Risk and Return Tools: Understanding Investment Performance Metrics

Welcome to Week 4. This presentation explores the essential metrics and tools used to evaluate investment performance through the lens of risk and return. We'll examine how these metrics help investors make informed decisions by quantifying the relationship between potential rewards and the risks taken to achieve them.

The Relationship Between Risk and Return

The fundamental principle of investing is that higher returns typically require taking on greater risk. This risk-return tradeoff forms the foundation of modern portfolio theory.

Investors are compensated for taking on additional risk through the potential for higher returns. This relationship is not always linear but tends to hold across different asset classes and time periods.

- Low risk assets (cash, T-bills) offer lower expected returns
- Medium risk assets (bonds, blue-chip stocks) offer moderate returns
- High risk assets (small caps, emerging markets) offer higher potential returns

Standard Deviation and Volatility

What is Standard Deviation?

Standard deviation measures the dispersion of returns around the average (mean) return. It quantifies how much an investment's performance varies from its expected outcome.

Interpreting Volatility

Higher standard deviation indicates greater volatility and risk. For example, a fund with 15% standard deviation is more volatile than one with 10%.

Practical Application

Investors use standard deviation to compare the relative risk of different investments and to determine if the potential return justifies the volatility.

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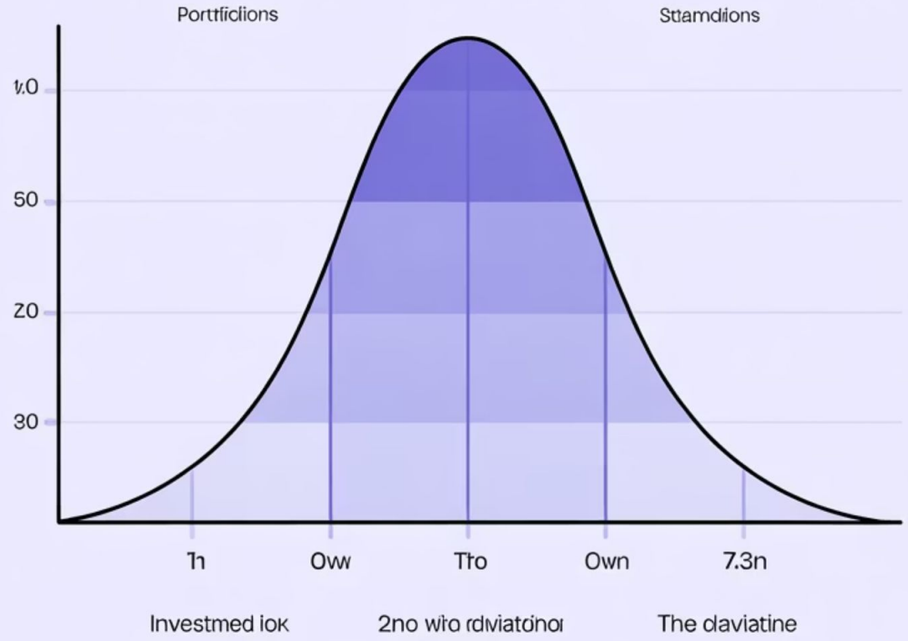
Understanding portfolio risk,



