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	6%	1 vote
✓	0.0079	71%	12 votes
	0.0108	6%	1 vote
	0.0112	18%	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.	81%	21 votes
✓	Consider the correlation between asset returns when calculating portfolio volatility.	88%	23 votes
	Restricting the portfolio to contain only the asset with the highest expected return.	4%	1 vote
✓	Defining the weights for each asset in the portfolio subject to constraint such as the sum of the weights equals 1.	92%	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.	4%	1 vote
	The portfolio's variance is the sum of the variances of the individual assets.	0%	0 votes
✓	The portfolio's expected return is the average of the expected returns of the individual assets.	73%	19 votes
	The portfolio's expected return is the sum of the expected returns of the individual assets.	23%	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

5. Suppose you set $\mu_0 = \max_i\{\mu_i\}$. Then the problem $\min_w \; w^\top Q w \quad \text{s.t.} \quad \mu^\top w \geq \mu_0, \quad \sum_i w_i = 1, \quad w_i \geq 0$ has as its unique solution

7 correct answers
out of 19 respondents

✓	The single asset with highest μ_i (a corner" portfolio).	37%	7 votes
	The equal-weighted portfolio.	5%	1 vote
	The global minimum-variance portfolio.	47%	9 votes
	No feasible solution.	11%	2 votes

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

10 correct answers
out of 13 respondents

	The frontier remains a hyperbola but with a kink at the minimum-variance point.	15%	2 votes
✓	Certain (σ, μ) pairs become infeasible, and the resulting curve is piecewise-linear in weight-space.	77%	10 votes
	The closed-form weight formula still holds but with truncated negatives to zero.	8%	1 vote
	The Lagrange multiplier on $\sum w_i = 1$ becomes non-constant along the frontier.	0%	0 votes

7. **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 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

8. 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 $\mu_P = w_M\mu_M + (1 - w_M)R_f, \quad \sigma_P = w_M\sigma_M$. 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 $\sigma = \sigma_M$.	61%	11 votes
	The original risky-only hyperbola.	11%	2 votes
	A piecewise curve joining $(R_f, 0)$ to the GMV point.	28%	5 votes
	Infeasible for any target return above R_f.	0%	0 votes