STOCK PORTFOLIO PERFORMANCE DATASET ANALYSIS

With pandas (python)

Note: this file is available at: https://drive.google.com/drive/folders/1eleZFerp8ppp9HYBvx-h7rySVSuAtRIE?usp=sharing

Disclosure: User investments are subjected to market ricks. Nothing in this lecture should be considered as investment advice. Past performance is not necessarily indicative of future returns. **Stock portfolio dataset in this lecture is only taken as the general example to show, how one can do data analysis using pandas (in python).** I AM NOT REPOSIBLE FOR YOUR ANY KIND OF LOSS/PROFIT ON YOUR STOCKS RETURNS. Consider a financial adviser before investing or invest at your own risk.

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What is stock portfolio performance?

Portfolio? : Portfolio is a collection of financial investments like stocks, bonds, commodities, cash, and cash equivalents, including closed-end funds and exchange traded funds (ETFs)

Portfolio performance measures are a key factor in the investment decision. These tools provide the necessary information for investors to assess how effectively their money has been invested (or may be invested). Remember, portfolio returns are only part of the story. Without evaluating risk-adjusted returns, an investor cannot possibly see the whole investment picture, which may inadvertently lead to clouded decisions.

What Is Portfolio Return?

Portfolio return refers to the gain or loss realized by an investment portfolio containing several types of investments. Portfolios aim to deliver returns based on the stated objectives of the investment strategy, as well as the risk tolerance of the type of investors targeted by the portfolio.

A good return ? : As an individual investor can achieve returns on one's investments that beat the average investor's long-term average of around 5.5 percent, then that person is doing pretty well.

S&P 500 Index – Standard & Poor's 500 Index

The Standard and Poor's 500, or simply the S&P 500, is a free-float weighted measurement stock market index of 500 of the largest companies listed on stock exchanges in the United States. It is one of the most commonly followed equity indices.

The S&P 500 index is a capitalization-weighted index and the 10 largest companies in the index account for 27.5% of the market capitalization of the index. The 10 largest companies in the index, in order of weighting, are Apple Inc., Microsoft, Amazon.com, Facebook, Alphabet Inc. (class A & C), Tesla, Inc., Berkshire Hathaway, JPMorgan Chase & Co., and Johnson & Johnson

For a list of the components of the index, see List of S&P 500 companies.

S&P 500 Index – Standard & Poor's 500 Index (Conti.)

Where, a **stock index**, or **stock market index**, is an index that measures a stock market, or a subset of the stock market, that helps investors compare current price levels with past prices to calculate market performance.

And, **the free-float methodology** is a method of calculating the market capitalization of a stock market index's underlying companies. With the free-float methodology, market capitalization is calculated by taking the equity's price and multiplying it by the number of shares readily available in the market.

And also**, market capitalization** refers to the total dollar market value of a company's outstanding shares of stock. Commonly referred to as "market cap," it is calculated by multiplying the total number of a company's outstanding shares by the current market price of one share.

Lastly, **equity**, typically referred to as shareholders' equity (or owners' equity for privately held companies), represents the amount of money that would be returned to a company's shareholders if all of the assets were liquidated and all of the company's debt was paid off in the case of liquidation. In the case of acquisition, it is the value of company sale minus any liabilities owed by the company not transferred with the sale.

S&P 500 Index – Standard & Poor's 500 Index (Conti.)

What is a Stock Pick?

A **stock pick** is when an analyst or investor uses a systematic form of analysis to conclude that a particular stock will make a good investment and, therefore, should be added to their portfolio.

Calculating Portfolio Weight: To get the market value of a stock position, multiply the share price by the number of shares outstanding. If Apple is trading at $100, and 5.48 billion shares are outstanding, then Apple's total market capitalization is $548 billion. If the total market capitalization of the S&P 500 is $18.3 trillion, then Apple's weight by market capitalization in the S&P 500 is 3%, or $548 billion / $18.3 trillion x 100 = 3%. If one have its own portfolio, the total weight of a portfolio should equal 100%.

S&P 500 Index – Standard & Poor's 500 Index (Conti.)

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What Is Portfolio Weight?

Portfolio weight is the percentage of an investment portfolio that a particular holding or type of holding comprises. The most basic way to determine the weight of an asset is by dividing the dollar value of a security by the total dollar value of the portfolio.

	A	B	C	D	E	F	G	H
1		the weight of the stock-picking concept						
2	ID	Large B/P	Large ROE	Large S/P	Large Return Rate in the last quarter	Large Market Value	Small systematic Risk	Annual Return
3	1	1.000	0.000	0.000	0.000	0.000	0.000	1.95%

Weighting Formula and Calculation for the S&P 500

The S&P 500 uses a market capitalization weighting method, giving a higher percentage allocation to companies with the largest market capitalizations.

