

QF632-2025-W5

Number of participants: 32



1.

Consider two assets, A and B, with expected returns of 6% and 8% respectively. The standard deviation of returns for Asset A is 10%, and for Asset B is 12%. The correlation coefficient between the returns of Asset A and Asset B is 0.2. What is the variance of a portfolio consisting of 40% Asset A and 60% Asset B?

12 correct answers
out of 17 respondents

0.0128



1 vote



0.0079



12 votes

0.0108



1 vote

0.0112



3 votes



2.

Consider a portfolio optimization scenario under Modern Portfolio Theory where an investor seeks to construct a portfolio from three assets. The objective is to maximize the expected return of the portfolio subject to a specified level of risk. Which ones are essential of the optimization problem? (Multiple choices apply)

19 correct answers
out of 26 respondents



Calculating the historical return of each asset to determine future performance.



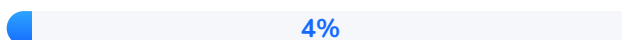
21 votes



Consider the correlation between asset returns when calculating portfolio volatility.



23 votes



Restricting the portfolio to contain only the asset with the highest expected return.

1 vote



Defining the weights for each asset in the portfolio subject to constraint such as the sum of the weights equals 1.



24 votes

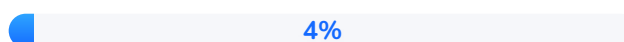


3.

An investor decides to construct an equal-weight portfolio of four assets. According to Modern Portfolio Theory, which of the following statements is true regarding the risk and return characteristics of this equal-weight portfolio?

19 correct answers
out of 26 respondents

The portfolio's variance is the average of the variances of the individual assets.



1 vote

The portfolio's variance is the sum of the variances of the individual assets.



0 votes

The portfolio's expected return is the average of the expected returns of the individual assets.



19 votes

The portfolio's expected return is the sum of the expected returns of the individual assets.



6 votes



4. **The Efficient Frontier is a critical concept in portfolio optimization under Modern Portfolio Theory (MPT). Which of the following statements accurately describes the Efficient Frontier?**

18 correct answers
out of 21 respondents

It is a single portfolio that provides the maximum return irrespective of the level of risk.

0%

0 votes

It is a graph that displays the expected returns of individual assets against their respective standard deviations.

0%

0 votes

It is the set of all possible portfolios that can be constructed with a given set of assets.

14%

3 votes

It represents a set of portfolios that offer the highest expected return for different levels of risk.

86%

18 votes

**Suppose you set $\mu_0 = \max_i \{\mu_i\}$.
Then the problem**



5. $\min_w w^\top Q w$ s.t. $\mu^\top w \geq \mu_0, \sum_i w_i = 1, w_i \geq 0$ has as its unique solution

7 correct answers
out of 19 respondents



The single asset with highest μ_i (a "corner" portfolio).



7 votes

The equal-weighted portfolio.



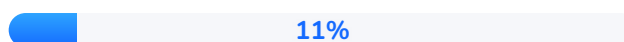
1 vote

The global minimum-variance portfolio.



9 votes

No feasible solution.



2 votes

When we impose $w_i \geq 0$, the efficient frontier is a subset of the unconstrained one. Which methodological effect emerges?



6.

10 correct answers
out of 13 respondents

The frontier remains a hyperbola but with a kink at the minimum-variance point.



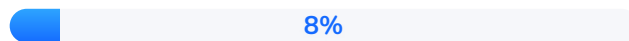
2 votes

Certain (σ, μ) pairs become infeasible, and the resulting curve is piecewise-linear in weight-space.



10 votes

The closed-form weight formula still holds but with truncated negatives to zero.



1 vote

The Lagrange multiplier on $\sum w_i = 1$ becomes non-constant along the frontier.



0 votes

CAPM predicts that in equilibrium

$\alpha_i = 0 \quad \forall i$. **Mathematically, this**

follows from the fact that any

nonzero α_i would imply an

7. **expected excess profit uncorrelated with market risk—violating no-arbitrage in a mean–variance world. Which formal property captures this “no-arbitrage” statement?**

12 correct answers
out of 14 respondents

$\sum_i \beta_i = 1.$

0%

0 votes

$E[\epsilon_{it}] = 0$ for all i

0%

0 votes

$E[\alpha_i] = 0$ across
all assets.

14%

2 votes

$E[(R_{it} - R_f) - \beta_i(R_{Mt} - R_f)] = 0.$

86%

12 votes

Starting from weights w_f in the risk-free asset and $w_M = 1 - w_f$ in the market portfolio with (μ_M, σ_M) , one shows $\mu_P =$



8. $w_M \mu_M + (1 - w_M) R_f$, $\sigma_P = w_M \sigma_M$. Eliminating w_M gives $\mu_P = R_f + \frac{\mu_M - R_f}{\sigma_M} \sigma_P$. The slope $\frac{\mu_M - R_f}{\sigma_M}$ is:

14 correct answers
out of 14 respondents



The Sharpe ratio of the market portfolio.

100%

14 votes

The Treynor ratio of the market portfolio.

0%

0 votes

The information ratio of the market portfolio.

0%

0 votes

The residual-volatility ratio.

0%

0 votes



9. **If instead we disallow borrowing or shorting the risk-free asset (i.e. $w_f \geq 0$ and $w_M \leq 1$), the efficient set becomes:**

11 correct answers
out of 18 respondents

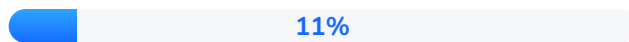


The same CML but truncated at $\sigma = \sigma_M$.



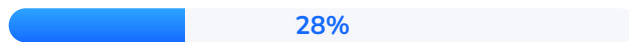
11 votes

The original risky-only hyperbola.



2 votes

A piecewise curve joining $(R_f, 0)$ to the GMV point.



5 votes

Infeasible for any target return above R_f .



0 votes