PRMIA

8006 Exam

Exam I: Finance Theory, Financial Instruments, Financial Markets – 2015 Edition

Questions & Answers
Demo

Version: 4.0

Question: 1

A utility function expresses:

A. Risk probabilities
B. Risk alternatives
C. Risk assessment
D. Risk attitude

Answer: D

Explanation:
A utility function provides a description of an individual or a firm's risk attitude. It expresses how risk seeking or risk averse a firm or an individual is. The utility function would explain differences between risk seeking and risk averse behavior, for example, as an individual becomes richer, he may seek (or shun) risk more than before. A utility function incorporates all of this, and therefore Choice 'd' is the correct answer.

Question: 2

If x represents wealth, and u(x) its utility, then a logarithmic utility function can be represented by:

A. u(x) = ln(x)
B. u(x) = exp(x)
C. u(x) = ln(-x)
D. u(x) = 1/ln(x)

Answer: A

Explanation:
A utility function provides a description of an individual or a firm's risk attitude. It expresses how risk seeking or risk averse they are. The utility function would provide for changes between risk seeking and risk averse behavior, for example, as an individual becomes richer, he may seek (or shun) risk more than before. A utility function incorporates all of this, and a logarithmic utility function is represented by u(x) = ln(x).

Question: 3

Which of the following is one of the basic axioms on which the principle of maximum expected utility is based:

A. Stochastic dominance
B. Transportation of choice
C. Utility maximization
D. Cognitive bias

Answer: A

Explanation:
Given a choice, decision makers will maximize expected utility. The four basic axioms on which the principle of maximizing expected utility is based are:
- Transitivity of choice,
- Continuity of choice,
- Independence of choice, and
- Stochastic dominance.

Question: 4

What kind of a risk attitude does a utility function with downward sloping curvature indicate?

A. risk mitigation
B. risk averse
C. risk seeking
D. risk neutral

Answer: B

Explanation:
A utility function is graphed with utility on the y-axis and the variable driving utility (generally wealth) along the x-axis.
A concave utility function, ie a function with a downward sloping curve, indicates risk aversion. A convex utility function indicates a risk seeking attitude and a straight line (ie no curvature) indicates a risk neutral attitude.

Question: 5

What kind of a risk attitude does a utility function with an upward sloping curvature indicate?

A. risk seeking
B. risk neutral
C. risk averse
D. risk mitigation

Answer: A

Explanation:
A utility function is graphed with utility on the y-axis and the variable driving utility (generally wealth) along the x-axis.
A concave utility function, ie a function with a downward sloping curve, indicates risk aversion. A convex utility function indicates a risk seeking attitude and a straight line (ie no curvature) indicates a risk neutral attitude.

Question: 6

The local coefficient of risk aversion for a utility function u(x) where x is wealth is expressed as:
A)
$$-\frac{u''(x)}{u'(x)}$$
B)
$$-\frac{u'(x)}{u''(x)}$$
C)
$$\frac{u'(x)}{u''(x)}$$
D)
$$\frac{u''(x)}{u'(x)}$$

A. Option A
B. Option B
C. Option C
D. Option D

Answer: A

Explanation:

$-\frac{u''(x)}{u'(x)}$ is the coefficient of risk aversion at x. Its inverse, ie $-\frac{u'(x)}{u''(x)}$, is called the coefficient of risk tolerance.
Risk aversion or risk tolerance is indicated in a utility function by its curvature. A concave utility function indicates risk aversion and a convex function indicates risk tolerance. The curvature is measured as a ratio of the second derivative to the first derivative of a function. A negative second derivative implies concavity. The expression is the coefficient of risk aversion, and its inverse, which is in the same units as wealth, is called the coefficient of risk tolerance.

Question: 7

A)
$\frac{u''(x)}{u'(x)}$
B)
$\frac{u'(x)}{u''(x)}$
C)
$-\frac{u''(x)}{u'(x)}$
D)
$-\frac{u'(x)}{u''(x)}$

A. Option A
B. Option B
C. Option C
D. Option D

Answer: D

Explanation:
$-\frac{u''(x)}{u'(x)}$ is the coefficient of risk aversion at x. Its inverse, ie $-\frac{u'(x)}{u''(x)}$, is called the coefficient of risk tolerance.
Risk aversion or risk tolerance is indicated in a utility function by its curvature. A concave utility function indicates risk aversion and a convex function indicates risk tolerance. The curvature is measured as a ratio of the second derivative to the first derivative of a function. A negative second derivative implies concavity. The expression - is the coefficient of risk aversion, and its inverse, which is in the same units as wealth, is called the coefficient of risk tolerance.

Question: 8

The objective function satisfying the mean-variance criterion for a gamble with an expected payoff of x, variance var(x) and coefficient of risk tolerance is λ is:
A)
$Maximize\left[\frac{e(x.var(x))}{2\lambda}\right]$
B)
$Minimize\left[e(x)-\frac{var(x)}{2\lambda}\right]$
C)
$Minimize\left[\frac{e(x.var(x))}{2\lambda}\right]$
D)

$$Maximize \left[e(x) - \frac{var(x)}{2\lambda} \right]$$

A. Option A
B. Option B
C. Option C
D. Option D

Answer: D

Explanation:
Choice 'd' represents the mean-variance function to be maximized for selecting between mutually exclusive gambles. The other choices are incorrect.
(The mean-variance criterion is a fairly complex subject, and this question is only intended to make sure that you know, and can identify the function that is being maximized. A complete explanation/derivation of the mean-variance criterion, that links together expected returns, volatility and the risk tolerance of the investor to arrive at the efficient frontier is beyond the scope of the PRM syllabus.)

