

Data Driven Methods in Finance: basics I

Fall 2023: IEOR 4576

Naftali Cohen



Question/s of the week

Question: On average, how many times must a 6-sided die be rolled until a 6 turns up?

Answer:

Question: On average, how many times must a 6-sided die be rolled until a 6 turns up twice in a row?

Answer:

Active vs. Passive investing

Two major categories of equity portfolio management: **active** and **passive** investing.

Active vs. Passive investing

Two major categories of equity portfolio management: **active** and **passive** investing.

Passive Equity Portfolio Management (a.k.a. Indexing): is a portfolio management approach that is usually designed to track some commonly known index (e.g. S&P 500). The purpose of indexing is **to match** the underlying index's performance, **not to outperform it**.

Trading: Trading is only initiated to match stocks that may enter or leave the index, or to reinvest dividends, or to deal with corporate actions.

Rewards: PMs are rewarded on their ability to replicate the index (i.e. minimize the tracking error).

Active vs. Passive investing

Two major categories of equity portfolio management: **active** and **passive** investing.

Passive Equity Portfolio Management (a.k.a. Indexing): is a portfolio management approach that is usually designed to track some commonly known index (e.g. S&P 500). The purpose of indexing is **to match** the underlying index's performance, **not to outperform it**.

Trading: Trading is only initiated to match stocks that may enter or leave the index, or to reinvest dividends, or to deal with corporate actions.

Rewards: PMs are rewarded on their ability to replicate the index (i.e. minimize the tracking error).

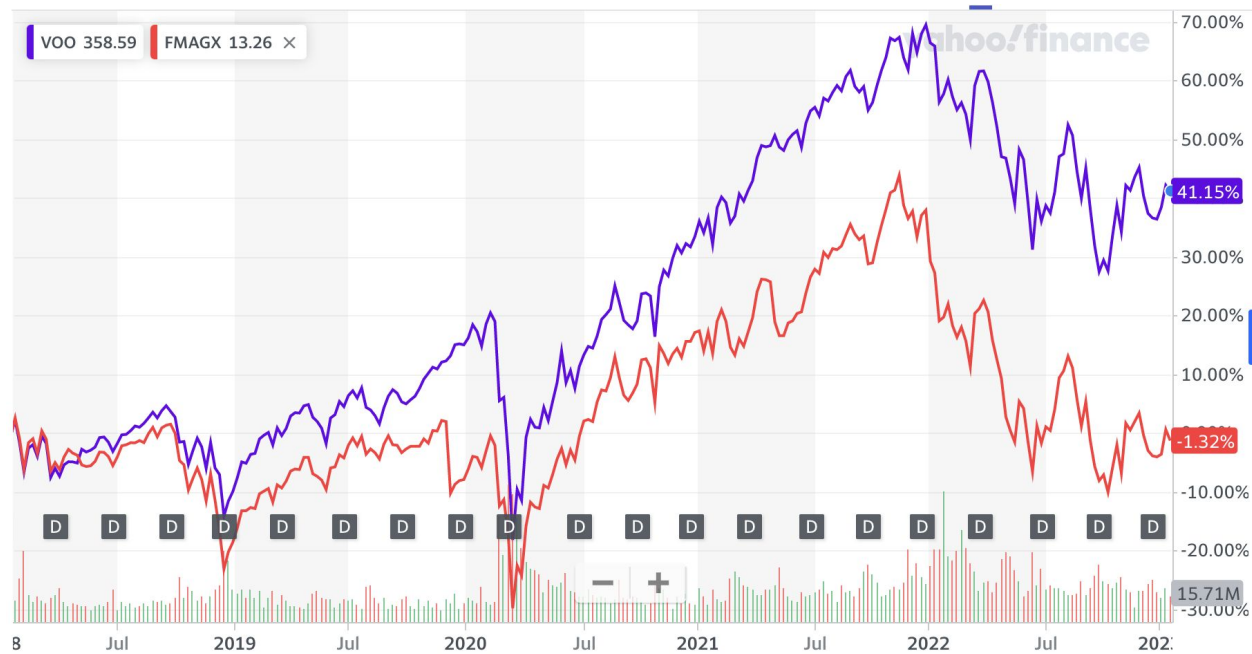
Active Equity Portfolio Management: is a portfolio management approach that is usually designed to outperform or beat a passive benchmark on an absolute or risk-adjusted basis. It may also be a pure absolute strategy without any reference to an index.

Trading: Trading is initiated to purchase stocks that the manager believes will **outperform**. In many cases, active managers have **higher turnover** than passive managers. They trade more often.

Rewards: PMs are usually rewarded on their absolute return or risk adjusted return over some benchmark.

Active vs. Passive investing: example

- Vanguard 500 (VOO) is an index mutual fund that purchases every security in the S&P 500.
- Fidelity Magellan Fund (FMAGX) is an active fund with no particular benchmark and attempts to achieve a high rate of return.



Active vs. Passive investing

Question: How do investors like us gain access to active or passive portfolios?

- Purchase a mutual fund or an exchange-traded funds (ETFs).
 - Currently, ETFs are really just passive investments, whereas Mutual Funds can be both.
- Invest in a hedge fund.
 - A large amount of capital is usually required.
- Build our own portfolio stock-by-stock.
 - Very expensive in terms of trading costs at most brokerages.

Active vs. Passive investing

Major Equity Benchmarks for Portfolio Managers:

- S&P 500, 400, 600, 1500 (tracks large companies listed on stock exchanges in the United States)
- Russell 3000, 2000, 1000 (benchmark of the entire U.S stock market)
- Wilshire 5000 (all publicly traded companies in the United States)
- NASDAQ 100 (largest non-financial, single-exchange companies)

Active vs. Passive investing

Major Equity Benchmarks for Portfolio Managers:

- S&P 500, 400, 600, 1500 (tracks large companies listed on stock exchanges in the United States)
- Russell 3000, 2000, 1000 (benchmark of the entire U.S stock market)
- Wilshire 5000 (all publicly traded companies in the United States)
- NASDAQ 100 (largest non-financial, single-exchange companies)

Which to Choose?

- What's your style goal? Large-cap or small-cap?
- Is transparency important?
- What's your trading activity like? Is liquidity very important? Do you have a lot of cash flows?
- Sometimes, it's just legacy.

Qualitative vs. Quantitative

Qualitative: Portfolio managers focus on intangibles (aspects that are not easily measured or quantified) and generally do not use computers, mathematics, or statistics to differentiate between the “good” and the “bad” stocks.

We call this “qualitative” although many practitioners call it “fundamental” portfolio management. This is because these managers will review fundamentals of the company, including income statements, balance sheets, and speak to company CEOs.

Qualitative vs. Quantitative

Qualitative: Portfolio managers focus on intangibles (aspects that are not easily measured or quantified) and generally do not use computers, mathematics, or statistics to differentiate between the “good” and the “bad” stocks.

We call this “qualitative” although many practitioners call it “fundamental” portfolio management. This is because these managers will review fundamentals of the company, including income statements, balance sheets, and speak to company CEOs.

What are some famous qualitative/ fundamentalist portfolio managers?

- [Peter Lynch](#) was an example of a famous fundamentalist. He managed the Fidelity Magellan fund.
- [Warren Buffett](#) is another example of a fundamentalist. He buys companies that he thinks are cheap after studying their financials (the [Benjamin Graham](#) philosophy).
 - Good Read on Buffett: “[Buffett: The Making of an American Capitalist](#)” by Roger Lowenstein.

Qualitative vs. Quantitative

Quantitative: Portfolio managers use mathematics, statistics to model and forecast security returns. Quantifiable data is used in these models, such as macroeconomic data, fundamental stock data, etc. These models are run through computer programs to identify the “good” and “bad” stocks. Information is filtered mathematically rather than intuitively.

- Less associated with individuals and more associated with great institutions or hedge funds.
- Examples include firms like Barclays Global Investors, State Street Investment Advisors, and Goldman Sachs Asset Management, as well as hedge funds such as Two Sigma, Citadel, point72, and Millennium.

Qualitative vs. Quantitative

Advantages	Quantitative	Qualitative
Objectivity		
Breadth		
Behavioral errors		
Replicability		
Costs		
Controlled risk		

Qualitative vs. Quantitative

Advantages	Quantitative	Qualitative
Objectivity	High	Low
Breadth		
Behavioral errors		
Replicability		
Costs		
Controlled risk		

Qualitative vs. Quantitative

Advantages	Quantitative	Qualitative
Objectivity	High	Low
Breadth	High	Low
Behavioral errors		
Replicability		
Costs		
Controlled risk		

Qualitative vs. Quantitative

Advantages	Quantitative	Qualitative
Objectivity	High	Low
Breadth	High	Low
Behavioral errors	Low	High
Replicability		
Costs		
Controlled risk		

Qualitative vs. Quantitative

Advantages	Quantitative	Qualitative
Objectivity	High	Low
Breadth	High	Low
Behavioral errors	Low	High
Replicability	High	Low
Costs		
Controlled risk		

Qualitative vs. Quantitative

Advantages	Quantitative	Qualitative
Objectivity	High	Low
Breadth	High	Low
Behavioral errors	Low	High
Replicability	High	Low
Costs	High	High
Controlled risk		

Qualitative vs. Quantitative

Advantages	Quantitative	Qualitative
Objectivity	High	Low
Breadth	High	Low
Behavioral errors	Low	High
Replicability	High	Low
Costs	High	High
Controlled risk	High	Low

Qualitative vs. Quantitative

Disadvantages	Quantitative	Qualitative
Qualitative inputs		
Historical data reliance		
Data mining		
Reactivity		

Qualitative vs. Quantitative

Disadvantages	Quantitative	Qualitative
Qualitative inputs	Low	High
Historical data reliance		
Data mining		
Reactivity		

Qualitative vs. Quantitative

Disadvantages	Quantitative	Qualitative
Qualitative inputs	Low	High
Historical data reliance	High	Low
Data mining		
Reactivity		

Qualitative vs. Quantitative

Disadvantages	Quantitative	Qualitative
Qualitative inputs	Low	High
Historical data reliance	High	Low
Data mining	High	Low
Reactivity		

Qualitative vs. Quantitative

Disadvantages	Quantitative	Qualitative
Qualitative inputs	Low	High
Historical data reliance	High	Low
Data mining	High	Low
Reactivity	Low	High

Question/s of the week

Question: On average, how many times must a 6-sided die be rolled until a 6 turns up?

$$\text{Answer: } N = 1 \cdot \frac{1}{6} + (1 + N) \cdot \left(\frac{5}{6}\right) \Rightarrow N = 6$$

Question: On average, how many times must a 6-sided die be rolled until a 6 turns up twice in a row?

$$\text{Answer: } N = 6 + 1 \cdot \frac{1}{6} + (1 + N) \cdot \left(\frac{5}{6}\right) \Rightarrow N = 42$$



Disclaimer

This course is for educational purposes only and does not offer investment advice or pre-packaged trading algorithms. The views expressed herein are not representative of any affiliated organizations or agencies. The main objective is to explore the specific challenges that arise when applying Data Science and Machine Learning techniques to financial data. Such challenges include, but are not limited to, issues like short historical data, non-stationarity, regime changes, and low signal-to-noise ratios, all of which contribute to the difficulty in achieving consistently robust results. The topics covered aim to provide a framework for making more informed investment decisions through a systematic and scientifically-grounded approach.

