Elphinstone Research Group

Capital Asset Pricing Model

Contents

CAPM Formula

The Capital Asset Pricing Model is used to determine the expected return of a stock.

The expected return of a stock is equal to the risk-free return plus the risk premium.

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f)$$

$\boldsymbol{E(R_i)}$ = Expected Return of a Stock
$\boldsymbol{R_f}$ = Risk-Free Rate
$\boldsymbol{\beta_i}$ = Beta of a Stock (Systematic Risk)
$\boldsymbol{(E(R_m) - R_f)}$ = Market Risk Premium

CAPM Example

Risk Free Rate = 0.05 (5%), Market Return = 0.12 (12%)

Stock A (Undervalued):
Expected Return = 0.15 (15%), Beta = 0.5

$$E(R_A) = R_f + \beta_A(E(R_m) - R_f) \qquad 8.5\% = 5\% + 0.5(12\% - 5\%)$$

Stock B (Fairly Valued):
Expected Return = 0.155 (15.5%), Beta = 1.5

$$E(R_B) = R_f + \beta_B(E(R_m) - R_f) \qquad 15.5\% = 5\% + 1.5(12\% - 5\%)$$

Stock C (Overvalued):
Expected Return = 0.08 (8%), Beta = 1.2

$$E(R_C) = R_f + \beta_C(E(R_m) - R_f) \qquad 13.4\% = 5\% + 1.2(12\% - 5\%)$$

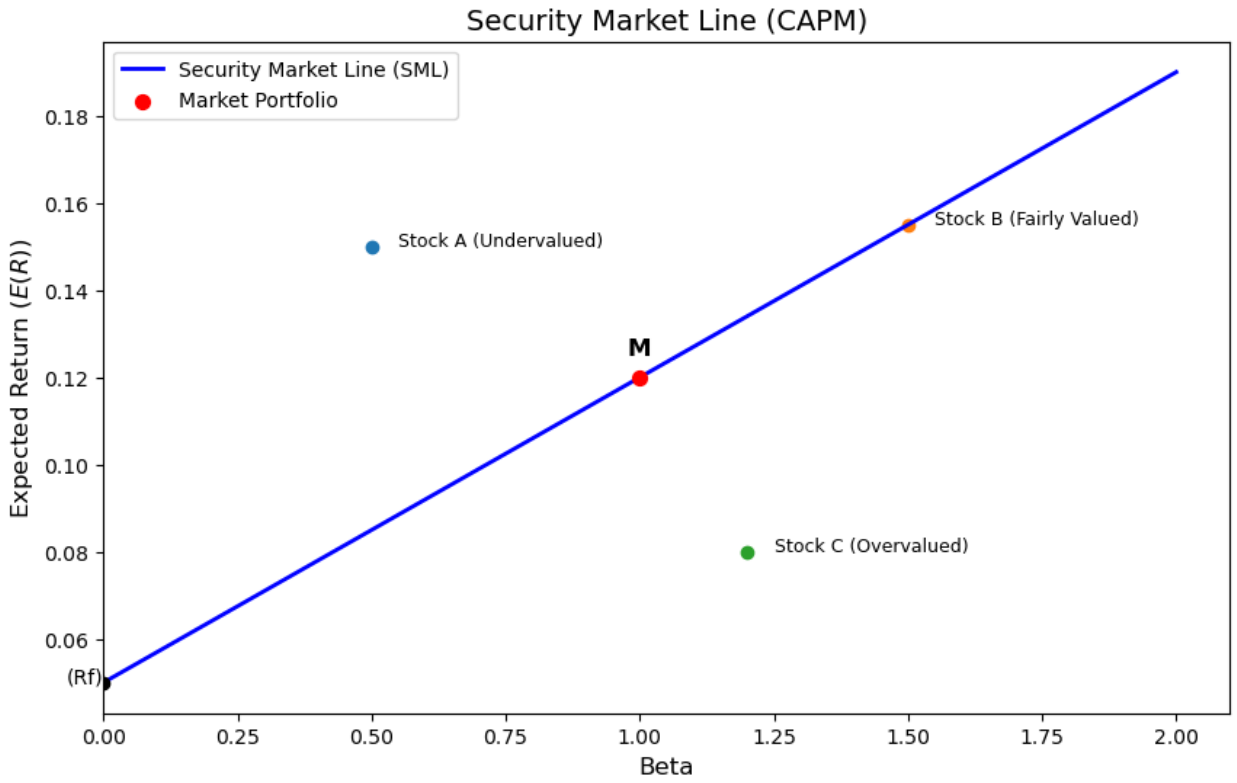
Security Market Line

The SML is a graphical representation of the CAPM, plotting an asset's expected return against its systematic risk

