**Quantitative Value Strategy**

"Value investing" means investing in the stocks that are cheapest relative to common measures of business value (like earnings or assets).

For this project, we're going to build an investing strategy that selects the 50 stocks with the best value metrics. From there, we will calculate recommended trades for an equal-weight portfolio of these 50 stocks.

# Performance of stock

We chose the stock that generated 8% return over 2019 but the problem is the rest of the market is returning a few times that amount? If we compare with indices from S&P 500. It returns for us a 24% return between the starting price and the ending price of that year

In [6]:

final\_dataframe

Out[6]:

**Number of Shares to Ticker Price Price-to-Earnings Ratio**

**Buy**

1. A 126.32 55.04 N/A
2. AAL 21.42 -1.16 N/A
3. AAP 163.22 23.2 N/A

## **3** AAPL 129.21 36.19 N/A

**4** ABBV 112.50 40.82 N/A **...** ... ... ... ...

1. YUM 108.39 36.53 N/A
2. ZBH 163.60 -253.76 N/A
3. ZBRA 535.84 56 N/A
4. ZION 55.69 8.81 N/A
5. ZTS 161.54 47.49 N/A
6. rows × 4 columns

# Removing Glamour Stocks

The opposite of a "value stock" is a "glamour stock".

Since the goal of this strategy is to identify the 50 best value stocks from our universe, our next step is to remove glamour stocks from the DataFrame.

We'll sort the DataFrame by the stocks' price-to-earnings ratio, and drop all stocks outside the top 50.

# Calculating the Number of Shares to Buy

We now need to calculate the number of shares we need to buy. We shall begin with a portfolio of 100000

We can now use the global portfolio\_size variable to calculate the number of shares that our strategy should purchase.

# Building a Better (and More Realistic) Value Strategy

Every valuation metric has certain flaws.

For example, the price-to-earnings ratio doesn't work well with stocks with negative earnings.

Similarly, stocks that buyback their own shares are difficult to value using the price-to-book ratio.

Investors typically use a composite basket of valuation metrics to build robust quantitative value strategies. In this section, we will filter for stocks with the lowest percentiles on the following metrics:

Price-to-earnings ratio

Price-to-book ratio

Price-to-sales ratio

Enterprise Value divided by Earnings Before Interest, Taxes, Depreciation, and Amortization (EV/EBITDA)

Enterprise Value divided by Gross Profit (EV/GP)

Some of these metrics aren't provided directly by the IEX Cloud API, and must be computed after pulling raw data. We'll start by calculating each data point from scratch.

In [13]:

dataframe

Out[13]:

**Number of Price-to- Price-to- Price-to-**

**PE PB PS EV/EBITDA EV/GP RV**

**Ticker Price Shares to Earnings Book Sales EV/EBITDA EV/GP**

**Percentile Percentile Percentile Percentile Percentile Score**

**Buy Ratio Ratio Ratio**

**40** AON 234.850 N/A None N/A None N/A None N/A NaN N/A NaN N/A N/A

**71** BRK.B 251.370 N/A None N/A None N/A None N/A NaN N/A NaN N/A N/A

**118** CTL 11.000 N/A 10 N/A None N/A None N/A NaN N/A NaN N/A N/A

**136** DISCK 49.740 N/A None N/A None N/A None N/A NaN N/A NaN N/A N/A

**165** ETFC 50.750 N/A 14.37 N/A None N/A None N/A NaN N/A NaN N/A N/A

**168** EVRG 55.400 N/A None N/A None N/A None N/A NaN N/A NaN N/A N/A

**190** FOX 34.040 N/A None N/A None N/A None N/A NaN N/A NaN N/A N/A

**192** FRC 180.960 N/A None N/A None N/A None N/A NaN N/A NaN N/A N/A

**204** GOOG 2173.110 N/A None N/A None N/A None N/A NaN N/A NaN N/A N/A

1. MYL 15.954 N/A 31.45 N/A None N/A None N/A NaN N/A NaN N/A N/A
2. NBL 8.610 N/A -0.76 N/A None N/A None N/A NaN N/A NaN N/A N/A

**348** NWS 23.920 N/A None N/A None N/A None N/A NaN N/A NaN N/A N/A

**363** PEG 55.330 N/A None N/A None N/A None N/A NaN N/A NaN N/A N/A

**442** TROW 168.590 N/A None N/A None N/A None N/A NaN N/A NaN N/A N/A

**452** UA 19.230 N/A None N/A None N/A None N/A NaN N/A NaN N/A N/A

**454** UAL 55.800 N/A None N/A None N/A None N/A NaN N/A NaN N/A N/A

**498** XRX 26.710 N/A None N/A None N/A None N/A NaN N/A NaN N/A N/A

# Calculating Value Percentiles

We now need to calculate value score percentiles for every stock in the universe. More specifically, we need to calculate percentile scores for the following metrics for every stock:

Price-to-earnings ratio

Price-to-book ratio

Price-to-sales ratio

EV/EBITDA

EV/GP

Here's how what we get after the computation:

Out[16]:

