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CFA Level I Formula Sheet

This formula sheet is a compilation of key formulas and concepts frequently encountered in CFA exams, designed to streamline your study process and enhance your understanding. By consolidating essential formulas from various topics like Quantitative Methods, Statistics, Financial Analysis, and Portfolio Management, this resource is a quick reference guide during your exam preparations.

Remember, while memorization is helpful, a deep understanding of these concepts and their applications is crucial for success on CFA exams. Consider using Kaplan Schweser's study products to gain a comprehensive grasp of these topics and prepare for a CFA exam.

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Time Value of Money

In this section, you'll explore the foundational formulas of Time Value of Money (TVM), including those for future value, present value, annuities, and perpetuities. We'll break down each formula, define its components, and illustrate the key relationships that govern them. By mastering these formulas, you'll be equipped to tackle a variety of TVM problems with confidence.

Formulas

Future Value of Lump Sum

$FV = PV(1 + i)^n$
$FV_n = PV_0 \left(1 + \frac{i}{m} \right)^{mn}$
(with non-annual compounding)

Effective Annual Rate

$EAR = \left(1 + \frac{i}{m} \right)^m - 1 $

Present Value of Lump Sum

$PV = \frac{FV_n}{(1 + i)^n}$

Perpetuity

$PV = \frac{PMT}{i}$ (with end of period payments)

Definitions

- **FV** = Future Value
- **PV** = Present Value
- **PMT** = Payment
- **i** = interest rate per period
- **n** = number of periods
- **m** = compounding periods per year

Key Relationships

Interest Rate and Present Value: PV and interest rates have an inverse relationship. As interest rates increase, present value decreases, and vice versa.

Interest Rate and Future Value: FV and interest rates have a direct relationship. As interest rates increase, future value increases, and vice versa.

Number of Periods and Present Value: PV and the number of periods have an inverse relationship. As the number of periods increases, present value decreases.

Number of Periods and Future Value: FV and the number of periods have a direct relationship. As the number of periods increases, future value increases.

Compounding Frequency and Effective Annual Rate: For a given nominal rate, the effective annual rate increases as the compounding frequency increases.

Annuity Due vs. Ordinary Annuity: The future value of an annuity due is always greater than the future value of an ordinary annuity, assuming the same payments, interest rate, and number of periods. This is because each payment in an annuity due occurs one period earlier, allowing for an additional period of compounding.

Perpetuity and Interest Rate: The present value of a perpetuity is inversely related to the interest rate. As the interest rate increases, the present value of the perpetuity decreases.

Statistics

Statistics are a cornerstone of financial analysis. This section provides information to help you understand data distributions, central tendency, and dispersion, enabling you to make informed decisions and draw meaningful conclusions.

We'll introduce key statistical measures such as mean, median, mode, range, standard deviation, and variance, along with clear explanations and practical examples. By mastering these concepts, you'll be prepared to analyze data effectively and confidently approach the quantitative challenges of the CFA exams.

Formulas

Population mean

$\mu = \Sigma X / N$

Sample mean

$x = \Sigma x / n$

Population variance

$\sigma^2 = \Sigma(X - \mu)^2 / N$

Sample variance

$s^2 = \Sigma(x - x)^2 / (n - 1)$

Population standard deviation

$\sigma = \sqrt{\sigma^2}$

Sample standard deviation

$s = \sqrt{s^2}$

Definitions

μ (mu): Represents the population mean.
x (x-bar): Represents the sample mean.
Σ (Sigma): Denotes summation, or the adding together of values.
X: Represents an individual value or observation in a population.
x: Represents an individual value or observation in a sample.
N: Represents the total number of observations or individuals in a population.
n: Represents the total number of observations or individuals in a sample.
σ^2 (sigma squared): Represents the population variance.
s^2 (s squared): Represents the sample variance.
σ (sigma): Represents the population standard deviation.
s: Represents the sample standard deviation.