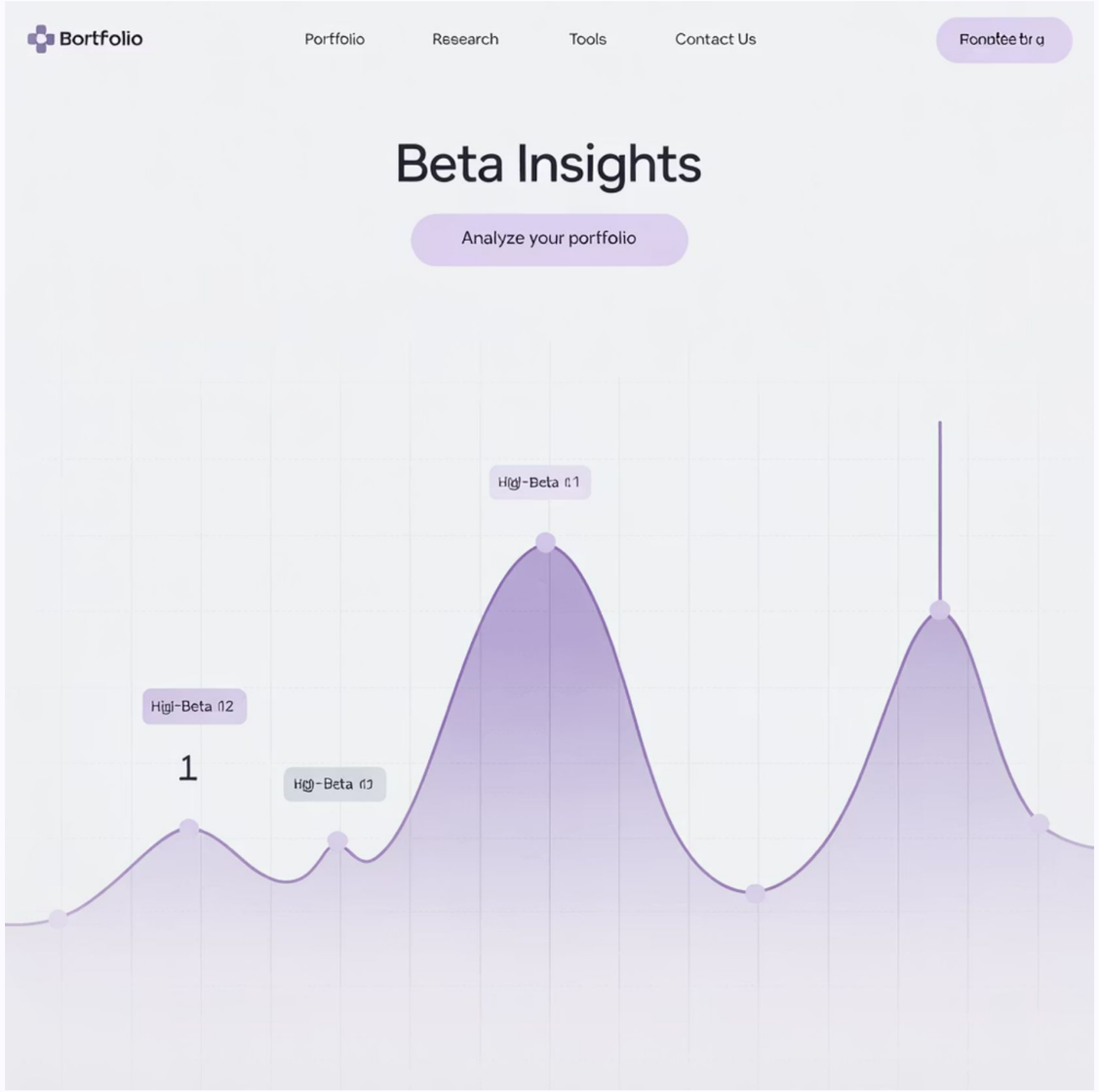
Beta: Measuring Market Risk

Definition

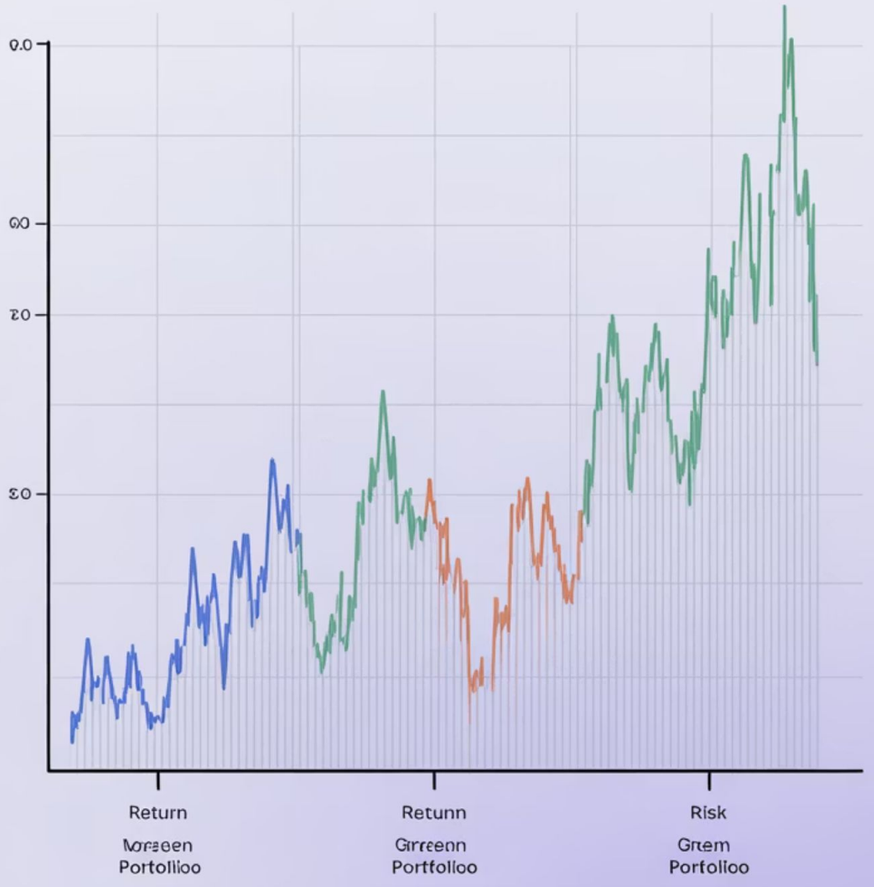
Beta measures an investment's sensitivity to market movements, typically relative to a benchmark like the S&P 500.

- β = 1: Moves in line with the market
- β > 1: More volatile than the market
- β < 1: Less volatile than the market
- Negative β: Moves opposite to the market

Beta helps investors understand systematic risk—the risk that cannot be diversified away.



Investment Portfolio Comparison



Sharpe Ratio: Risk-Adjusted Return

Formula

Sharpe Ratio = (Return of Portfolio - Risk-Free Rate) / Standard Deviation of Portfolio

Interpretation

Higher Sharpe ratios indicate better risk-adjusted performance. A ratio of 1 is considered good, above 2 is very good, and 3+ is excellent.

Application

The Sharpe ratio allows investors to compare investments with different risk profiles on an equal footing.

Alpha and Tracking Error

Alpha (α)

Alpha measures an investment's excess return relative to its benchmark, after adjusting for beta risk.

- Positive alpha: Outperformed risk-adjusted expectations
- Negative alpha: Underperformed risk-adjusted expectations

Alpha is often used to evaluate active manager skill.

Tracking Error

Tracking error measures how closely a portfolio follows its benchmark, calculated as the standard deviation of the difference in returns.

- Low tracking error: Closely follows benchmark
- High tracking error: Significant deviation from benchmark

Limitations of Traditional Metrics

1 Assumption of Normal Distribution

Many risk metrics assume returns follow a normal distribution, but real-world returns often exhibit fat tails and skewness, underestimating extreme events.

2 Backward-Looking Nature

Historical data may not be predictive of future performance, especially during regime changes or market disruptions.

3 Benchmark Dependency

Metrics like beta and alpha are highly dependent on the chosen benchmark, which may not always be appropriate for the investment strategy.

4 Time Period Sensitivity

Results can vary significantly based on the time period selected, potentially leading to misleading conclusions.

Interpreting Metrics in Portfolio Analysis

Combine Multiple Metrics

No single metric tells the complete story. Use a combination of risk and return measures to gain a comprehensive understanding.

Consider Investment Objectives

Interpret metrics in the context of specific investment goals, time horizons, and risk tolerance levels.

Evaluate Consistency

Look for consistency in performance across different market environments and time periods.

Supplement with Qualitative Analysis

Complement quantitative metrics with qualitative factors like investment process, team stability, and organizational structure.