The_Dave_Ramsey_Portfolio

September 29, 2021

1 The Dave Ramsey Portfolio

https://www.daveramsey.com/blog/daves-investing-philosophy

Step 1: Set goals for your investments.
Step 2: Save 15% of your income for retirement.
Step 3: Choose good growth stock mutual funds.
Step 4: Invest with a long-term perspective.
Step 5: Get help from an investing professional.

Age: 38 Years Old

Reitrement: Have 1 million dollar by age 60

College fund: Save $100,000 in ten years for daughter's tuition

Buy a home: Buy a $500,000

[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")

# fix_yahoo_finance is used to fetch data
import fix_yahoo_finance as yf
yf.pdr_override()
```

[2]:
```
income_for_retirement = 5000 # Monthly
save_15_percent = 5000 * 0.15
```

[3]:
```
print('Save 15% of your income for retirement: ', save_15_percent)
print('Save in a year: $', save_15_percent*12)
print('Save in 2 years: $', save_15_percent*24)
print('Save in 5 years: $', save_15_percent*60)
print('Save in 10 years: $', save_15_percent*120)
print('Save in 20 years: $', save_15_percent*240)
```

```
print('Save in age of 60: $', save_15_percent*264)
print('Save in age of 65: $', save_15_percent*324)
```

```
Save 15% of your income for retirement:  750.0
Save in a year: $ 9000.0
Save in 2 years: $ 18000.0
Save in 5 years: $ 45000.0
Save in 10 years: $ 90000.0
Save in 20 years: $ 180000.0
Save in age of 60: $ 198000.0
Save in age of 65: $ 243000.0
```

[4]:
```
# input
symbols = ['VTSAX','SPY','VGSLX','VSIAX']
start = '2014-01-01'
end = '2019-01-01'

# Read data
dataset = yf.download(symbols,start,end)['Adj Close']

# View Columns
dataset.head()
```

```
[*********************100%***********************]  4 of 4 downloaded
```

[4]:

Date	SPY	VGSLX	VSIAX	VTSAX
2014-01-02	163.383347	72.174324	36.409233	41.514381
2014-01-03	163.356522	72.711060	36.523590	41.532322
2014-01-06	162.883148	73.026787	36.286076	41.406715
2014-01-07	163.883560	73.263588	36.549976	41.675892
2014-01-08	163.919250	73.003120	36.567574	41.693832

[5]:
```
dataset.tail()
```

[5]:

Date	SPY	VGSLX	VSIAX	VTSAX
2018-12-24	231.115768	99.095360	45.703533	57.410362
2018-12-26	242.792862	102.520523	47.724945	60.261646
2018-12-27	244.656876	102.657135	47.872852	60.745079
2018-12-28	244.341248	102.949883	47.991177	60.725346
2018-12-31	246.481415	103.164574	48.326435	61.258110

[6]:
```
# Calculate Daily Returns
returns = dataset.pct_change()
returns = returns.dropna()
```

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

[7]:
```
                 SPY     VGSLX     VSIAX     VTSAX
Date
2014-01-03 -0.000164  0.007437  0.003141  0.000432
2014-01-06 -0.002898  0.004342 -0.006503 -0.003024
2014-01-07  0.006142  0.003243  0.007273  0.006501
2014-01-08  0.000218 -0.003555  0.000481  0.000430
2014-01-09  0.000654  0.000324  0.001443  0.000645
```

[8]:
```
# Calculate mean returns
meanDailyReturns = returns.mean()
print(meanDailyReturns)
```

```
SPY      0.000362
VGSLX    0.000327
VSIAX    0.000267
VTSAX    0.000345
dtype: float64
```

[9]:
```
# Calculate std returns
stdDailyReturns = returns.std()
print(stdDailyReturns)
```

```
SPY      0.008306
VGSLX    0.009270
VSIAX    0.009084
VTSAX    0.008408
dtype: float64
```

[10]:
```
# Define weights for the portfolio
weights = np.array([0.25, 0.25, 0.25, 0.25])
```

[11]:
```
# Calculate the covariance matrix on daily returns
cov_matrix = (returns.cov())*250
print (cov_matrix)
```