Key Relationships

Mean, Median, and Mode: In a symmetrical distribution, the mean, median, and mode are equal. In a skewed distribution, they will differ.

Range and Standard Deviation: Both measure dispersion, but the standard deviation is more informative as it considers all data points, while range only uses the minimum and maximum values.

Variance and Standard Deviation: Standard deviation is the square root of variance. Variance measures the average squared deviation from the mean, while standard deviation measures the average deviation from the mean.

Sample vs. Population: Formulas for sample variance and standard deviation use (n - 1) in the denominator to provide an unbiased estimate of the population parameters.

Financial Analysis

Transitioning from statistical foundations, we now explore the realm of financial analysis, a critical topic for evaluating a company's performance and financial health. This section provides essential formulas to dissect financial statements, interpret key ratios, and assess a company's profitability, liquidity, and solvency.

We'll introduce fundamental financial ratios, including those for leverage, liquidity, efficiency, and profitability, and provide insights into their significance and interpretation. By mastering these concepts, you'll gain the ability to analyze financial data effectively, enabling you to make informed investment decisions and confidently navigate the CFA exams.

Formulas

Debt-to-equity ratio

D/E = Total Debt / Total Equity

Current ratio

Current Ratio = Current Assets / Current Liabilities

Return on equity (ROE)

ROE = Net Income / Shareholders' Equity

Definitions

D/E: Represents the debt-to-equity ratio, a measure of a company's financial leverage.
D: Represents total debt, which includes all of a company's short-term and long-term debt obligations.
E: Represents total equity, which is the value of a company's assets minus its liabilities. It represents the shareholders' ownership interest in the company.
ROE: Represents return on equity, a measure of a company's profitability that shows how much profit a company generates with the money shareholders have invested.

Key Relationships

A high D/E ratio indicates that a company has a high level of financial leverage, which can be risky.

A low current ratio may indicate that a company is having difficulty paying its short-term obligations.

A high ROE is generally desirable, as it indicates that a company is generating a good return for its shareholders.

Portfolio Management

Moving on from company-level analysis, we now explore the principles of portfolio management, a critical aspect of optimizing investment strategies and managing risk. This section equips you with the tools to construct diversified portfolios, evaluate risk-adjusted returns, and understand the interplay between asset allocation and portfolio performance.

We'll introduce key portfolio management concepts such as Modern Portfolio Theory, the Capital Asset Pricing Model, and performance evaluation measures. By mastering these concepts, you'll be empowered to make informed investment decisions and build portfolios that align with your risk tolerance and return objectives, confidently tackling the portfolio management challenges of the CFA exams.

Formulas

Expected return of a portfolio

$E(Rp) = \Sigma wi * E(Ri)$

Portfolio variance

$\sigma p^2 = \Sigma i \Sigma j \, wiwjCov(Ri, Rj)$

Sharpe ratio

Sharpe ratio = (Rp - Rf) / σp

Definitions

E(Rp): Represents the expected return of a portfolio.
wi: Represents the weight of asset i in the portfolio.
E(Ri): Represents the expected return of asset i.
σp^2: Represents the portfolio variance, a measure of the portfolio's risk.
Cov(Ri, Rj): Represents the covariance between returns on assets i and j.
Sharpe ratio: Represents the risk-adjusted return of a portfolio, calculated as the portfolio's excess return over the risk-free rate divided by the portfolio's standard deviation.
Rp: Represents the portfolio return.
Rf: Represents risk-free returns.
σp: Represents the portfolio standard deviation, a measure of the portfolio's total risk.

Key Relationships

The expected return of a portfolio is a weighted average of the expected returns of its individual assets.

The variance of a portfolio depends on the weights of the assets, their individual variances, and the covariances between their returns.

The Sharpe ratio measures the excess return per unit of risk, with a higher Sharpe ratio indicating a better risk-adjusted performance.

Was This Information Helpful?