Company Weighting in S & P $= \dfrac{\text{Company market cap}}{\text{Total of all market caps}}$

Example: To get the market value of a stock position, multiply the share price by the number of shares outstanding. If Apple is trading at $100, and 5.48 billion shares are outstanding, then Apple's total market capitalization is $548 billion. If the total market capitalization of the S&P 500 is $18.3 trillion, then Apple's weight by market capitalization in the S&P 500 is 3%, or $548 billion / $18.3 trillion x 100 = 3%. If one have its own portfolio, the total weight of a portfolio should equal 100%.

Weighting Formula and Calculation for the S&P 500 (Conti.)

Determination of the weighting of each component of the S&P 500 begins with summing the total market cap for the index.

1. Calculate the total market cap for the index by adding all the market caps of the individual companies.

2. The weighting of each company in the index is calculated by taking the company's market capitalization and dividing it by the total market cap of the index.

3. For review, the market capitalization of a company is calculated by taking the current stock price and multiplying it by the company's outstanding shares.

4. Fortunately, the total market cap for the S&P, as well as the market caps of individual companies, is published frequently on financial websites, saving investors the need to calculate them.

About Dataset – Stock Portfolio Performance

The dataset of performances of weighted scoring stock portfolios are obtained with mixture design from the US stock market historical database.

Data Set Characteristics:	Multivariate	Number of Instances:	315	Area:	Business
Attribute Characteristics:	Real	Number of Attributes:	12	Date Donated	2016-04-22
Associated Tasks:	Regression	Missing Values?	N/A	Number of Web Hits:	82017

Dataset source (UCI Machine Learning Repository):
https://archive.ics.uci.edu/ml/datasets/Stock+portfolio+performance

Dataset download link, direct link: stock portfolio performance data set.xlsx

About Dataset – Stock Portfolio Performance (Conti.)

Dataset distribution (six sheets of excel file) –

- Sheet 1 – 4th period (65 rows, 63 Ids or stocks and 19 columns).

- Sheet 2 – 3rd period (65 rows, 63 Ids or stocks and 19 columns).

- Sheet 3 – 2nd period (65 rows, 63 Ids or stocks and 19 columns).

- Sheet 4 – 1st period (65 rows, 63 Ids or stocks and 19 columns).

- Sheet 5 – all period (65 rows, 63 Ids or stocks and 19 columns).

- Sheet 6 – Time frame (5 rows and 5 columns).

	A	B	C	D
1	Time-frame	The beginning time of the 1st holding period	The beginning time of the 20th holding period	The length of period
2	The all-period	1990/9/30	2010/6/30	80 quarters (20 years)
3	The 1st period	1990/9/30	1995/6/30	20 quarters (5 years)
4	The 2nd period	1995/9/30	2000/6/30	20 quarters (5 years)
5	The 3rd period	2000/9/30	2005/6/30	20 quarters (5 years)
6	The 4th period	2005/9/30	2010/6/30	20 quarters (5 years)

About Dataset – Stock Portfolio Performance (Conti.)

Data columns names (3 subsets – the weight of the stock-picking concept, the original investment performance indicator and the normalized investment performance indicator) (only in 4th, 3rd, 2nd, 1st and all period sheets) –

'ID', ' Large B/P ', ' Large ROE ', ' Large S/P ', ' Large Return Rate in the last quarter ', ' Large Market Value ', ' Small systematic Risk', 'Annual Return', 'Excess Return', 'Systematic Risk', 'Total Risk', 'Abs. Win Rate', 'Rel. Win Rate', 'Annual Return' (normalized), 'Excess Return' (normalized), 'Systematic Risk' (normalized), 'Total Risk' (normalized), 'Abs. Win Rate' (normalized), and 'Rel. Win Rate' (normalized).

About Dataset – Stock Portfolio Performance (Conti.)

Column 1 – ID: Id of each stock.

Column 2 – Large B/P: Book value to price (B/P). The book value literally means the value of a business according to its books or accounts, as reflected on its financial statements. Theoretically, it is what investors would get if they sold all the company's assets and paid all its debts and obligations. Therefore, book value is roughly equal to the amount stockholders would receive if they decided to liquidate the company. Mathematically, book value is the difference between a company's total assets and total liabilities. Book Value Formula –

Book value of a company = Total assets − Total liabilities

And then, the stock with the greatest (or smallest) value of B/P gets a grade value of 100 (or 0). The interpolation method is applied to the rest of stocks.

About Dataset – Stock Portfolio Performance (Conti.)

Column 3 – Large ROE: Return on Equity. Return on equity (ROE) is a measure of financial performance calculated by dividing net income by shareholders' equity. Because shareholders' equity is equal to a company's assets minus its debt, ROE is considered the return on net assets.

