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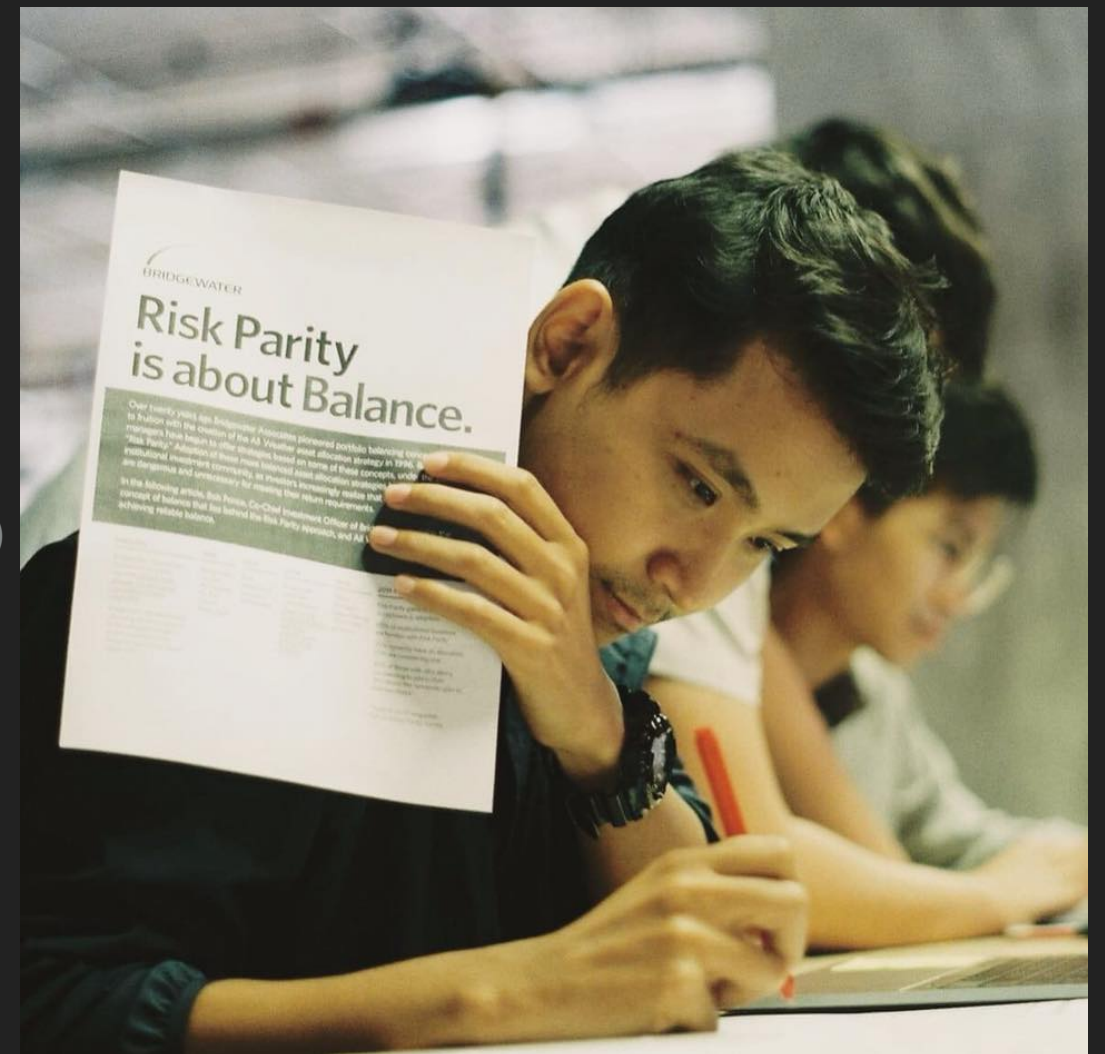
FINDING ALPHA

PYTHON & TALIB

TANAPAT KAMSAIIN Data Scientist @AVA Alpha

PROFILE

- ▶ Big data engineering @DPU
- ▶ Investment consultant @FNSYRUS
- ▶ Proprietary trader 2 years
- ▶ Data Scientist @AVA Alpha Team (present)
- ▶ Founder @PopQuants



PROFILE [LINKEDIN.COM](#)



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MarketAnyware



Dhurakij Pundit University

WHY ALGORITHMIC TRADING

- ▶ Expert Advisors (EA)
- ▶ AI Trading
- ▶ Robot trading
- ▶ High frequency Trading (HFT)
- ▶ Copy Trading

WHY ALGORITHMIC TRADING

▶ Pros:

- ▶ Minimize emotional trading
- ▶ Allows for backtesting
- ▶ Preserves the trader's discipline
- ▶ Improve your order speed
- ▶ Allows multiple accounts
- ▶ 24/7 Trading hour