**Number of Price-to- Price-to- Price-to-**

**PE PB PS EV/EBITDA EV/GP RV**

**Ticker Price Shares to Earnings Book Sales EV/EBITDA EV/GP**

**Percentile Percentile Percentile Percentile Percentile Score**

**Buy Ratio Ratio Ratio**

* 1. A 128.32 N/A 54.48 0.849505 7.73 0.730693 7.1700 0.811881 32.751629 0.877228 13.461088 0.79604 N/A
  2. AAL 21.72 N/A -1.15 0.150495 -1.95 0.047525 0.7836 0.073267 -4.386988 0.033663 2.264593 0.10495 N/A
  3. AAP 165.01 N/A 23.77 0.447525 3.09 0.419802 1.0500 0.117822 10.730406 0.217822 2.412225 0.108911 N/A
  4. AAPL 134.01 N/A 36.22 0.706931 32.16 0.954455 7.0100 0.80099 24.884904 0.790099 18.899728 0.922772 N/A
  5. ABBV 111.42 N/A 40.28 0.756436 15.25 0.883168 4.3000 0.609901 14.402806 0.415842 9.104474 0.607921 N/A

**...** ... ... ... ... ... ... ... ... ... ... ... ... ... ...

1. YUM 109.62 N/A 37.14 0.722772 -3.98 0.045545 5.6000 0.735644 22.699450 0.734653 9.611493 0.653465 N/A
2. ZBH 168.10 N/A -254.41 0.009901 2.90 0.39604 4.9800 0.69604 30.525738 0.869307 8.282914 0.524752 N/A
3. ZBRA 514.09 N/A 57.30 0.861386 12.65 0.853465 6.0000 0.755446 37.453665 0.893069 14.283792 0.829703 N/A
4. ZION 55.52 N/A 8.84 0.178218 1.22 0.128713 2.5000 0.384158 6.544386 0.063366 2.878890 0.128713 N/A
5. ZTS 160.64 N/A 46.83 0.818812 20.11 0.920792 11.2500 0.924752 31.965440 0.875248 16.764964 0.89505 N/A
6. rows × 14 columns

# Calculating the RV Score

We'll now calculate our RV Score (which stands for Robust Value), which is the value score that we'll use to filter for stocks in this investing strategy.

The RV Score will be the arithmetic mean of the 4 percentile scores that we calculated in the last section.

In [17]:

rv\_dataframe

Out[17]:

**Number of Price-to- Price- Price-to-**

**PE PB PS EV/EBITDA EV/GP RV**

**Ticker Price Shares to Earnings to-Book Sales EV/EBITDA EV/GP**

**Percentile Percentile Percentile Percentile Percentile Score**

**Buy Ratio Ratio Ratio**

1. A 128.32 N/A 54.48 0.849505 7.73 0.730693 7.1700 0.811881 32.751629 0.877228 13.461088 0.79604 0.813069
2. AAL 21.72 N/A -1.15 0.150495 -1.95 0.047525 0.7836 0.073267 -4.386988 0.033663 2.264593 0.10495 0.08198
3. AAP 165.01 N/A 23.77 0.447525 3.09 0.419802 1.0500 0.117822 10.730406 0.217822 2.412225 0.108911 0.262376
4. AAPL 134.01 N/A 36.22 0.706931 32.16 0.954455 7.0100 0.80099 24.884904 0.790099 18.899728 0.922772 0.83505
5. ABBV 111.42 N/A 40.28 0.756436 15.25 0.883168 4.3000 0.609901 14.402806 0.415842 9.104474 0.607921 0.654653

**...** ... ... ... ... ... ... ... ... ... ... ... ... ... ...

1. YUM 109.62 N/A 37.14 0.722772 -3.98 0.045545 5.6000 0.735644 22.699450 0.734653 9.611493 0.653465 0.578416
2. ZBH 168.10 N/A -254.41 0.009901 2.90 0.39604 4.9800 0.69604 30.525738 0.869307 8.282914 0.524752 0.499208
3. ZBRA 514.09 N/A 57.30 0.861386 12.65 0.853465 6.0000 0.755446 37.453665 0.893069 14.283792 0.829703 0.838614
4. ZION 55.52 N/A 8.84 0.178218 1.22 0.128713 2.5000 0.384158 6.544386 0.063366 2.878890 0.128713 0.176634
5. ZTS 160.64 N/A 46.83 0.818812 20.11 0.920792 11.2500 0.924752 31.965440 0.875248 16.764964 0.89505 0.886931
6. rows × 14 columns

# Selecting the 50 Best Value Stocks¶

As before, we can identify the 50 best value stocks in our universe by sorting the DataFrame on the RV Score column and dropping all but the top 50 entries. We start with a portfolio of 1000000

# Calculating the Number of Shares to Buy

We'll use the portfolio\_input function that we created earlier to accept our portfolio size. Then we will use similar logic in a for loop to calculate the number of shares to buy for each stock in our investment universe.