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Average Shareholders' Equity}}$$

And again, The stock with the greatest (or smallest) value of ROE gets a grade value of 100 (or 0). The interpolation method is also applied to the rest of stocks.

Column 4 – Large S/P: The price-to-sales (P/S) ratio is a valuation ratio that compares a company's stock price to its revenues. It is an indicator of the value that financial markets have placed on each dollar of a company's sales or revenues. Where, Revenue is the income generated from normal business operations and includes discounts and deductions for returned merchandise. It is the top line or gross income figure from which costs are subtracted to determine net income.

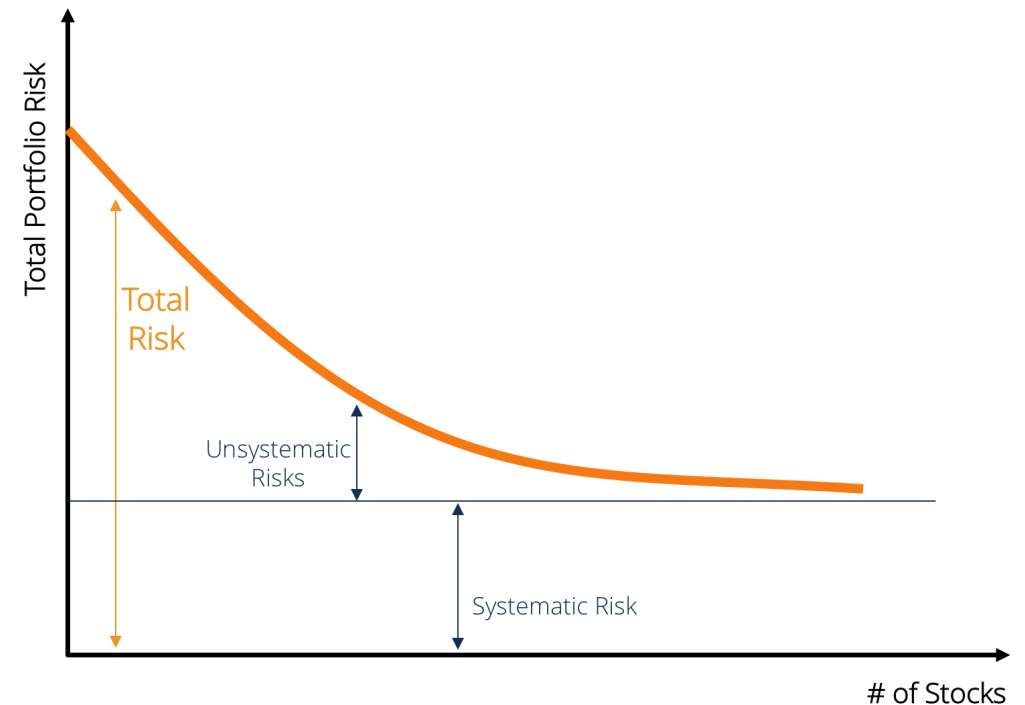# About Dataset – Stock Portfolio Performance (Conti.)

Column 5 – Large Rate Return in the last quarter: A rate of return (RoR) is the net gain or loss of an investment over a specified time period, expressed as a percentage of the investment's initial cost. When calculating the rate of return, you are determining the percentage change from the beginning of the period until the end. The formula to calculate the rate of return (RoR) is:

$$\text{Rate of return} = \left[\frac{(\text{Current value} - \text{Initial value})}{\text{Initial value}} \right] \times 100$$

Column 6 – Large Market Value: Market value (also known as OMV, or "open market valuation") is the price an asset would fetch in the marketplace, or the value that the investment community gives to a particular equity or business. A company's market value is a good indication of investors' perceptions about its business prospects. The range of market values in the marketplace is enormous, ranging from less than $1 million for the smallest companies to hundreds of billions for the world's biggest and most successful companies. Market value is determined by the valuations or multiples accorded by investors to companies, such as price-to-sales, price-to-earnings, and so on. The higher the valuations, the greater the market value.

About Dataset – Stock Portfolio Performance (Conti.)

Column 7 – Small systematic risk: Systematic risk refers to the risk inherent to the entire market or market segment. Systematic risk, also known as "undiversifiable risk," "volatility" or "market risk," affects the overall market, not just a particular stock or industry. Systematic risk is caused by factors that are external to the organization. All investments or securities are subject to systematic risk. Systematic risk includes market risk, interest rate risk, purchasing power risk, and exchange rate risk.

Total Risk = Systematic Risk + Unsystematic Risk

About Dataset – Stock Portfolio Performance (Conti.)

