In [1]:
```
from quickfs import QuickFS
import os
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import json
import yfinance as yf
from datetime import date
```

In [2]:
```
# Backtesting Years
year2015 = '2015'
year2010 = '2010'

start_yf = year2010 + '-01-01'
end_yf = year2015 + '-01-01'
```

In [3]:
```
exchange_input = input('Choose either NASDAQ, NYSE, NYSEAMERICAN: ').strip().upper()
```

```
Choose either NASDAQ, NYSE, NYSEAMERICAN: NASDAQ
```

In [4]:
```
exchange_input
```

Out[4]:
```
'NASDAQ'
```

In [5]:
```
csv_name = 'NASDAQ_ROE_2015-2020.csv'
```

In [6]:
```
print(csv_name)
```

```
NASDAQ_ROE_2015-2020.csv
```

In [7]:
```
def read_csv(filename=csv_name):
    df = pd.read_csv(csv_name, converters={'roe_median': pd.eval,
                                           'price_to_sales': pd.eval,
                                           'roic_5yr_avg': pd.eval,
                                          'revenue_cagr_10': pd.eval,
                                           }
                                            ,index_col=0)
    return df
```

In [8]:
```
df1 = read_csv()
```

In [9]:
```
def filter1_list(df_clean):
    df_clean['roe_median'] = df_clean['roe_median'].apply(np.mean)
    df_clean['roic_5yr_avg'] = df_clean['roic_5yr_avg'].apply(np.mean)
    df_clean['mean_ps'] = df_clean['price_to_sales'].apply(np.mean)
    df_clean['revenue_cagr_10'] = df_clean['revenue_cagr_10'].apply(np.mean)


    mid_caps = df_clean[(df_clean['mean_ps']>0) & (df_clean['mean_ps'] < 1)].copy()

    sorted_mid_caps = mid_caps[['roe_median',
                            'mean_ps',
                            'roic_5yr_avg',
                            'revenue_cagr_10',
                            ]].sort_values('mean_ps', ascending=True).copy()
```

```
    sorted_mid_caps[sorted_mid_caps['mean_ps'] < 1]
    sorted_mid_caps.reset_index(inplace=True)
    sorted_mid_caps.rename(columns={'index':'stocks'}, inplace=True)

    sorted_mid_caps = sorted_mid_caps[sorted_mid_caps['revenue_cagr_10']>0.012]
    sorted_mid_caps = sorted_mid_caps[sorted_mid_caps['roic_5yr_avg']>0.012]
    sorted_mid_caps = sorted_mid_caps[sorted_mid_caps['roe_median']>0.2]
    sorted_mid_caps['stocks'] = np.where(sorted_mid_caps.stocks.str.contains(':US') ==
    sorted_mid_caps.set_index(['stocks'], inplace=True)
    yf_stocks = sorted_mid_caps.index.tolist()

    return yf_stocks
```

In [10]:
```
filteredOnce = filter1_list(df1)
```

In [11]:
```
len(filteredOnce)
```

Out[11]:
```
23
```

In [12]:
```
print(filteredOnce)
```

```
['JMBA', 'HQI', 'CDW', 'ARCB', 'JBSS', 'UFPI', 'PTSI', 'NRCIB', 'RCMT', 'CCRN', 'COS
T', 'SCVL', 'PATK', 'KFRC', 'RILY', 'ULH', 'BBSI', 'SAIA', 'CHRW', 'ESRX', 'SWBI', 'H
IMX', 'LFVN']
```

In [13]:
```
def filter2_cagr_list(filtered_list):
    print(F'Getting CAGR ticker data for year {start_yf} to {end_yf}')
    close = yf.download(filtered_list, start=start_yf, end=end_yf)['Adj Close']
    close = close.ffill()
    #close.dropna(axis=1, inplace=True)
    log_returns = np.log(close.div(close.shift(1)))
    #print(log_returns)
    CAGR = np.exp(log_returns.mean() *252*5 - 1) #multiply by 5 because 5 years from s
    #print(CAGR)
    CAGR = CAGR.sort_values(ascending=False)[:].index
    CAGR = CAGR.tolist()
    return CAGR
```

In [14]:
```
yf_cagr_filter = filter2_cagr_list(filteredOnce)
```

```
Getting CAGR ticker data for year 2010-01-01 to 2015-01-01
[**********************100%************************]  23 of 23 completed
```

In [15]:
```
print('List for the exchange {}'.format(exchange_input))
```

```
List for the exchange NASDAQ
```