```
            SPY     VGSLX     VSIAX     VTSAX
SPY    0.017247  0.011189  0.016896  0.017374
VGSLX  0.011189  0.021483  0.012191  0.011465
VSIAX  0.016896  0.012191  0.020630  0.017679
VTSAX  0.017374  0.011465  0.017679  0.017674
```

[12]:
```
# Calculate expected portfolio performance
portReturn = np.sum(meanDailyReturns*weights)
```

[13]:
```python
# Print the portfolio return
print(portReturn)
```

```
0.00032514438021171376
```

[14]:
```python
# Create portfolio returns column
returns['Portfolio'] = returns.dot(weights)
```

[15]:
```python
returns.head()
```

[15]:
```
                 SPY     VGSLX     VSIAX     VTSAX  Portfolio
Date
2014-01-03 -0.000164  0.007437  0.003141  0.000432   0.002711
2014-01-06 -0.002898  0.004342 -0.006503 -0.003024  -0.002021
2014-01-07  0.006142  0.003243  0.007273  0.006501   0.005790
2014-01-08  0.000218 -0.003555  0.000481  0.000430  -0.000606
2014-01-09  0.000654  0.000324  0.001443  0.000645   0.000767
```

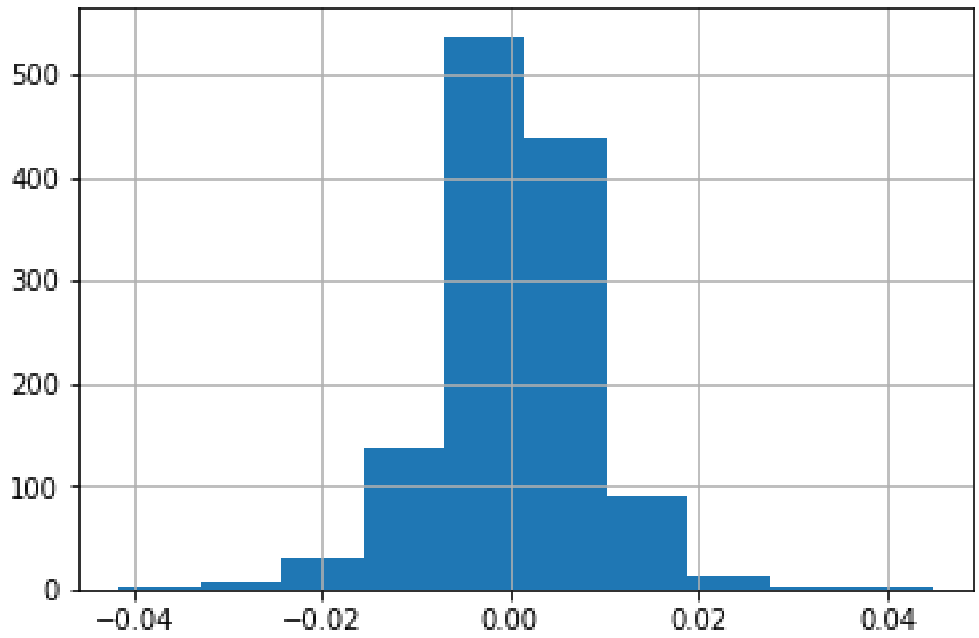
[16]:
```python
returns.tail()
```

[16]:
```
                 SPY     VGSLX     VSIAX     VTSAX  Portfolio
Date
2018-12-24 -0.026423 -0.037350 -0.025442 -0.026435  -0.028912
2018-12-26  0.050525  0.034564  0.044229  0.049665   0.044746
2018-12-27  0.007677  0.001333  0.003099  0.008022   0.005033
2018-12-28 -0.001290  0.002852  0.002472 -0.000325   0.000927
2018-12-31  0.008759  0.002085  0.006986  0.008773   0.006651
```

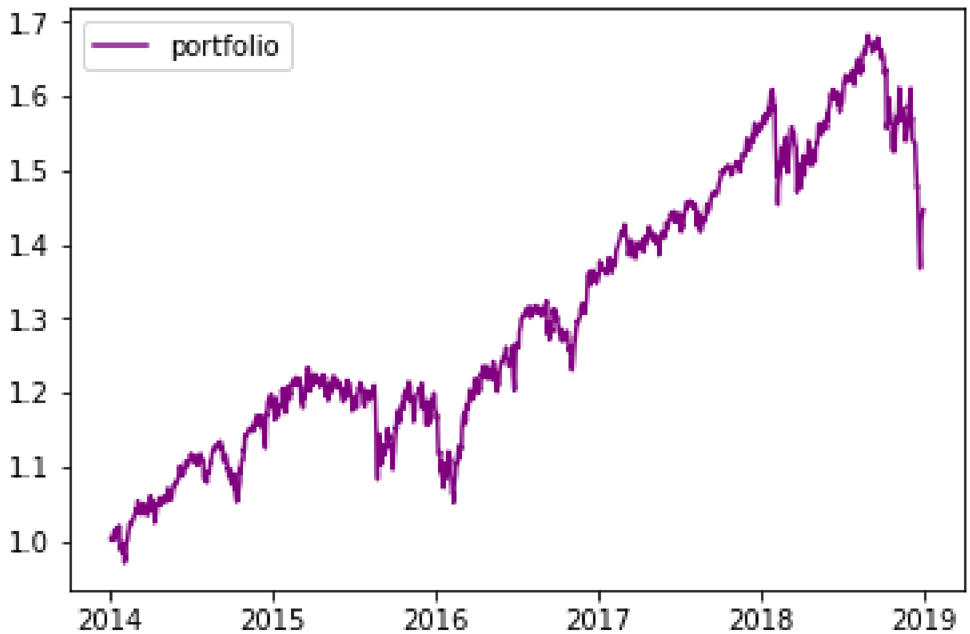
[17]:
```python
# Calculate cumulative returns
daily_cum_ret=(1+returns).cumprod()
print(daily_cum_ret.tail())
```

