

# Trade-off between expected return and risk

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Trade-off between Expected Return and Risk Expected return is the guess of an investor's regarding the returns from an investment while risk is a possibility of deviation from the expected returns. Standard deviation helps investors assess if their estimates are incorrect and thereafter estimate the possibility of positive outcomes by considering alternative investments. Due to the high rates of volatility in the stock markets, many investors are risk averse and would only risk investing where there is the highest projected return. Risk and return models quantify risk with regards to standard deviation or volatility.

#### Standard deviation

Fluctuations of the returns in a stock market depend on the occurrence of unexpected extreme values. This approach measure the expected future returns by using the historical returns. Investors would prefer investing in low standard deviation investments between investments with equal expected returns.

#### Asset allocation in a portfolio

Allocation of assets in portfolio in different asset classes helps an investor to diversify their risks so as to maximize their returns while minimizing their risks as shown below;

#### Return Maximization

#### Risk Minimization

#### Objective Function

#### Maximize Expected Return

#### Minimize return variance

#### Constraint

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Where,

$\sigma^2$  in the Investor's expected variance

$E(R)$  = Investor's expected returns

Portfolio Efficiency

An efficient portfolio allocates assets in a way that yields the highest expected returns at a certain level of risk. Diversification involves combination of different portfolios with different market performance so as to reduce the expected risk without necessarily reducing the expected return. To achieve with an efficient portfolio in a portfolio that has many risky assets, it is then diversified with riskless assets as follows;

Where;

$w$ : risky asset

$1 - w$ : riskless asset

For example, risk can be distributed as follows;

Asset

Allocation

risk-free

risky 1

risky 2

65.7%

23.7%

10.5%

Total

99.9%

The decision on the asset allocation portfolio is based on the investors' risk tolerance or risk-return tradeoffs.

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Work cited

Christoffersen, P. F., and F. X. Diebold, How Relevant is Volatility Forecasting for Financial Risk Management? *The Review of Economics and Statistics*, 82, 12-23, 2000