	0.018688
BEP	0.001008	0.017715
NTES	0.001217	0.025516
MED	0.001932	0.030629

[30]:
```
table.sort_values(by='Risk')
```

[30]:

	Returns	Risk
NVS	0.000381	0.012697
JNJ	0.000481	0.012727
DUK	0.000371	0.014241
T	0.000201	0.014743
MCD	0.000607	0.014915
BTI	0.000065	0.016956
BMY	0.000130	0.017037
BEP	0.001008	0.017715
ABBV	0.000825	0.018688
INTC	0.000802	0.020660
PEAK	0.000203	0.021118
NTES	0.001217	0.025516
DFS	0.000439	0.026557
MED	0.001932	0.030629
ET	0.000441	0.035920

[31]:
```
rf = 0.01
table['Sharpe Ratio'] = (table['Returns'] - rf) / table['Risk']
table
```

[31]:

	Returns	Risk	Sharpe Ratio
BMY	0.000130	0.017037	-0.579353

```
MED   0.001932  0.030629     -0.263418
ET    0.000441  0.035920     -0.266110
BTI   0.000065  0.016956     -0.585904
ABBV  0.000825  0.018688     -0.490961
T     0.000201  0.014743     -0.664674
DFS   0.000439  0.026557     -0.360010
JNJ   0.000481  0.012727     -0.747934
BEP   0.001008  0.017715     -0.507614
PEAK  0.000203  0.021118     -0.463927
DUK   0.000371  0.014241     -0.676146
NTES  0.001217  0.025516     -0.344223
INTC  0.000802  0.020660     -0.445200
MCD   0.000607  0.014915     -0.629777
NVS   0.000381  0.012697     -0.757553
```

[32]:
```
table['Max Returns'] = rets.max()
```

[33]:
```
table['Min Returns'] = rets.min()
```

[34]:
```
table['Median Returns'] = rets.median()
```

[35]:
```
total_return = stock_rets[-1:].transpose()
table['Total Return'] = 100 * total_return
table
```

[35]:

	Returns	Risk	Sharpe Ratio	Max Returns	Min Returns	\
BMY	0.000130	0.017037	-0.579353	0.061207	-0.159851	
MED	0.001932	0.030629	-0.263418	0.308843	-0.286532	
ET	0.000441	0.035920	-0.266110	0.339360	-0.419771	
BTI	0.000065	0.016956	-0.585904	0.110688	-0.088633	
ABBV	0.000825	0.018688	-0.490961	0.137673	-0.162524	
T	0.000201	0.014743	-0.664674	0.100223	-0.092410	
DFS	0.000439	0.026557	-0.360010	0.267542	-0.268354	
JNJ	0.000481	0.012727	-0.747934	0.079977	-0.100379	
BEP	0.001008	0.017715	-0.507614	0.166883	-0.143016	
PEAK	0.000203	0.021118	-0.463927	0.148885	-0.228344	
DUK	0.000371	0.014241	-0.676146	0.123009	-0.115021	
NTES	0.001217	0.025516	-0.344223	0.140844	-0.148030	
INTC	0.000802	0.020660	-0.445200	0.195213	-0.180415	
MCD	0.000607	0.014915	-0.629777	0.181254	-0.158753	
NVS	0.000381	0.012697	-0.757553	0.074794	-0.098247	

	Median Returns	Total Return
BMY	0.000983	0.727148
MED	0.001797	6.536049
ET	0.000000	-0.935831
BTI	0.000189	3.067651

```
ABBV        0.001234      1.944501
T           0.000725      1.019712
DFS         0.000698      2.460146
JNJ         0.000530     -0.107287
BEP         0.001194      1.492222
PEAK        0.001345      2.308582
DUK         0.000915     -1.267558
NTES        0.001106     -0.320028
INTC        0.001083     -0.981557
MCD         0.000977     -0.830213
NVS         0.000676      0.900896
```

[36]:
```
table['Average Return Days'] = (1 + total_return)**(1 / days) - 1
table
```

[36]:

	Returns	Risk	Sharpe Ratio	Max Returns	Min Returns	Median Returns	Total Return	Average Return Days
BMY	0.000130	0.017037	-0.579353	0.061207	-0.159851	0.000983	0.727148	4.434019e-06
MED	0.001932	0.030629	-0.263418	0.308843	-0.286532	0.001797	6.536049	3.874814e-05
ET	0.000441	0.035920	-0.266110	0.339360	-0.419771	0.000000	-0.935831	-5.754191e-06
BTI	0.000065	0.016956	-0.585904	0.110688	-0.088633	0.000189	3.067651	1.849184e-05
ABBV	0.000825	0.018688	-0.490961	0.137673	-0.162524	0.001234	1.944501	1.178610e-05
T	0.000201	0.014743	-0.664674	0.100223	-0.092410	0.000725	1.019712	6.209003e-06
DFS	0.000439	0.026557	-0.360010	0.267542	-0.268354	0.000698	2.460146	1.487386e-05
JNJ	0.000481	0.012727	-0.747934	0.079977	-0.100379	0.000530	-0.107287	-6.569455e-07
BEP	0.001008	0.017715	-0.507614	0.166883	-0.143016	0.001194	1.492222	9.064898e-06
PEAK	0.000203	0.021118	-0.463927	0.148885	-0.228344	0.001345	2.308582	1.396789e-05
DUK	0.000371	0.014241	-0.676146	0.123009	-0.115021	0.000915	-1.267558	-7.806949e-06
NTES	0.001217	0.025516	-0.344223	0.140844	-0.148030	0.001106	-0.320028	-1.961694e-06
INTC	0.000802	0.020660	-0.445200	0.195213	-0.180415	0.001083	-0.981557	-6.036736e-06
MCD	0.000607	0.014915	-0.629777	0.181254	-0.158753	0.000977	-0.830213	-5.102056e-06
NVS	0.000381	0.012697	-0.757553	0.074794	-0.098247			

```
NVS         0.000676      0.900896         5.488766e-06
```

[37]:
```
initial_value = df.iloc[0]
ending_value = df.iloc[-1]
table['CAGR'] = ((ending_value / initial_value) ** (252.0 / days)) -1
table
```

[37]:

	Returns	Risk	Sharpe Ratio	Max Returns	Min Returns	\
BMY	0.000130	0.017037	-0.579353	0.061207	-0.159851	
MED	0.001932	0.030629	-0.263418	0.308843	-0.286532	
ET	0.000441	0.035920	-0.266110	0.339360	-0.419771	
BTI	0.000065	0.016956	-0.585904	0.110688	-0.088633	
ABBV	0.000825	0.018688	-0.490961	0.137673	-0.162524	
T	0.000201	0.014743	-0.664674	0.100223	-0.092410	
DFS	0.000439	0.026557	-0.360010	0.267542	-0.268354	
JNJ	0.000481	0.012727	-0.747934	0.079977	-0.100379	
BEP	0.001008	0.017715	-0.507614	0.166883	-0.143016	
PEAK	0.000203	0.021118	-0.463927	0.148885	-0.228344	
DUK	0.000371	0.014241	-0.676146	0.123009	-0.115021	
NTES	0.001217	0.025516	-0.344223	0.140844	-0.148030	
INTC	0.000802	0.020660	-0.445200	0.195213	-0.180415	
MCD	0.000607	0.014915	-0.629777	0.181254	-0.158753	
NVS	0.000381	0.012697	-0.757553	0.074794	-0.098247	

	Median Returns	Total Return	Average Return Days	CAGR
BMY	0.000983	0.727148	4.434019e-06	-0.003237
MED	0.001797	6.536049	3.874814e-05	0.288620
ET	0.000000	-0.935831	-5.754191e-06	-0.039155
BTI	0.000189	3.067651	1.849184e-05	-0.013614
ABBV	0.001234	1.944501	1.178610e-05	0.119298
T	0.000725	1.019712	6.209003e-06	0.015984
DFS	0.000698	2.460146	1.487386e-05	0.013678
JNJ	0.000530	-0.107287	-6.569455e-07	0.071976
BEP	0.001194	1.492222	9.064898e-06	0.159327
PEAK	0.001345	2.308582	1.396789e-05	-0.004463
DUK	0.000915	-1.267558	-7.806949e-06	0.047909
NTES	0.001106	-0.320028	-1.961694e-06	0.167445
INTC	0.001083	-0.981557	-6.036736e-06	0.107753
MCD	0.000977	-0.830213	-5.102056e-06	0.089968
NVS	0.000676	0.900896	5.488766e-06	0.053626

[38]:
```
table.sort_values(by='Average Return Days')
```

[38]:

	Returns	Risk	Sharpe Ratio	Max Returns	Min Returns	\
DUK	0.000371	0.014241	-0.676146	0.123009	-0.115021	
INTC	0.000802	0.020660	-0.445200	0.195213	-0.180415	
ET	0.000441	0.035920	-0.266110	0.339360	-0.419771	

MCD	0.000607	0.014915	-0.629777	0.181254	-0.158753
NTES	0.001217	0.025516	-0.344223	0.140844	-0.148030
JNJ	0.000481	0.012727	-0.747934	0.079977	-0.100379
BMY	0.000130	0.017037	-0.579353	0.061207	-0.159851
NVS	0.000381	0.012697	-0.757553	0.074794	-0.098247
T	0.000201	0.014743	-0.664674	0.100223	-0.092410
BEP	0.001008	0.017715	-0.507614	0.166883	-0.143016
ABBV	0.000825	0.018688	-0.490961	0.137673	-0.162524
PEAK	0.000203	0.021118	-0.463927	0.148885	-0.228344
DFS	0.000439	0.026557	-0.360010	0.267542	-0.268354
BTI	0.000065	0.016956	-0.585904	0.110688	-0.088633
MED	0.001932	0.030629	-0.263418	0.308843	-0.286532

	Median Returns	Total Return	Average Return Days	CAGR
DUK	0.000915	-1.267558	-7.806949e-06	0.047909
INTC	0.001083	-0.981557	-6.036736e-06	0.107753
ET	0.000000	-0.935831	-5.754191e-06	-0.039155
MCD	0.000977	-0.830213	-5.102056e-06	0.089968
NTES	0.001106	-0.320028	-1.961694e-06	0.167445
JNJ	0.000530	-0.107287	-6.569455e-07	0.071976
BMY	0.000983	0.727148	4.434019e-06	-0.003237
NVS	0.000676	0.900896	5.488766e-06	0.053626
T	0.000725	1.019712	6.209003e-06	0.015984
BEP	0.001194	1.492222	9.064898e-06	0.159327
ABBV	0.001234	1.944501	1.178610e-05	0.119298
PEAK	0.001345	2.308582	1.396789e-05	-0.004463
DFS	0.000698	2.460146	1.487386e-05	0.013678
BTI	0.000189	3.067651	1.849184e-05	-0.013614
MED	0.001797	6.536049	3.874814e-05	0.288620