```
                 SPY     VGSLX     VSIAX     VTSAX  Portfolio
Date
2018-12-24  1.414561  1.373000  1.255273  1.382903   1.367353
2018-12-26  1.486032  1.420457  1.310792  1.451585   1.428536
2018-12-27  1.497441  1.422350  1.314855  1.463230   1.435726
2018-12-28  1.495509  1.426406  1.318105  1.462754   1.437057
2018-12-31  1.508608  1.429381  1.327313  1.475588   1.446615
```

[18]:
```python
returns['Portfolio'].hist()
plt.show()
```



[19]:
```
import matplotlib.dates

# Plot the portfolio cumulative returns only
fig, ax = plt.subplots()
ax.plot(daily_cum_ret.index, daily_cum_ret.Portfolio, color='purple',␣
↪label="portfolio")
ax.xaxis.set_major_locator(matplotlib.dates.YearLocator())
plt.legend()
plt.show()
```



[20]:
```
# Print the mean
print("mean : ", returns['Portfolio'].mean()*100)

# Print the standard deviation
print("Std. dev: ", returns['Portfolio'].std()*100)

# Print the skewness
print("skew: ", returns['Portfolio'].skew())

# Print the kurtosis
print("kurt: ", returns['Portfolio'].kurtosis())
```

```
mean :  0.032514438021171314
Std. dev:  0.7915524366523183
skew:  -0.4078573639390761
kurt:  3.007279112651302
```

[21]:
```
# Calculate the standard deviation by taking the square root
port_standard_dev = np.sqrt(np.dot(weights.T, np.dot(weights, cov_matrix)))

# Print the results
print(str(np.round(port_standard_dev, 4) * 100) + '%')
```

```
12.520000000000001%
```

```
[22]: # Calculate the portfolio variance
port_variance = np.dot(weights.T, np.dot(cov_matrix, weights))

# Print the result
print(str(np.round(port_variance, 4) * 100) + '%')
```

```
1.5699999999999998%
```

```
[23]: # Calculate total return and annualized return from price data
total_return = (returns['Portfolio'][-1] - returns['Portfolio'][0]) /␣
 ↪returns['Portfolio'][0]