▶ Cons:

- ▶ Mechanical failures can happen
- ▶ Requires the monitoring of functionality
- ▶ Requires more data
- ▶ Can perform poorly
- ▶ Overfitting

ALGORITHMIC TRADING STRATEGIES

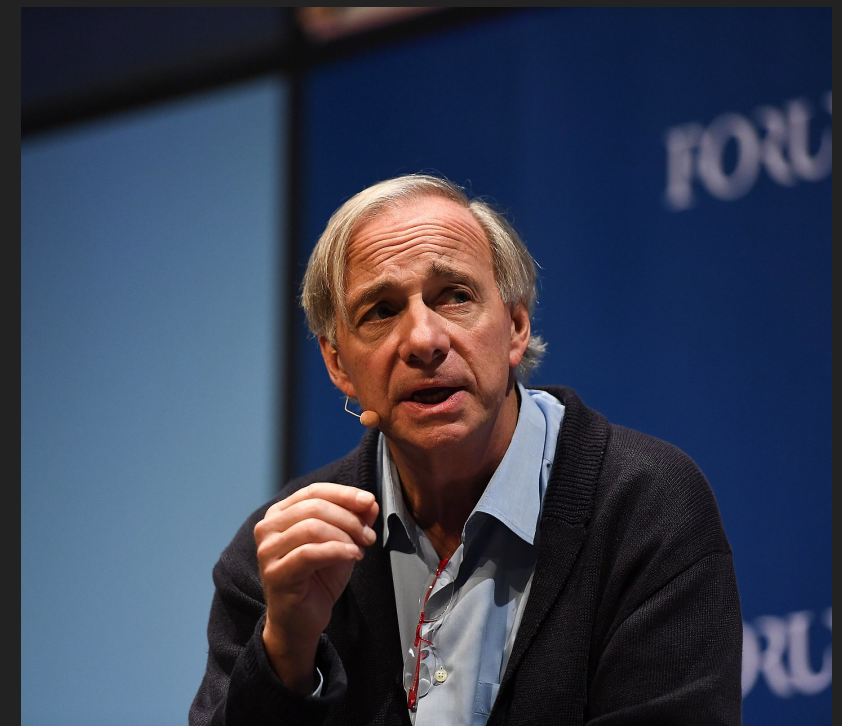
- ▶ Trend-following Strategies
- ▶ Arbitrage Opportunities
- ▶ Index Fund Rebalancing
- ▶ Mathematical Model-Based Strategies
- ▶ Trading Range (Mean Reversion)
- ▶ Volume-weighted Average Price (VWAP)
- ▶ Percentage of Volume
- ▶ High Frequency Trading (HFT)
- ▶ Etc.

ALGORITHMIC TRADING STRATEGIES : EXAMPLES

- ▶ Trend-following Strategies
- ▶ Index Fund Rebalancing
- ▶ Mathematical Model-Based Strategies
- ▶ Trading Range (Mean Reversion)
- ▶ Technical Analysis [Exercise]

RAY DALIO: BRIDGE WATER MOST SUCCESSFUL HEDGE FUND

- ▶ *Portfolio Return = Cash + Beta + Alpha*
- ▶ Risk parity & All weather Strategy



Ray Dalio : Bridge Water
Association, Principle Author.