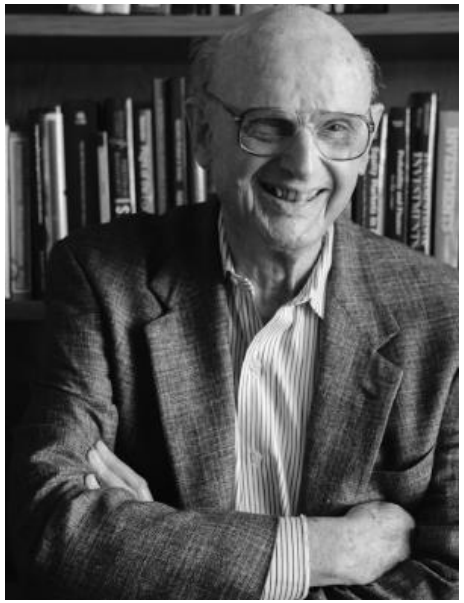
Stock A (Undervalued):
Expected Return = 0.15 (15%), Beta = 0.5
CAPM/Required Return = 0.085 (8.5%)

Stock B (Fairly Valued):
Expected Return = 0.155 (15.5%), Beta = 1.5
CAPM/Required Return = 0.155 (15.5%)

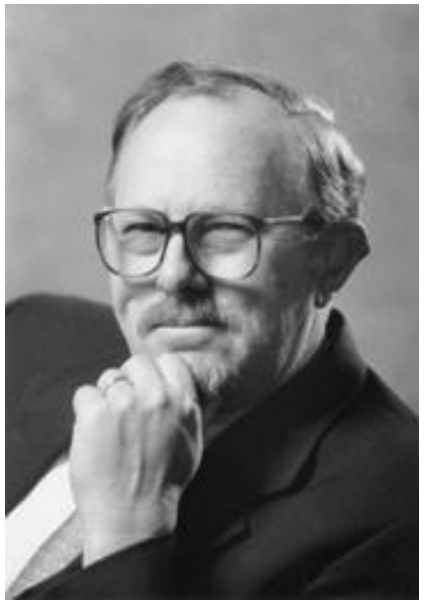
Stock C (Overvalued):
Expected Return = 0.08 (8%), Beta = 1.2
CAPM/Required Return = 0.134 (13.4%)



