Sharpe Ratio: Definition, Formula, and Examples

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Understanding the Sharpe Ratio

The Sharpe ratio is a metric that compares an investment's return to its risk. It helps investors understand if higher returns are due to smart investing or simply taking on more risk.

How It Works:

1. **Numerator**: The difference between the investment's returns and a benchmark (like the risk-free rate or an index). This shows the "excess return."
2. **Denominator**: The standard deviation of the investment's returns over the same period. This measures the investment's volatility or risk.

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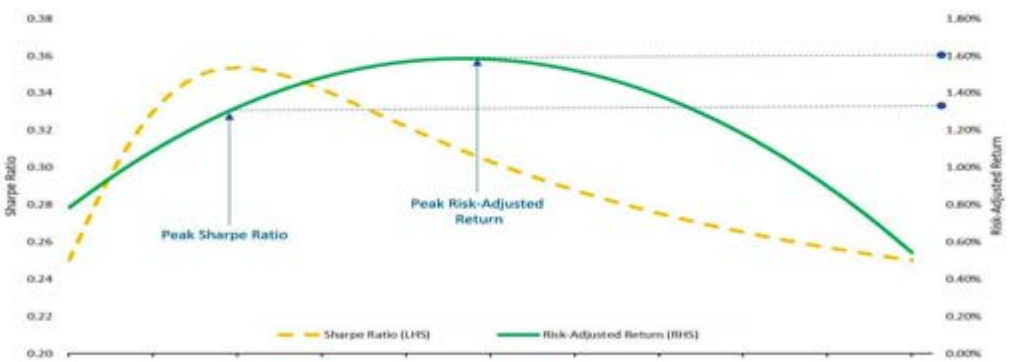
Who created the Sharpe Ratio?

- Proposed by economist **William F. Sharpe** in 1966.
- Developed from his work on the **capital asset pricing model (CAPM)**.
- Originally called the **reward-to-variability ratio**.
- Sharpe won the **Nobel Prize in Economics** in 1990 for his contributions to CAPM.
- By using the Sharpe ratio, investors can make more informed decisions about the risk and return of their investments.



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KEY TAKEAWAYS 

- The Sharpe ratio divides a portfolio's excess returns by a measure of its volatility to assess risk-adjusted performance
- Excess returns are those above an industry benchmark or the risk-free rate of return
- The calculation may be based on historical returns or forecasts
- A higher Sharpe ratio is better when comparing similar portfolios.
- The Sharpe ratio has inherent weaknesses and may be overstated for some investment strategies.

Formula and Calculation of the Sharpe Ratio

In its simplest form,

$$Sharpe\ Ratio = \frac{R_p - R_f}{\sigma_p}$$

where:

R_p = return of portfolio

R_f = risk-free rate

σ_p = standard deviation of the portfolio's excess return

Calculation Steps:

1. Calculate the Average Return:

1. Subtract the risk-free rate (Rf) from the return (Rp) for each period.
2. Find the average of these differences over the total period (e.g., 10 years).

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What the Sharpe Ratio Can Tell You

- Measures risk-adjusted returns
- Compares fund performance to a benchmark
- Accounts for return volatility
- Uses risk-free rate as baseline
- Assesses excess returns relative to risk
- Utilizes standard deviation to measure volatility

This metric helps investors evaluate investment quality by balancing returns with associated risk. Generally, the higher the Sharpe ratio, the more attractive the risk-adjusted return.

Portfolio underperforms risk-free rate or has negative expected returns.

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Sharpe Ratio Pitfalls 

Potential for manipulation: Lengthening measurement intervals reduces volatility estimate, using monthly returns is typically used for accuracy

Risk assessment issues: Assumes normal distribution of returns, may understate tail risk in herding-prone markets

Serial correlation effects: Adjacent time intervals may be correlated can artificially lower volatility, inflating the Sharpe ratio

"Picking up nickels" problem: Strategies with steady small gains but rare catastrophic losses, may show misleadingly high Sharpe ratios until a major loss occurs

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Sharpe Ratio Alternatives

Sortino Ratio
Focuses on downside risk· Uses negative returns in denominator· Better for asymmetric return distributions

Treynor Ratio
Uses beta instead of standard deviation· Measures excess return per unit of systematic risk· Evaluates compensation for market-related risk

These alternatives address Sharpe ratio limitations, offering more nuanced risk-adjusted performance measures.

Good Sharpe Ratio

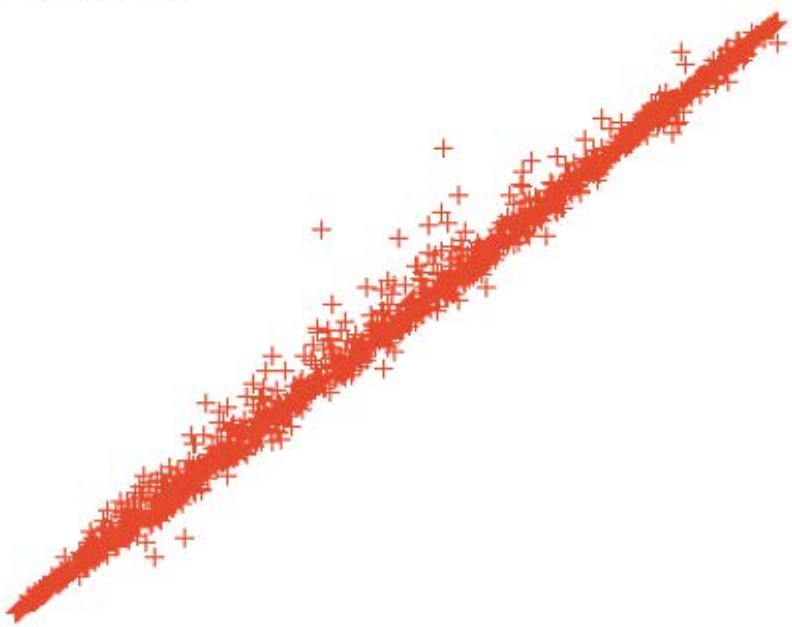
- Generally, above 1 is considered good
- Indicates excess returns relative to volatility
- Best evaluated by comparing with peers or sector averages
- Context-dependent: A "good" ratio varies based on market conditions and comparable investments

	1 Year	3 Years	5 Years	10 Years	15 Years	20 Years
	(%)	(% p.a.)	(% p.a.)	(% p.a.)	(% p.a.)	(% p.a.)
S&P/ASX 200	0.59	0.58	0.5	0.5	0.62	0.44
S&P/ASX 20	0.65	0.65	0.57	0.47	0.6	0.47
S&P/ASX 50	0.67	0.67	0.53	0.49	0.62	0.46
S&P/ASX Small Ordinaries	0.31	0.06	0.24	0.33	0.38	0.21
S&P/ASX MidCap 50	0.32	0.48	0.52	0.63	0.65	0.46
As at 29/02/2024						

Bottom Line

The Sharpe ratio is useful for comparing similar investments, such as mutual funds and ETFs tracking the same index.

However, investors should note that investments with higher Sharpe ratios can be more volatile.



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