In [16]:
```
print(yf_cagr_filter)
```

```
['PATK', 'NRCIB', 'CDW', 'PTSI', 'SAIA', 'RCMT', 'LFVN', 'HQI', 'HIMX', 'JBSS', 'COS
T', 'BBSI', 'SWBI', 'KFRC', 'SCVL', 'ESRX', 'ULH', 'JMBA', 'ARCB', 'UFPI', 'CHRW', 'C
CRN', 'RILY']
```

In [17]:
```
len(yf_cagr_filter)
```

Out[17]:
```
23
```

In [18]:
```
print(yf_cagr_filter[:17])
```

```
['PATK', 'NRCIB', 'CDW', 'PTSI', 'SAIA', 'RCMT', 'LFVN', 'HQI', 'HIMX', 'JBSS', 'COS
T', 'BBSI', 'SWBI', 'KFRC', 'SCVL', 'ESRX', 'ULH']
```

In [19]:
```
fwd_start = '2015-01-01'
fwd_end = '2023-04-17'
```

In [20]:
```
print('We should now test the performance from the time period ' + fwd_start + ' to '
```

```
We should now test the performance from the time period 2015-01-01 to 2023-04-17
```

In [21]:
```
def strategy_fwd(tickers):
    '''Calculates the performance of a ticker or list of tickers on an adjusted close
    tickers == either ticker list or a single symbol'''

    forward_test = yf.download(tickers, start=fwd_start, end=fwd_end)['Adj Close']

    returns = forward_test.pct_change()
    returns = returns.ffill()

    try:
        strategy_returns = returns.mean(axis=1)
        strategy_returns.name = 'Strategy'
    except ValueError:
        strategy_returns = returns
        strategy_returns.name = 'Benchmark'

    strategy_returns.dropna(inplace=True)
    strategy_returns = strategy_returns.add(1).cumprod().mul(100)

    return strategy_returns
```

With all stocks in best CAGR stocks (from 2010-2015)

In [22]:
```
SPY = strategy_fwd('SPY')
```

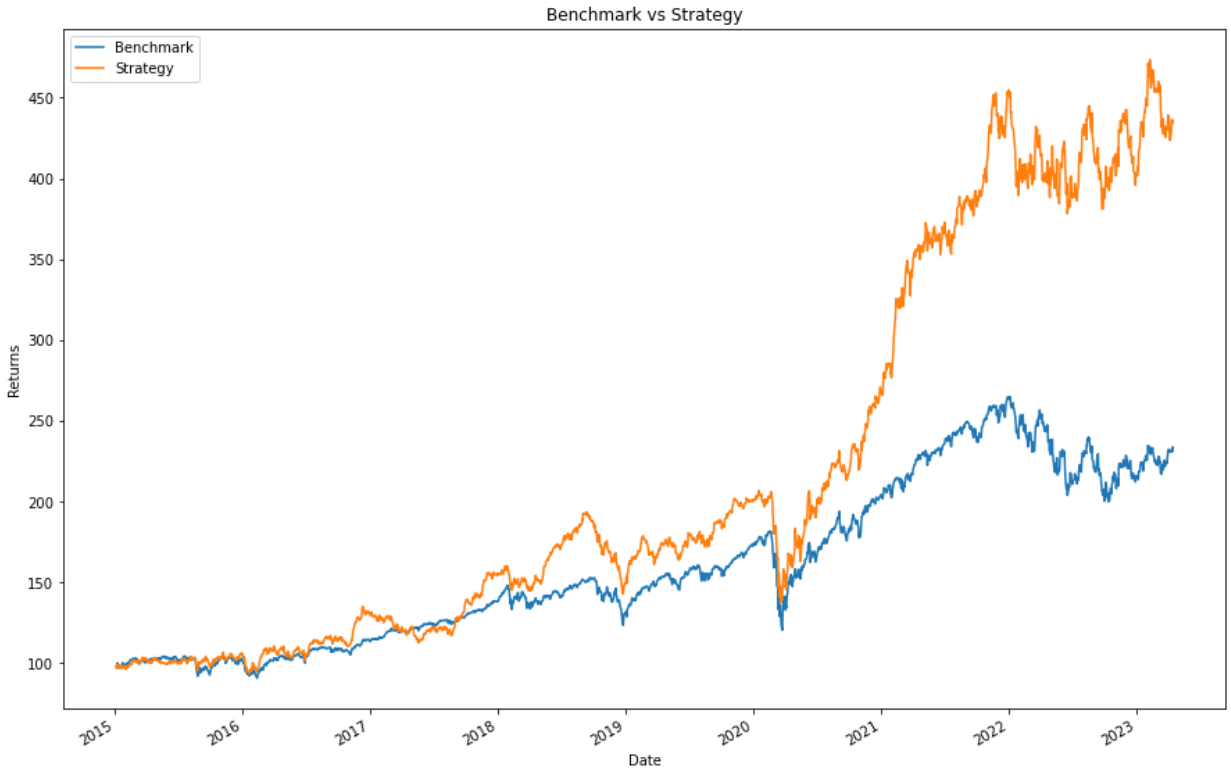
```
[**********100%**********]  1 of 1 completed
```

In [23]:
```
Strat = strategy_fwd(yf_cagr_filter[:])
```

```
[**********100%**********]  23 of 23 completed
```

In [24]:
```
def plot_compare(perf1, perf2):
    perf1.plot(legend=True, figsize=(15,10))
    perf2.plot(legend=True)
    plt.title("{} vs {}".format(perf1.name, perf2.name))
    plt.ylabel("Returns")
    return plt.show()
```

In [25]:
```
plot_compare(SPY, Strat)
```



In [26]:
```
Outperformance = Strat[-1] - SPY[-1]
Outperformance
```

Out[26]:
```
202.03448799378373
```

In [27]:
```
SPY = strategy_fwd('SPY')
```

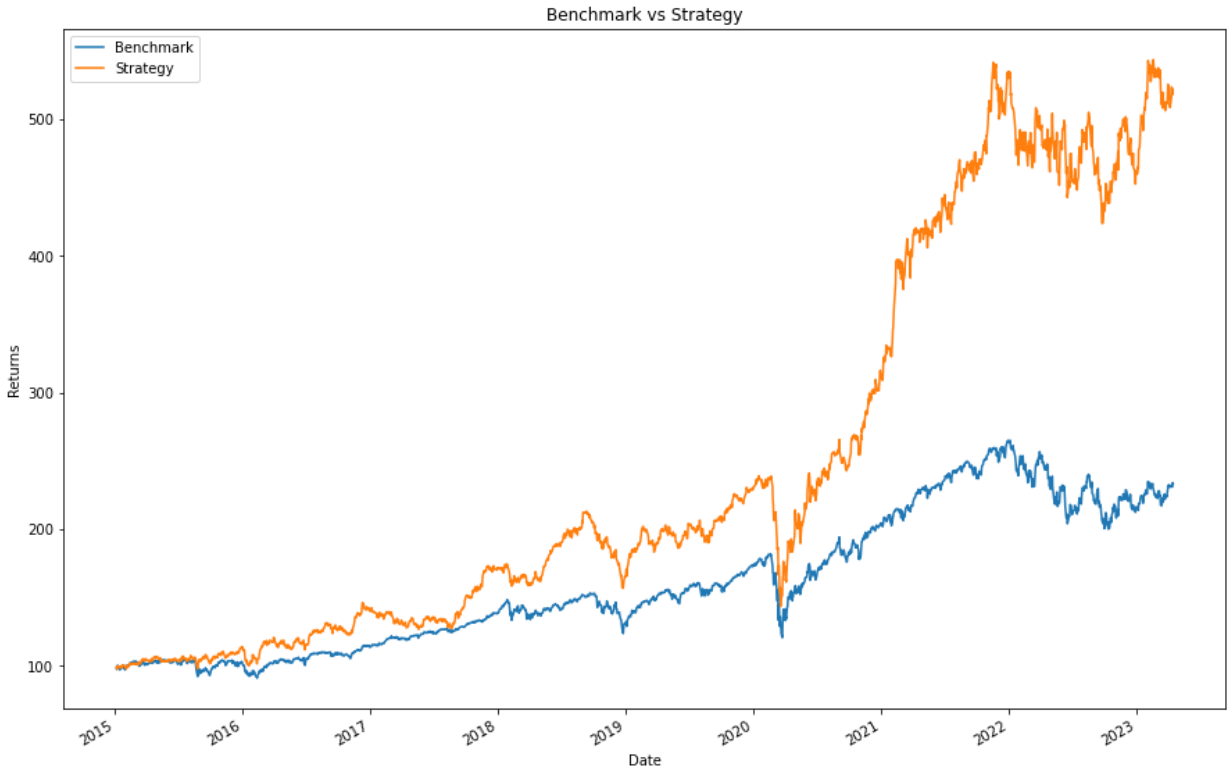
```
[**********100%**********]  1 of 1 completed
```

With 15 best CAGR stocks (from 2010-2015)

In [28]:
```
Strat = strategy_fwd(yf_cagr_filter[:15])
```

```
[**********100%**********]  15 of 15 completed
```

In [29]:
```
plot_compare(SPY, Strat)
```



In [30]:
```
Outperformance = Strat[-1] - SPY[-1]
Outperformance
```

Out[30]:
```
285.27326620530494
```