



B.Com Honours

Semester V

Calicut University

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Course Code: COM5EJ302 • Module 4 Notes

Module IV: Portfolio Management, Selection, & Performance Evaluation

Covers Markowitz diversification model, Efficient Frontier, Capital Asset Pricing Model (CAPM), Sharpe Ratio, Treynor Ratio, and Jensen's Alpha performance measures.

Unit 15: Portfolio Analysis & Markowitz Diversification Model

Portfolio Expected Return: $(E(R_p) = w_1 E(R_1) + w_2 E(R_2))$.

Portfolio Risk (σ_p) with 2 assets:

$$\sigma_p = \sqrt{w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 \sigma_1 \sigma_2 \rho_{12}}$$

Risk reduction is maximized when correlation ($\rho_{12} = -1$).

Unit 16: Portfolio Selection, Efficient Frontier, & CAPM

Efficient Frontier represents set of portfolios offering maximum expected return for given risk level.
Capital Asset Pricing Model (CAPM) SML Equation:

$$\text{Capital Asset Pricing Model CAPM: } E(R_i) = R_f + \beta_i [E(R_m) - R_f]$$

Unit 17: Portfolio Performance Evaluation Measures

- Sharpe Ratio (Total Risk):** $(S_p = \frac{R_p - R_f}{\sigma_p})$
- Treynor Ratio (Systematic Risk):** $(T_p = \frac{R_p - R_f}{\beta_p})$
- Jensen's Alpha (Risk-Adjusted Excess Return):** $(\alpha_p = R_p - [R_f + \beta_p (R_m - R_f)])$

Practical Problem 2 (CAPM Expected Return & Sharpe / Treynor / Jensen Performance Ratios): Portfolio A reports Actual Average Return ($R_p = 18\%$), Standard Deviation ($\sigma_p = 15\%$), and Portfolio Beta ($\beta_p = 1.20$). Risk-Free Rate (R_f) = 6% p.a., Expected Market Return (R_m) = 14% p.a., Market Standard Deviation (σ_m) = 10%.

Calculate (a) CAPM Required Expected Return, (b) Sharpe Ratio, (c) Treynor Ratio, and (d) Jensen's Alpha.

Step-by-Step Solved Portfolio Performance Evaluation Statement:

- 1. CAPM Required Expected Return ($E(R_p)$):**
 $E(R_p) = R_f + \beta_p [E(R_m) - R_f] = 6\% + 1.20 \times (14\% - 6\%) = 6\% + 9.6\% = \mathbf{15.6\%}$
- 2. Sharpe Ratio (S_p):**
 $S_p = \frac{R_p - R_f}{\sigma_p} = \frac{18\% - 6\%}{15\%} = \frac{12\%}{15\%} = \mathbf{0.80}$ quad (ext{Market Sharpe } = $\frac{14\% - 6\%}{10\%} = 0.80$)
- 3. Treynor Ratio (T_p):**
 $T_p = \frac{R_p - R_f}{\beta_p} = \frac{18\% - 6\%}{1.20} = \frac{12\%}{1.20} = \mathbf{10.00\%}$ quad (ext{Market Treynor } = $\frac{14\% - 6\%}{1.0} = 8.00\%$)
- 4. Jensen's Alpha (α_p):**

$\alpha_p = R_p - E(R_p) = 18\% - 15.6\% = \mathbf{+2.40\%}$ quad (ext{Superior Portfolio Management!})

Portfolio Evaluation Summary Table:

Performance Metric	Portfolio Output Value	Market Benchmark Value	Evaluation Assessment
CAPM Required Return	15.60%	14.00%	Actual (18%) Exceeds CAPM Required
Sharpe Ratio (S _p)	0.80	0.80	Matches Market Total Risk Efficiency
Treynor Ratio (T _p)	10.00%	8.00%	Outperforms Market Systematic Risk
Jensen's Alpha (α _p)	+2.40%	0.00%	Positive Excess Alpha Generated

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