Portfolio Analysis Report

Gen Ai and Portfolio Theory by Alastair McBride

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Introduction

Portfolio theory, introduced by Harry Markowitz in 1952, transformed investment strategies by emphasizing the importance of diversification. It highlights that asset returns should be considered within the context of the entire portfolio, not in isolation. Combining assets with different risk and return profiles can minimize overall portfolio risk and achieve a better risk-return balance. The theory proposes the "efficient frontier," representing optimal portfolios that deliver the highest expected return for a given level of risk. This systematic approach empowers investors to make informed, data-driven decisions to manage uncertainty and align investments with their risk tolerance and financial goals.

Historical Annual Returns

- X values: [6.6, 5.6, -9.0, 12.6, 14.0]

- Y values: [24.5, -5.9, 19.9, -7.8, 14.8]

- Weights: wX=0.6, wY=0.4

Calculated Statistics

- Mean of X: 5.96

- Mean of Y: 9.1

- Std Dev of X: 8.16

- Std Dev of Y: 13.39

- Pearson Correlation: -0.39

Portfolio Statistics

$$\bar{P} = w_X \bar{X} + w_Y \bar{Y} = 7.22$$

$$\sigma_P = \sqrt{(w_X \sigma_X)^2 + (w_Y \sigma_Y)^2 + 2 w_X w_Y \sigma_X \sigma_Y r_{XY}} = 5.68$$

Efficient Frontier Data Table

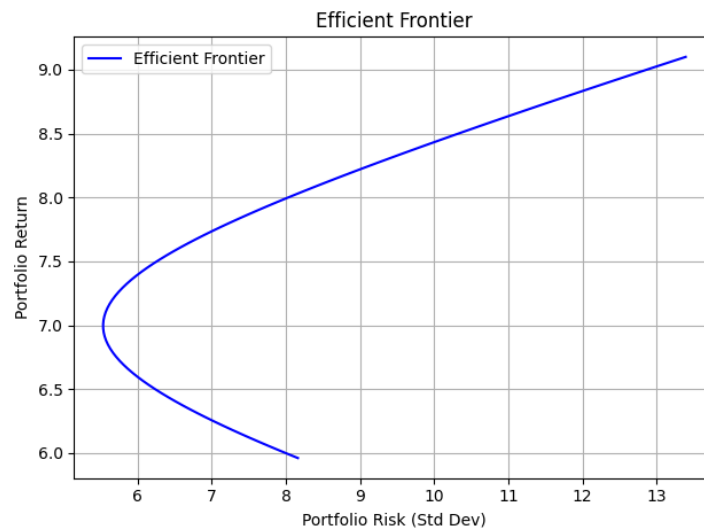|	All X	A	B	C	D	All Y
X	1.0	0.8	0.6	0.4	0.2	0.0
Y	0.0	0.2	0.4	0.6	0.8	1.0
return	5.96	6.59	7.22	7.84	8.47	9.1
risk	8.16	6.02	5.68	7.4	10.19	13.39

Efficient Frontier Graph

Figure 1: Efficient Frontier