Origins and Evolution of the CAPM

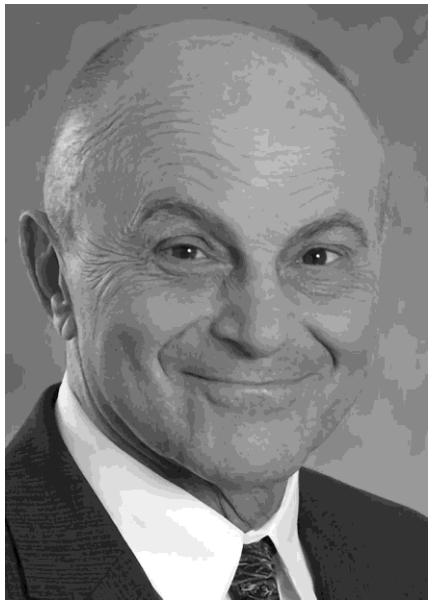


Harry Markowitz



William F. Sharpe

John Lintner



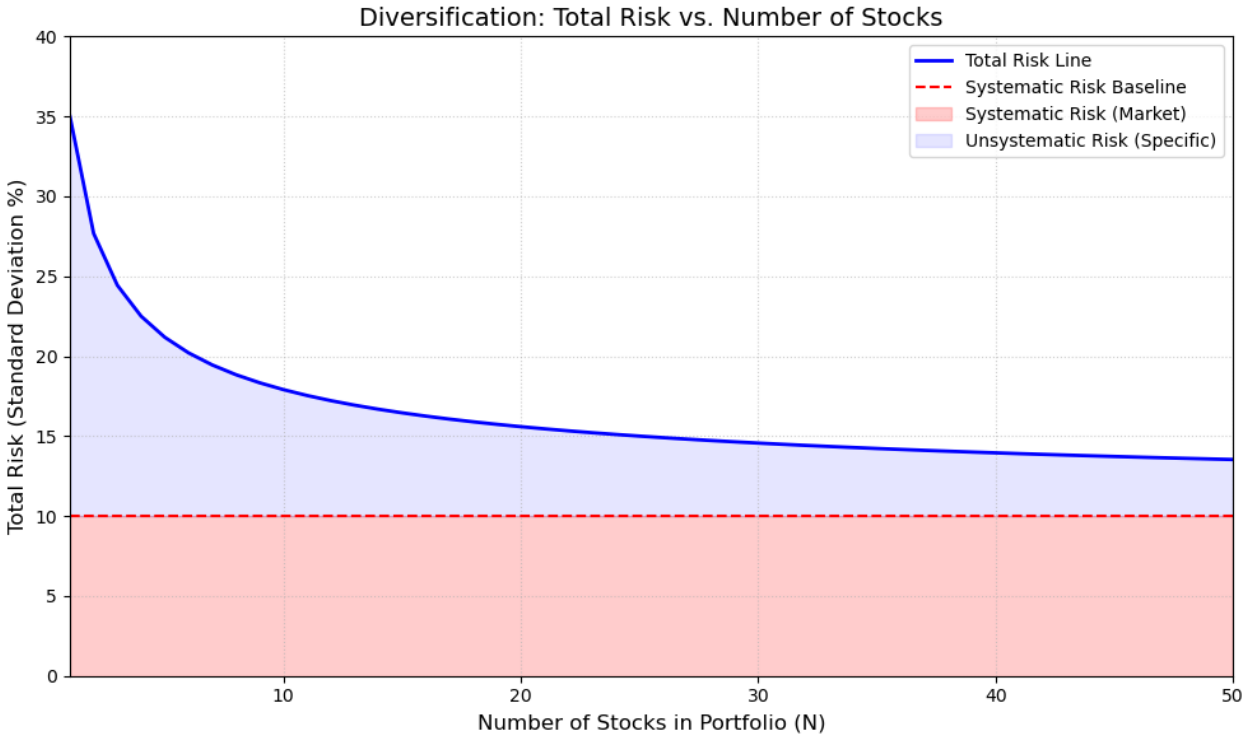
Eugene Fama

Kenneth French

Types of Risk - Systematic vs. Unsystematic Risk

Systematic Risk (Market Risk):
Undiversifiable risk, which cannot be avoided, and so investors receive a premium for incurring the risk. External "Macro" events, such as interest rate fluctuations, which affect everyone in the market and cannot be avoided.

Unsystematic Risk (Idiosyncratic):
Firm-specific risk is diversifiable, so the market provides no premium for a risk that can be avoided through diversification. Internal "Micro" events unique to the firm, such as a change in management.



Applying the CAPM to DCF analysis

The result of CAPM is the Cost of Equity (R_e) within the Weighted Average Cost of Capital

If CAPM gives a high R_e, the WACC goes up.

WACC

$$WACC = \left(\frac{E}{V} \text{ x } R_e\right) + \left(\frac{D}{V} \text{ x } R_d\right) \text{ x } (1\text{-}t))$$

Present Value of Terminal Value

$$\text{PV of TV} = \frac{TV}{(1+WACC)^n}$$

Additional Resources

1. *Investopedia*

   https://www.investopedia.com/

2. *Corporate Finance Institute (CFI)*

   https://corporatefinanceinstitute.com/

3. *ScienceDirect*

   https://www.sciencedirect.com/topics/economics-econometrics-and-finance/capm

4. *Research Papers on CAPM*

   The Capital Asset Pricing Model: Theory and Evidence – by Eugene F. Fama and Kenneth R. French