In [20]:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | | | | | | | | | | | | | Out[20]: | |
|  | | | | | | |  | |  | |  | |  | |  | |  | |  | |  | |  |
|  | **Ticker** | **Price** | **Number of**  **Shares to**  **Buy** | **Price-to-**  **Earnings**  **Ratio** | **PE**  **Percentile** | **Price-to-**  **Book**  **Ratio** | | **PB**  **Percentile** | | **Price-to-**  **Sales**  **Ratio** | | **PS**  **Percentile** | | **EV/EBITDA** | | **EV/EBITDA**  **Percentile** | | **EV/GP** | | **EV/GP**  **Percentile** | | **RV**  **Score** | |
| **0** | UNM | 27.60 | 724 | 7.09 | 0.166337 | 0.5137 | | 0.053465 | | 0.4278 | | 0.023762 | | 3.601049 | | 0.041584 | | 0.415220 | | 0.00396 | | 0.057822 | |
| **1** | MCK | 177.32 | 112 | -6.99 | 0.110891 | -56.4400 | | 0.007921 | | 0.1158 | | 0.005941 | | 6.586463 | | 0.065347 | | 2.480215 | | 0.110891 | | 0.060198 | |
| **2** | FTI | 8.63 | 2317 | -0.67 | 0.156436 | 0.8920 | | 0.071287 | | 0.2859 | | 0.009901 | | 2.415908 | | 0.039604 | | 1.548016 | | 0.051485 | | 0.065743 | |
| **3** | AIG | 47.31 | 422 | -6.70 | 0.112871 | 0.5781 | | 0.057426 | | 0.8810 | | 0.079208 | | 6.969419 | | 0.067327 | | 0.848936 | | 0.019802 | | 0.067327 | |
| **4** | MET | 61.15 | 327 | 10.76 | 0.2 | 0.6873 | | 0.059406 | | 0.7644 | | 0.069307 | | 5.146876 | | 0.049505 | | 0.775059 | | 0.017822 | | 0.079208 | |
| **5** | ALL | 115.17 | 173 | 6.35 | 0.164356 | 1.1900 | | 0.113861 | | 0.7545 | | 0.065347 | | 2.277854 | | 0.037624 | | 0.713310 | | 0.015842 | | 0.079406 | |
| **6** | DXC | 27.09 | 738 | -2.38 | 0.137624 | 1.1500 | | 0.107921 | | 0.3588 | | 0.017822 | | 4.847890 | | 0.047525 | | 2.178908 | | 0.091089 | | 0.080396 | |
| **7** | AAL | 21.72 | 920 | -1.15 | 0.150495 | -1.9500 | | 0.047525 | | 0.7836 | | 0.073267 | | -4.386988 | | 0.033663 | | 2.264593 | | 0.10495 | | 0.08198 | |
| **8** | ABC | 106.09 | 188 | -6.55 | 0.114851 | -29.7500 | | 0.011881 | | 0.1066 | | 0.00396 | | 7.748008 | | 0.10495 | | 3.691487 | | 0.192079 | | 0.085545 | |
| **9** | F | 11.99 | 1668 | -38.89 | 0.049505 | 1.5200 | | 0.193069 | | 0.3671 | | 0.019802 | | 5.727185 | | 0.053465 | | 2.643278 | | 0.116832 | | 0.086535 | |
| **10** | HIG | 52.57 | 380 | 11.25 | 0.20198 | 1.0020 | | 0.093069 | | 0.8850 | | 0.081188 | | 4.618262 | | 0.043564 | | 0.908750 | | 0.023762 | | 0.088713 | |
| **11** | BA | 225.02 | 88 | -10.85 | 0.09505 | -6.8200 | | 0.037624 | | 2.1600 | | 0.336634 | | -14.434297 | | 0.021782 | | -  28.422203 | | 0.00198 | | 0.098614 | |
| **12** | PFG | 59.29 | 337 | 11.57 | 0.211881 | 0.9571 | | 0.083168 | | 1.0600 | | 0.120792 | | 7.778085 | | 0.106931 | | 1.034353 | | 0.025743 | | 0.109703 | |
| **13** | CVS | 69.34 | 288 | 13.18 | 0.231683 | 1.3200 | | 0.150495 | | 0.3481 | | 0.015842 | | 7.973940 | | 0.110891 | | 1.406101 | | 0.043564 | | 0.110495 | |
| **14** | AIZ | 128.10 | 156 | 19.11 | 0.344554 | 1.2000 | | 0.120792 | | 0.7196 | | 0.063366 | | 1.628904 | | 0.035644 | | 0.702872 | | 0.011881 | | 0.115248 | |
| **15** | AFL | 49.08 | 407 | 7.50 | 0.168317 | 1.0065 | | 0.09505 | | 1.5200 | | 0.221782 | | 6.011659 | | 0.055446 | | 1.476779 | | 0.049505 | | 0.11802 | |
| **16** | T | 28.31 | 706 | -39.01 | 0.047525 | 1.2900 | | 0.146535 | | 1.1700 | | 0.156436 | | 6.362734 | | 0.057426 | | 3.726117 | | 0.19604 | | 0.120792 | |
| **17** | TAP | 45.02 | 444 | -10.71 | 0.09703 | 0.7833 | | 0.065347 | | 1.0158 | | 0.112871 | | 7.454185 | | 0.091089 | | 4.514726 | | 0.241584 | | 0.121584 | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |