## **Algorithmic Trading (Equal Weights S&P500)**

## 1. Introduction

This is my first personal project on algorithmic trading.

The strategy for this project is assigning equal weights to all the companies in the S&P500 (a static list).

The hypothesis for this strategy is that smaller-cap stocks may have more room for growth or are more likely to be mispriced, compared to the mega-cap stocks that dominate the S&P 500's market-cap-weighted index.

How this hypothesis may work:

- Diversification of Risk: Equal-weighting reduces the concentration of risk by spreading it evenly across all 500 companies, limiting the dominance of largecap stocks.
- 2. Smaller-Cap Exposure: The strategy increases exposure to mid- and small-cap stocks, potentially leading to higher returns compared to large-cap stocks over certain periods.

The output of this project is a excel sheet recommending the number of shares to buy for each S&P500 company.

## 2. Methodology

- Data processing
  - Loaded a csv file of 505 S&P500 companies

```
Ticker
1
       AAL
2
       AAP
3
      AAPL
      ABBV
4
500
       YUM
501
       ZBH
502
      ZBRA
503
      ZION
504
       ZTS
```

[505 rows x 1 columns]

Figure 1: Static List of S&P500 Companies

Output of APIs

```
{'Global Quote': {'01. symbol': 'AAPL', '02. open': '225.1400', '03. high': '226.8050', '04. low': '223.3200', '05. price': '225.6700', '06. volume': '34044158', '07. latest trading day': '2024-10-03', '08. previous close': '226.7800', '09. change': '-1.1100', '10. change percent': '-0.4895%'}}
```

Figure 2: Response of API to get Stock Price of companies

```
[12]: {'Symbol': 'AAPL',
    'AssetType': 'Common Stock',
    'Name': 'Apple Inc',
    'Description': "Apple Inc. is an American multinational technology company that specializes in consumer electronics, computer software, and online services. Apple is the world's largest technology company by revenue (totalling $274.5 billion in 2020) and, since January 2021, the w orld's most valuable company. As of 2021, Apple is the world's fourth-largest PC vendor by unit sales, and fourth-largest smartphone manufact urer. It is one of the Big Five American information technology companies, along with Amazon, Google, Microsoft, and Facebook.",
    'CIK': '320193',
    'Exchange': 'NASDAQ',
    'Currency': 'USD',
    'Country': 'USD',
    'Country': 'USD',
    'Sector': 'TECHNOLOGY',
    'Industry': 'ELECTRONIC COMPUTERS',
    'Address': 'ONE INFINITE LOOP, CUPERTINO, CA, US',
    'OfficialSite': 'https://www.apple.com',
    'FiscalYearEnd': 'September',
    'LatestQuarter': '2024-86-30',
    'MarketCapitalization': '3447985799000'.
```

Figure 3: Response of API to get Market Capitalisation of companies

- Looping through all S&P500 companies
  - Created a loop to obtain the relevant data (price and market capitalisation) of all S&P500 companies
  - Created a DataFrame to store the data
     \* only looped for first 5 companies to get result

|   | Ticker | Price    | Market Capitalization | Number Of Shares to Buy |
|---|--------|----------|-----------------------|-------------------------|
| 0 | Α      | 144.5500 | 42104959000           | N/A                     |
| 1 | AAL    | 10.8200  | 7105537000            | N/A                     |
| 2 | AAP    | 38.8900  | 2218094000            | N/A                     |
| 3 | AAPL   | 225.6700 | 3447985799000         | N/A                     |
| 4 | ABBV   | 195.4500 | 347651047000          | N/A                     |

Figure 4: DataFrame consisting of data on S&P500 companies

User Interface

- o Using input function of python, users can input their portfolio size
- Calculated position size by dividing portfolio size with number of companies
- Calculated number of shares to buy of respective companies by dividing position size with stock price

|   | Ticker | Price  | Market Capitalization | Number Of Shares to Buy |
|---|--------|--------|-----------------------|-------------------------|
| 0 | Α      | 144.55 | 42104959000           | 1383                    |
| 1 | AAL    | 10.82  | 7105537000            | 18484                   |
| 2 | AAP    | 38.89  | 2218094000            | 5142                    |
| 3 | AAPL   | 225.67 | 3447985799000         | 886                     |
| 4 | ABBV   | 195.45 | 347651047000          | 1023                    |

Figure 5: Data Frame with updated data on number of shares to buy

- Saving output into an excel file
  - By using xlsxwriter library in python, an excel sheet with the recommended trades will be created and saved

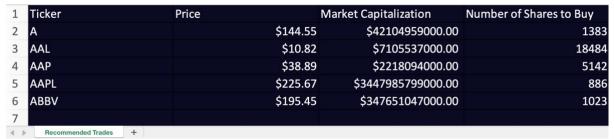


Figure 6: Excel Sheet of recommended trades

## 3. Learning Summary

- Algorithmic Trading Process is broken down generally into these steps:
  - Collecting Data
  - Developing a hypothesis for a strategy
  - Backtesting the strategy\* (did not do for this project)
  - Implement strategy in production\* (did not do for this project)
- How I can improve this project:
  - Purchasing an API to get real-time list of S&P500 companies
  - Purchasing an API that allows for batch calls (optimises the speed at which the data is collected)
  - o Backtest the strategy against historical data