Systematic risk is that part of the total risk that is caused by factors beyond the control of a specific company, such as economic, political, and social factors. It can be captured by the sensitivity of a security's return with respect to the overall market return. This sensitivity can be calculated by the β (beta) coefficient. The β coefficient is calculated by regressing a security's return on market return. The estimated equation is given below:

$$R_p = \alpha + \beta R_M + \epsilon$$

$R_M = Market\ Return$

$R_P = Portfolio\ Return$

$\epsilon = Error\ Term$

R_S is the return on a particular security while R_M is the market return. It can be observed that β is the regression coefficient of R_S on R_M. The intercept term α shows a security's return independent of market return.

About Dataset – Stock Portfolio Performance (Conti.)

Column 8 – Annual Return: The annual return is the return that an investment provides over a period of time, expressed as a time-weighted annual percentage. Sources of returns can include dividends, returns of capital and capital appreciation.

Example Annual Return Calculation:

$$CAGR = \left(\left(\frac{\text{Ending Value}}{\text{Beginning Value}} \right)^{\frac{1}{\text{Years}}} \right) - 1$$

where:

$CAGR$ = compound annual growth rate

$Years$ = holding period, in years

About Dataset – Stock Portfolio Performance (Conti.)

Example – Consider an investor that purchases a stock on Jan. 1, 2000, for $20. The investor then sells it on Jan. 1, 2005, for $35 – a $15 profit. The investor also receives a total of $2 in dividends (A dividend is the distribution of some of a company's earnings to a class of its shareholders, as determined by the company's board of directors.) over the five-year holding period. In this example, the investor's total return over five years is $17, or (17/20) 85% of the initial investment. The annual return required to achieve 85% over five years follows the formula for the compound annual growth rate (CAGR):

$$\left(\left(\frac{37}{20} \right)^{\frac{1}{5}} \right) - 1 = 13.1\% \text{ annual return}$$

Column 9 – Excess Return: Excess returns will depend on a designated investment return comparison for analysis. Some of the most basic return comparisons include a riskless rate and benchmarks with similar levels of risk to the investment being analyzed. The term "excess returns" is used to denote how a fund has performed compared to a benchmark.

About Dataset – Stock Portfolio Performance (Conti.)

Computing Excess Returns –

Excess Returns = Total Return – Expected Return

Where,

Expected Return = Risk Free Rate + [Beta * Market Return Premium]

For illustrative purposes, consider the following information about a stock that Jason (an analyst) is evaluating. The stock is currently traded on the New York Stock Exchange (NYSE), whose headquarters are domiciled in the U.S. The U.S. 10-year Treasury rate is 3.5%, and the historical average yearly return for stocks in the US market is 8.5%. The beta of the respective stock is 1.5, which indicates that over the last two years, the return has been and is 1.5 times as volatile as the benchmark – S&P 500. The total return from the stock was 18.7%. To find out what the excess returns are, Jason must first compute the stock's expected return following the Capital Asset Pricing model and then find the excess returns. The expected return can be calculated as:

About Dataset – Stock Portfolio Performance (Conti.)

Expected Return = Risk Free Rate + [Beta * Market Return Premium]

= 3.5% + [1.5 * 8.5%]

= 16.25%

The excess returns can be computed as:

Excess Returns = Total Return – Expected Return

= 18.7% – 16.25%

= 2.45%

Column 10 – Systematic Risk: Original systematic risk.

Column 11 – Total Risk: Risk is defined in financial terms as the chance that an outcome or investment's actual gains will differ from an expected outcome or return. Risk includes the possibility of losing some or all of an original investment. In general, financial theory classifies investment risks affecting asset values into two categories: systematic risk and unsystematic risk.

About Dataset – Stock Portfolio Performance (Conti.)

Total Risk = Systematic risk + unsystematic risk

Column 12 – Abs. Win Rate: Absolute Win Rate. Win rate refers to the rate at which a sales team turns opportunities into customers. It can be calculated by dividing the number of opportunities a team have won by the total number of opportunities that have been generated. Also, (according to investopedia) The win/loss ratio is the ratio of the total number of winning trades to the number of losing trades. It does not take into account how much was won or lost, but simply if they were winners or losers. The win/loss ratio can also be stated as winning trades : losing trades. The win/loss ratio is also known as the "success ratio". The formula for Win/Loss Ratio is –

$$\text{Win/loss ratio} = \frac{\text{Wins}}{\text{Losses}}$$

Column 13 – Rel. Win Rate: Relative win rate.

Column 14, 15, 16, 17, 18 and 19 have normalized values of annual return, excess return, systematic risk, total risk, absolute win rate and relative win rate.

References

- Lecture drive link: https://drive.google.com/drive/folders/1eleZFerp8ppp9HYBvx-h7rySVSuAtRIE?usp=sharing
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THANKS FOR UR PRECIOUS TIME! ☺

- Questions? 🗣 💬

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Thank you