# Annualize the total return over 5 year
annualized_return = ((total_return + 1)**(1/5))-1
```

```
[24]: # Calculate annualized volatility from the standard deviation
vol_port = returns['Portfolio'].std() * np.sqrt(250)
```

```
[25]: # Calculate the Sharpe ratio
rf = 0.01
sharpe_ratio = ((annualized_return - rf) / vol_port)
print(sharpe_ratio)
```

```
1.4906958426858135
```

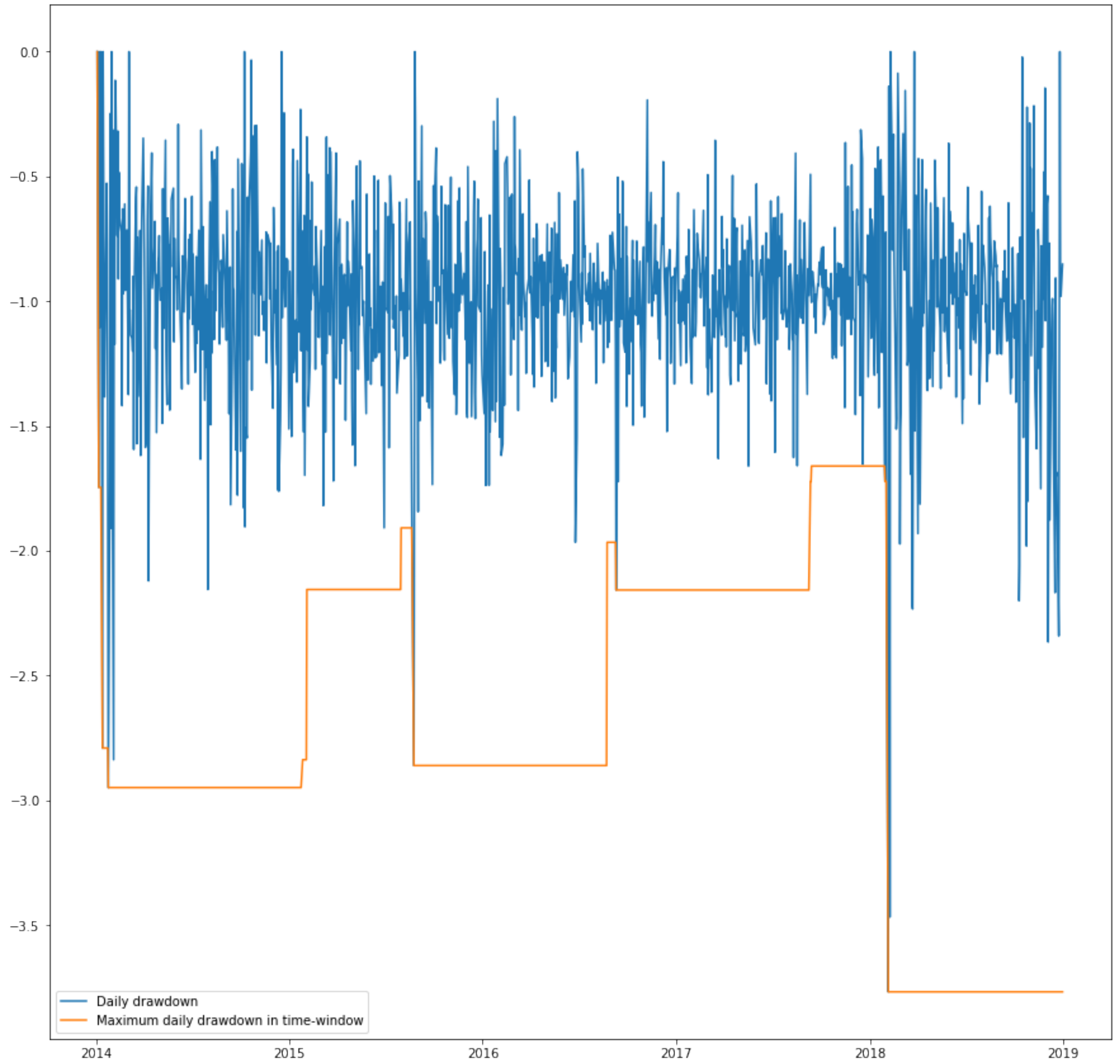
```
[26]: # Create a downside return column with the negative returns only
target = 0
downside_returns = returns.loc[returns['Portfolio'] < target]

# Calculate expected return and std dev of downside
expected_return = returns['Portfolio'].mean()
down_stdev = downside_returns.std()

# Calculate the sortino ratio
rf = 0.01
sortino_ratio = (expected_return - rf)/down_stdev

# Print the results
print("Expected return: ", expected_return*100)
print('-' * 50)
print("Downside risk:")
print(down_stdev*100)
print('-' * 50)
print("Sortino ratio:")
print(sortino_ratio)
```

```
Expected return:  0.032514438021171314
--------------------------------------------------
```

```
Downside risk:
SPY          0.696336
VGSLX        0.820082
VSIAX        0.706179
VTSAX        0.690994
Portfolio    0.606737
dtype: float64
--------------------------------------------------
Sortino ratio:
SPY         -1.389394
VGSLX       -1.179742
VSIAX       -1.370028
VTSAX       -1.400135
Portfolio   -1.594573
dtype: float64
```

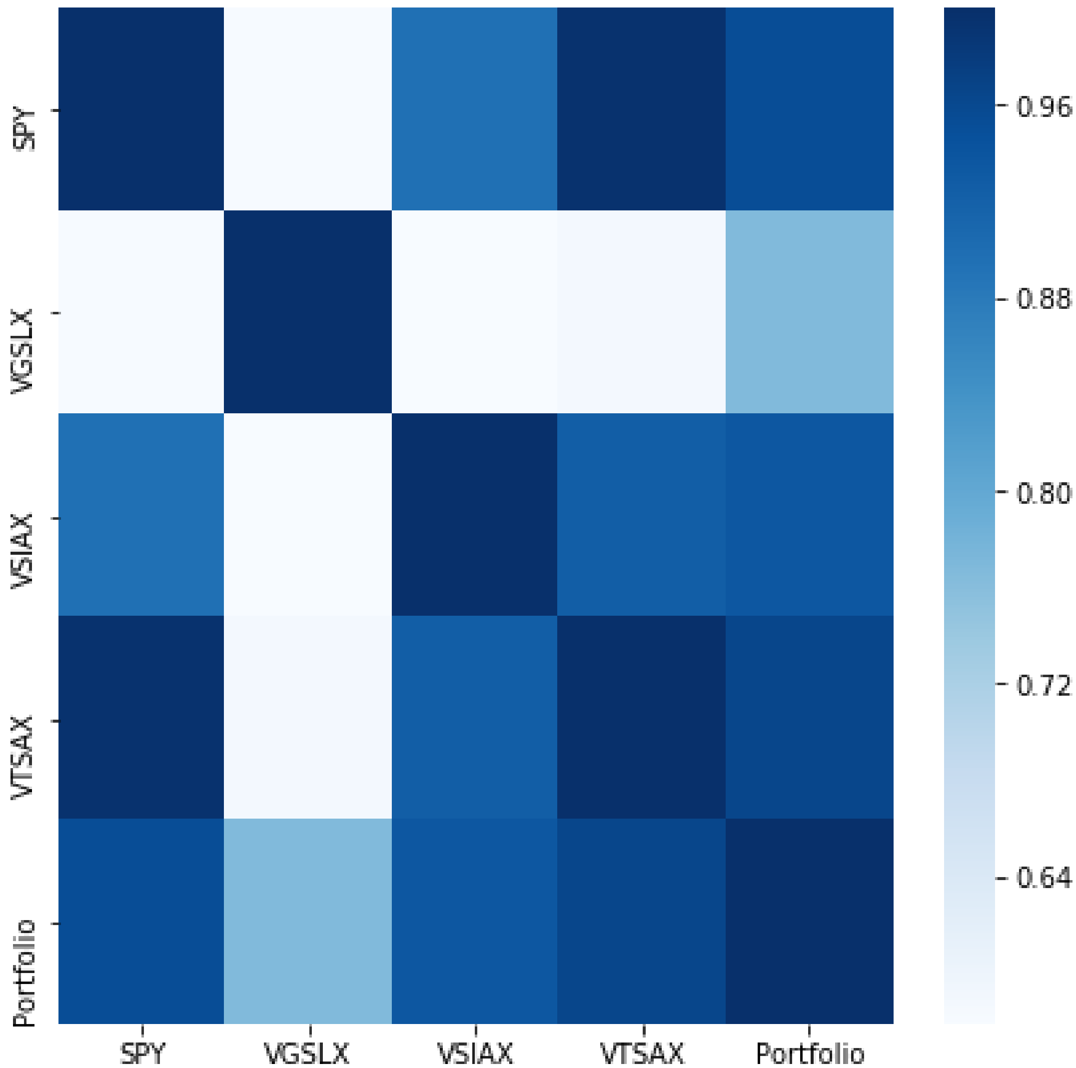
[27]:

```
# Calculate the max value
roll_max = returns['Portfolio'].rolling(center=False,min_periods=1,window=252).
↪max()

# Calculate the daily draw-down relative to the max
daily_draw_down = returns['Portfolio']/roll_max - 1.0

# Calculate the minimum (negative) daily draw-down
max_daily_draw_down = daily_draw_down.
↪rolling(center=False,min_periods=1,window=252).min()

# Plot the results
plt.figure(figsize=(15,15))
plt.plot(returns.index, daily_draw_down, label='Daily drawdown')
plt.plot(returns.index, max_daily_draw_down, label='Maximum daily drawdown in␣
↪time-window')
plt.legend()
plt.show()
```



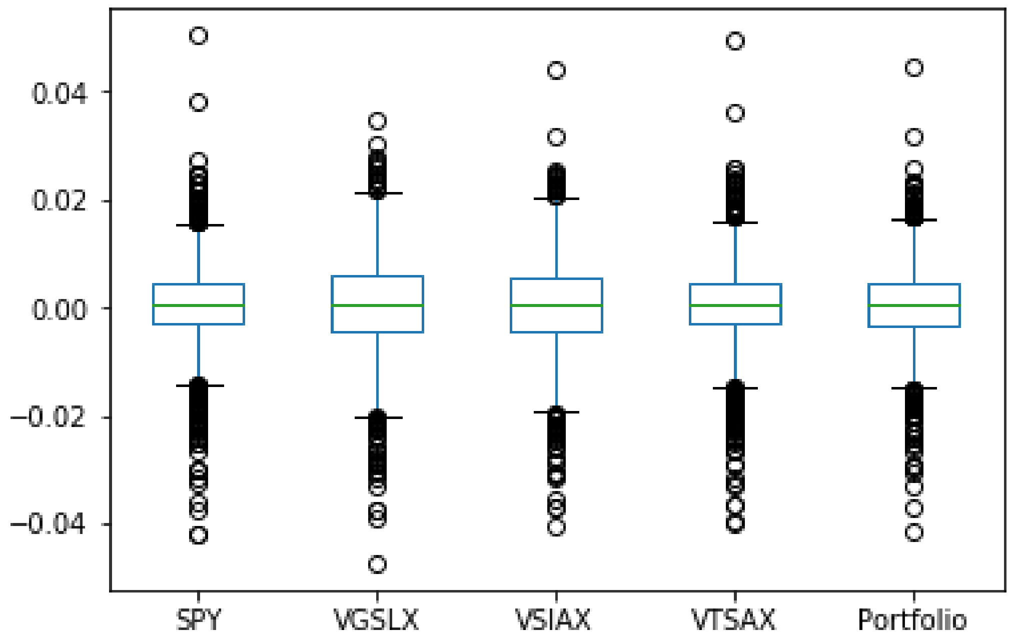
[28]:
```
plt.figure(figsize=(7,7))
corr = returns.corr()

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

[28]: <matplotlib.axes._subplots.AxesSubplot at 0x2448dd56550>

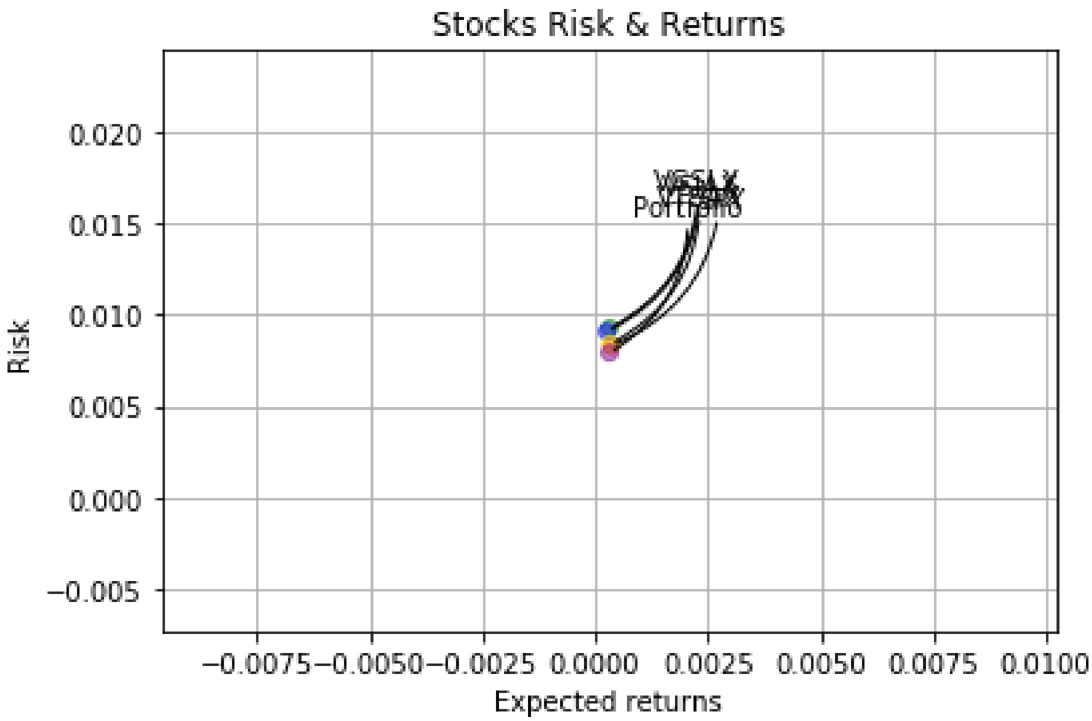


[29]:
```
# Box plot
returns.plot(kind='box')
```

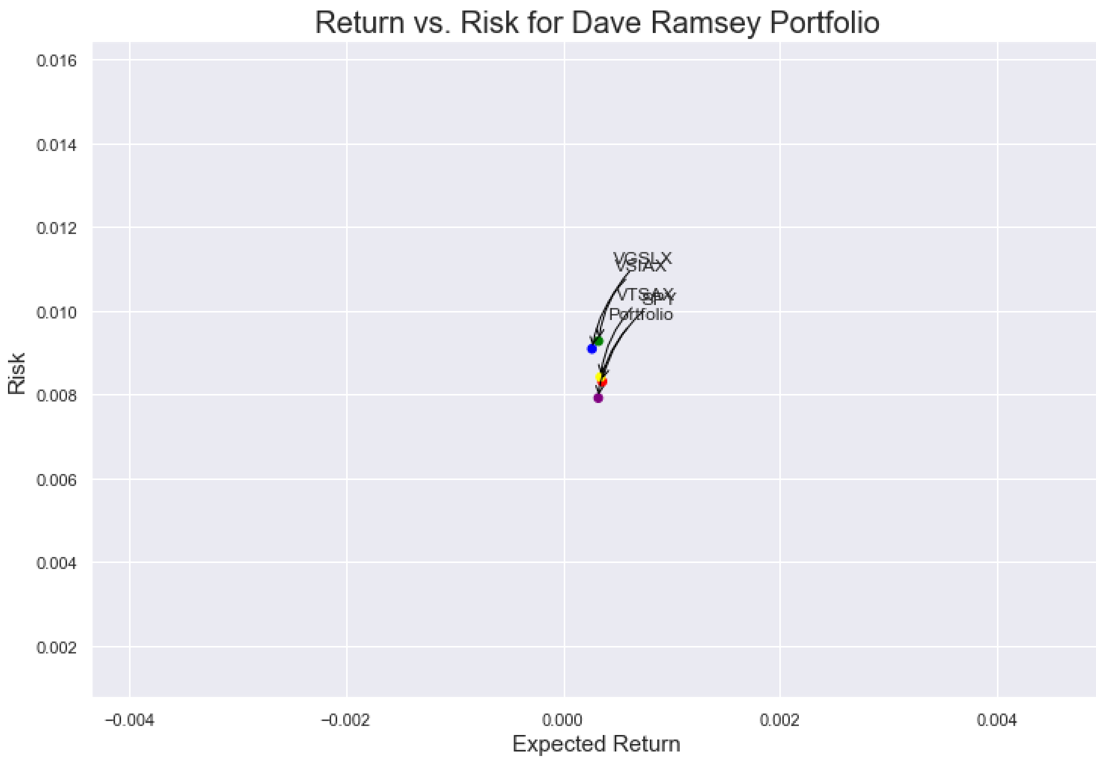
[29]: <matplotlib.axes._subplots.AxesSubplot at 0x2448de149b0>