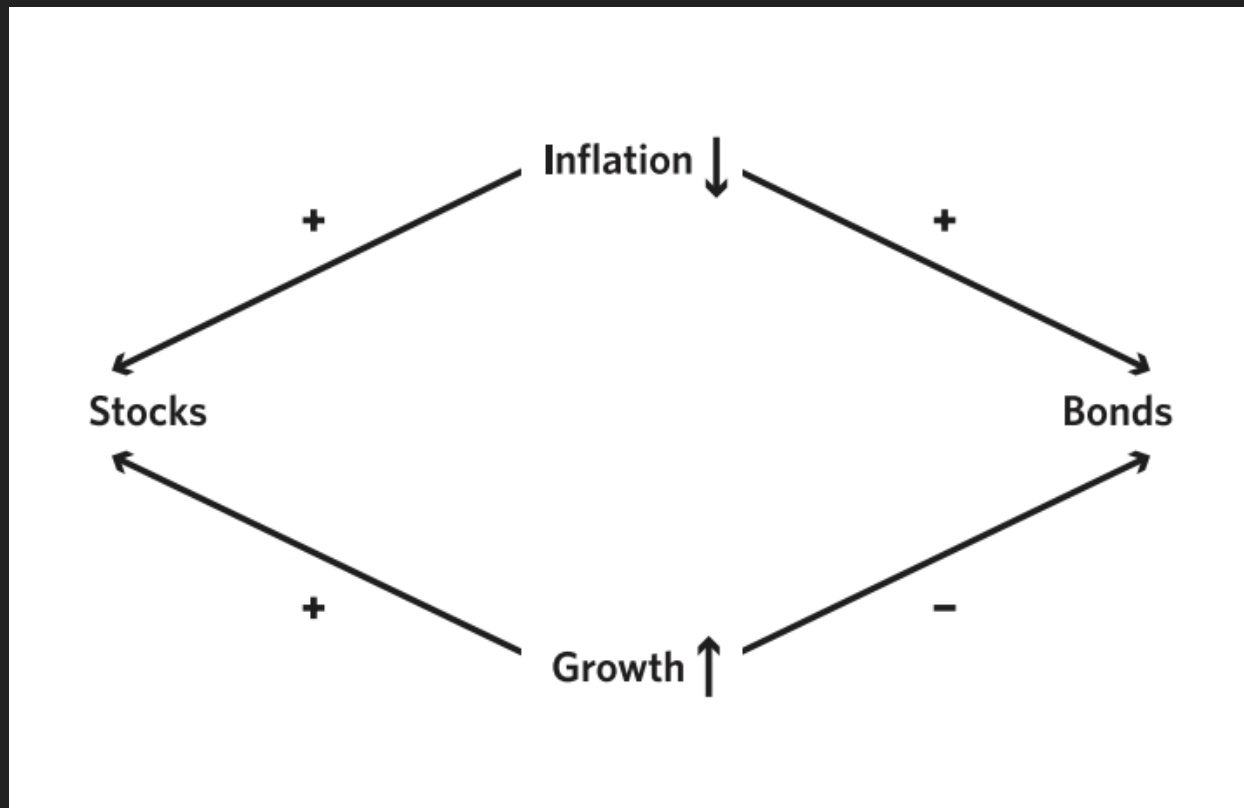
RISK PARITY

BRIDGEWATER

Risk Parity is about Balance.

Over twenty years ago Bridgewater Associates pioneered portfolio balancing concepts that came to fruition with the creation of the All Weather asset allocation strategy in 1996. Recently, several managers have begun to offer strategies based on some of these concepts, under the banner of “Risk Parity.” Adoption of these more balanced asset allocation strategies has surged in the institutional investment community, as investors increasingly realize that concentrated portfolios are dangerous and unnecessary for meeting their return requirements.

RISK PARITY



	Growth	Inflation
Rising	25% of risk	25% of risk
Falling	25% of risk	25% of risk

WHAT IS BETA

- ▶ A stock that swings more than the market over time has a beta greater than 1.0 = **High Beta**
- ▶ A stock beta is less than 1.0 = **Low Beta**
- ▶ High-Beta tend to be Riskier but provide the potential for higher returns; Low-Beta stocks pose less risk but typically yield lower returns.
- ▶ A stock beta 1.0 = Mr. Market

BETA CALCULATE

```
: # Import statsmodels library
import statsmodels.api as sm

# Create a regression model
reg = sm.OLS(data.daily_amazon_returns,
             data.daily_spy_returns)

# Fit the model
results = reg.fit()

# Print the beta of Amazon
print('Beta of Amazon: %.2f' % results.params[0])
```

Beta of Amazon: 1.87

Regression Method : Ordinary least square (OLS)

Syntax:

OLS(y,x)

In our case,

y = daily_amazon_returns

x = daily_spy_returns

$$\beta_i = \frac{\text{Covariance}(R_i, R_m)}{\text{Variance}(R_m)}$$

where,

β_i = Beta of the asset

R_i = Returns of the asset

R_m = Returns of the market

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```
In [26]: # Import the numpy library
import numpy as np

# Calculate the covariance of Amazon and S&P500.
Covariance = np.cov(data.daily_amazon_returns,
                   data.daily_spy_returns)[0][1]

# Calculate the variance of S&P500
Variance = np.var(data.daily_spy_returns)

# Print the beta of Amazon
print('Beta of Amazon: %.2f' % (Covariance / Variance))
```

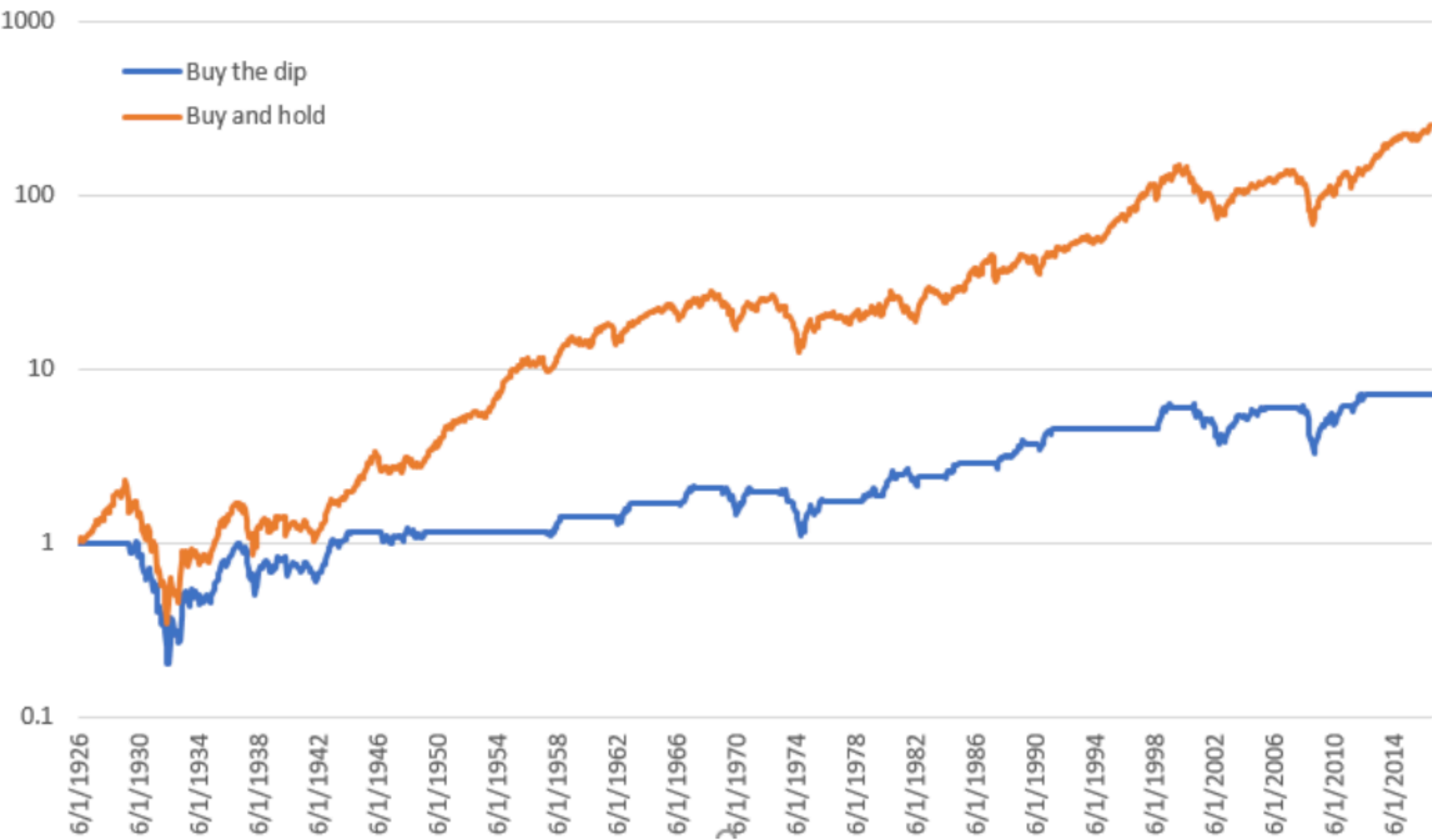
Beta of Amazon: 1.87

Variance-covariance Method

BUY AND HOLD STRATEGY

- ▶ Buy & Hold is a passive investment strategy in which an investor buys stocks and holds them for a long period.

Cumulative Excess Return (Log Scale)



HOW TO CALCULATE BETA FOR A PORTFOLIO

- ▶ Ex. Portfolio has 3 stocks A, B and C with portfolio weights as 10%, 30%, and 60% respectively. The beta of these three stocks is 1.1, 1.3 and 0.8
- ▶ The portfolio beta will be:
- ▶ ***Portfolio beta = $1.1 * 10\% + 1.3 * 30\% + 0.8 * 60\% = 0.98$***

ALPHA

- ▶ Alpha, also known as “Excess return” or “Abnormal rate of return”
- ▶ Is one of the most widely used measures of risk-adjusted performance. The number shows how much better or worse a fund performed relative to a benchmark.

Alpha is a measure of how well an investment performed compared to its benchmark.

ALPHA: HOW IT WORKS?

- ▶ Let's assume you are a Portfolio manager who expects portfolio return 15% next year. And the portfolio actually returns 16%
- ▶ The Alpha of the Portfolio : $\text{actual} - \text{expect} = \text{Alpha}$
- ▶ Alpha : $16\% - 15\% = 1\%$

ALPHA + CAPITAL ASSET PRICING MODEL (CAPM)

- ▶ $r = R_f + \text{beta} * (R_m - R_f) + \text{Alpha}$
- ▶ **Where:**
- ▶ r = security's portfolio's return
- ▶ R_f = Risk free rate of return (10 year Bond)
- ▶ beta = Security's or portfolio's price volatility relative to the overall market
- ▶ R_m = The market return