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Portfolio Management

2015 CFA一级知识框架图

Reading 42 & 43

Portfolio Risk and Return

重点 & 难点

核心思想

Asset allocation： Efficient frontier $+R_f$ → CAL → (identical expectations) → CML

Pricing (return)： CAPM (SML)

Markowitz Modern portfolio theory★★ 计算、性质

Assumption		✓ Each investment can be measured by expected returns and Risk, which is measured in terms of variance (or standard deviation); ✓ Investors make their decision only based on expected return, standard deviation and covariance; ✓ Utility maximization; ✓ Risk averse.
推导	Portfolio diversification	$E(r_p)=\sum_{i=1}^{n} w_i E(R_i)$ $\sigma_P=\sqrt{\sigma_P^2}=\sqrt{\sum_{i=1}^{n} w_i^2\sigma_i^2+\sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j Cov_{i,j}}$ 特殊的(要求计算)：$\sigma_p^2 = w_1^2\sigma_1^2+w_2^2\sigma_2^2+2w_1w_2\sigma_1\sigma_2\rho_{1,2}$
		1. n越大, Correlation越小 → diversification benefit越大 2. $\rho_{1,2}$=1, $\sigma_p = w_1\sigma_1+w_2\sigma_2$, 两个资产组合E(R)和σ在一条直线上, σ_p最大; $\rho_{1,2}$=-1, $\sigma_p = /w_1\sigma_1 - w_2\sigma_2/$, 两个资产组合E(R)和σ在一条折线上，一定有一个点σ_p=0
	Indifference curve	Risk averse： accept a riskier investment only if they are compensated in the form of greater expected return (Indifference curve是凸的)
结论		✓ Minimum variance frontier、Global minimum-variance portfolio ✓ Efficient frontier ✓ Optimal portfolio (EF和indifference curve的切点)

identical expectations

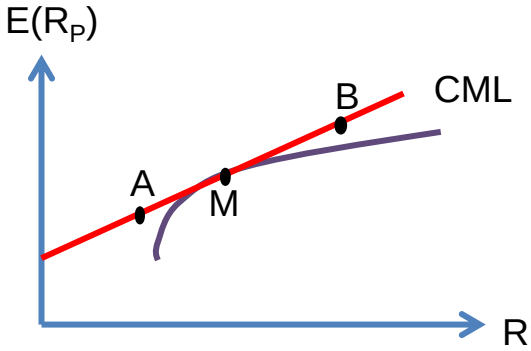
计算、性质

CAL

公式 $$E(R_P) = R_F + \frac{E(R_T) - R_F}{s_T} s_P$$

特点

- ✓ All investors' optimal portfolios will be made up of some combination of an optimal portfolio of risky assets and the risk-free asset.
- ✓ Investors with different asset expectations will face different CALs



CML★★

公式 $$E(R_P) = R_F + \frac{E(R_M) - R_F}{\sigma_M} \sigma_P$$

Market portfolio

① tangent point where the CML touches the Markowitz EF.
② Consists of every risky assets
③ Weighting on each asset are equal to the percentage of the market value of the asset to MV $_{Portfolio}$

特点

① CML上的点： Efficient portfolio
② Passive investment strategy using CML：risk-free asset +M
③ A: lending portfolio
B: borrowing portfolio

CPAM (SML) ★★	
基础	Systematic risk： cannot be diversified away. (or market risk) Interest rate risk、currency risk、macroeconomic risk…… Unsystematic risk： diversifiable, firm-specific risk
Assumption	✓ Investors are risk-averse, utility-maximizing, rational individuals. ✓ Markets are frictionless; no transaction costs and no taxes. ✓ Investors plan for the same single holding period. ✓ Investors have homogeneous expectations or beliefs. ✓ All investments are infinitely divisible. ✓ Investors are price takers.
公式	$E(R_i)=R_f+\beta_i[E(R_M)-R_f]$ $\quad \beta_i=\frac{Cov_{i,mkt}}{\sigma_{mkt}^2}=(\frac{\sigma_i}{\sigma_{mkt}})\times\rho_{i,mkt}$
应用	Undervalued (buy): market estimated return > Expected return from the SML Overvalued (sell): market estimated return < Expected return from the SML

计算、性质

Difference between SML and CML ★★

Difference	SML	CML
Measure of risk	systematic risk	standard deviation (total risk)
Application	determine the appropriate expected returns for securities	determine the appropriate asset allocation
Definition	Graph of the capital asset pricing model	Graph of the efficient frontier
Slope	Market risk premium	Market portfolio Sharpe ratio

Multifactor model	✓ Macroeconomic factors ✓ Fundamental factors ✓ Statistical factors
Single factor model (Market model)	Factor: expected excess return on the market portfolio $E(R_i) - R_f = \beta_i (E(R_M) - R_f)$

了解

Relative portfolio performance (risk-adjusted returns) ★★

	计算	性质
Sharpe ratio	$\text{Sharpe ratio}=\frac{R_P - R_f}{\sigma_P}$	✓ The Sharpe ratio for any portfolio along the CML is the same. ✓ For not well-diversified portfolio
Treynor measure	$\text{Treynor measure}=\frac{R_P - R_f}{\beta_P}$	✓ For fully diversified portfolio
M-squared (M^2)	$M^2 = (R_P - R_f)\frac{\sigma_M}{\sigma_P} - (R_M - R_f)$	✓ M-squared (M^2) measure produces the same portfolio rankings as the Sharpe ratio but is stated in percentage terms. ✓ For not well-diversified portfolio
Jensen's alpha	$\alpha_P = (R_P - R_f) - \beta_P (R_M - R_f)$	✓ For fully diversified portfolio.

Reading 41 & 44

Portfolio Management & Basic of Portfolio Planning and Construction

Investor	Risk Tolerance ★★	Investment Horizon ★★	Liquidity Needs ★	Income Needs
Individuals	Depend on individual	Depend on individual	Depend on individual	Depend on individual
DB pensions	High	Long	Low	Depends on age
Banks	Low	Short	High	Pay interest
Endowments	High	Long	Low	Spending level
Insurance	Low	Long—life Short—P&C	High	Low
Mutual funds	Depends on fund	Depends on fund	High	Depends on fund

考法：不同投资者的特征

<table>
<tr><td>Portfolio Management</td><td colspan="3">✓ planning step
• Creating the Investment Policy Statement
• Creating the Strategic Asset Allocation
✓ the execution step
✓ the feedback step</td></tr>
<tr><td rowspan="3">IPS
★
概念</td><td rowspan="2">Objectives</td><td colspan="2">Return</td></tr>
<tr><td>Risk
(above/average/below)</td><td>Willingness: 业余爱好、以前的投资
Ability: wealth, age,net income……</td></tr>
<tr><td>Constrains
(significant/insignificant)</td><td colspan="2">1. Liquidity requirement
2. Time horizon
3. Tax concerns
4. Legal and regulatory factors
5. Unique circumstances</td></tr>
<tr><td>Investment strategy
★★
概念</td><td colspan="3">✓ Strategic asset allocation (SAA):
• combine IPS and capital market expectations to formulate weightings on asset classes
• Correlations within the class → high
• Correlations between asset classes → low
✓ Tactical asset allocation: varies from SAA weights; short-term opportunities
✓ Security selection: deviation from index weights</td></tr>
</table>

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