[30]:
```
rets = returns.dropna()

colors=['red','green','blue','yellow','purple']
plt.scatter(rets.mean(), rets.std(), c=colors,alpha = 0.5)

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

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



[31]:
```
area = np.pi*10.0

sns.set(style='darkgrid')
plt.figure(figsize=(12,8))
colors=['red','green','blue','yellow','purple']

plt.scatter(rets.mean(), rets.std(), s=area, c=colors)
plt.xlabel("Expected Return", fontsize=15)
plt.ylabel("Risk", fontsize=15)
plt.title("Return vs. Risk for Dave Ramsey Portfolio", fontsize=20)

for label, x, y in zip(rets.columns, rets.mean(), rets.std()):
    plt.annotate(
        label,
        xy = (x, y), xytext = (50, 50),
        textcoords = 'offset points', ha = 'right', va = 'bottom',
        arrowprops = dict(arrowstyle = '->', connectionstyle = 'arc3,rad=0.2',␣
 ↪color = 'black'))
```



[32]:
```
print("Stock returns: ")
print(rets.mean())
print('-' * 50)
print("Stock risk:")
print(rets.std())
```

```
Stock returns:
SPY          0.000362
VGSLX        0.000327
VSIAX        0.000267
VTSAX        0.000345
Portfolio    0.000325
dtype: float64
--------------------------------------------------
Stock risk:
SPY          0.008306
VGSLX        0.009270
VSIAX        0.009084
VTSAX        0.008408
Portfolio    0.007916
dtype: float64
```

[33]:
```
table = pd.DataFrame()
table['Returns'] = rets.mean()
table['Risk'] = rets.std()
table.sort_values(by='Returns')
```

[33]:

	Returns	Risk
VSIAX	0.000267	0.009084
Portfolio	0.000325	0.007916
VGSLX	0.000327	0.009270
VTSAX	0.000345	0.008408
SPY	0.000362	0.008306

[34]:
```
table.sort_values(by='Risk')
```

[34]:

	Returns	Risk
Portfolio	0.000325	0.007916
SPY	0.000362	0.008306
VTSAX	0.000345	0.008408
VSIAX	0.000267	0.009084
VGSLX	0.000327	0.009270

[35]:
```
rf = 0.01
table['Sharpe_Ratio'] = (table['Returns'] - rf) / table['Risk']
table
```

[35]:

	Returns	Risk	Sharpe_Ratio
SPY	0.000362	0.008306	-1.160409
VGSLX	0.000327	0.009270	-1.043439
VSIAX	0.000267	0.009084	-1.071490
VTSAX	0.000345	0.008408	-1.148292
Portfolio	0.000325	0.007916	-1.222263

Dave Ramsey Portfolio is the lowest risk with lowest returns. Compare other portfolio strategies, Dave Ramsey Portfolio is the safest strategies.