Question: 9

Which of the following statements are true:

A. The mean-variance criterion is a simplification of the principal of maximum expected utility
B. The mean-variance criterion is superior to the principal of maximum expected utility
C. The mean-variance criterion is the same thing as the principal of maximum expected utility
D. The mean-variance criterion is inferior to the principal of maximum expected utility

Answer: A

Explanation:
The principle of maximum expected utility requires maximizing the expected utilities of the different possible outcomes of a gamble weighted according to the probabilities of their occurrence. This is very difficult to apply in practice in the financial markets where utility functions and various other inputs for maximizing expected utility are not known. Markowitz suggested the mean-variance criterion as a simplification of the principle of maximum expected utility, and it can be shown that the mean-variance gives a good approximation when the range of outcomes under consideration does not exceed plus or minus one coefficient of risk tolerance. (Recall that the coefficient of risk tolerance is the value of x where the gambler is indifferent between equal probabilities of winning x or losing x/2.)

Question: 10

Which of the following expressions represents the Sharpe ratio, where μ is the expected return, σ is the standard deviation of returns, rm is the return of the market portfolio and rf is the risk free rate:

A.
$$\frac{\sigma - \mu}{exp(r_f)}$$
B.
$$\frac{\mu - r_f}{\beta}$$
C)
$$\frac{(\mu - r_f)}{\sigma}$$
D)
$$\mu - rf - \beta(r_m - r_f)$$

A. Option A
B. Option B
C. Option C
D. Option D

Answer: C

Explanation:
The Sharpe ratio is the ratio of the excess returns of a portfolio to its volatility. It provides an intuitive measure of a portfolio's excess return over the risk free rate. The Sharpe ratio is calculated as [(Portfolio return - Risk free return)/Portfolio standard deviation]. Therefore Choice 'c' is the correct answer.
The Treynor ratio is similar to the Sharpe ratio, but instead of using volatility in the denominator, it uses the portfolio's beta. Therefore the Treynor Ratio is calculated as [(Portfolio return - Risk free return)/Portfolio's beta].
Jensen's alpha is another risk adjusted performance measure. It considers only the 'alpha', or the return attributable to a portfolio manager's skill. It is the difference between the return of the portfolio, and what the portfolio should theoretically have earned. Any portfolio can be expected to earn the risk free rate (rf), plus the market risk premium (which is given by [Beta x (Market portfolio's return - Risk free rate)]. Jensen's alpha is therefore the actual return earned less the risk free rate and the beta return.
Refer to the tutorial on risk adjusted performance measures for more details.

Question: 11

Which of the following expressions represents the Treynor ratio, where μ is the expected return, σ is the standard deviation of returns, rm is the return of the market portfolio and rf is the risk free rate:
A)
$$\frac{\mu - r_f}{\beta}$$
B)
$$\frac{(\mu - r_f)}{\sigma}$$
C)
$$\frac{\sigma - \mu}{exp(r_f)}$$

D)
$\mu - rf - \beta(r_m - r_f)$

A. Option A
B. Option B
C. Option C
D. Option D

Answer: A

Explanation:
The Sharpe ratio is the ratio of the excess returns of a portfolio to its volatility. It provides an intuitive measure of a portfolio's excess return over the risk free rate. The Sharpe ratio is calculated as [(Portfolio return - Risk free return)/Portfolio standard deviation].
The Treynor ratio is similar to the Sharpe ratio, but instead of using volatility in the denominator, it uses the portfolio's beta. Therefore the Treynor Ratio is calculated as [(Portfolio return - Risk free return)/Portfolio's beta]. Therefore Choice 'a' is the correct answer.
Jensen's alpha is another risk adjusted performance measure. It considers only the 'alpha', or the return attributable to a portfolio manager's skill. It is the difference between the return of the portfolio, and what the portfolio should theoretically have earned. Any portfolio can be expected to earn the risk free rate (rf), plus the market risk premium (which is given by [Beta x (Market portfolio's return - Risk free rate)]. Jensen's alpha is therefore the actual return earned less the risk free rate and the beta return.
Refer to the tutorial on risk adjusted performance measures for more details

Question: 12

Which of the following expressions represents Jensen's alpha, where μ is the expected return, σ is the standard deviation of returns, rm is the return of the market portfolio and rf is the risk free rate:
A.
$\frac{\mu - r_f}{\beta}$
B)
$\frac{\sigma - \mu}{exp(r_f)}$
C)
$\mu - rf - \beta(r_m - r_f)$
D)
$\frac{(\mu - r_f)}{\sigma}$

A. Option A
B. Option B
C. Option C
D. Option D

Answer: C

Explanation:
The Sharpe ratio is the ratio of the excess returns of a portfolio to its volatility. It provides an intuitive measure of a portfolio's excess return over the risk free rate. The Sharpe ratio is calculated as [(Portfolio return - Risk free return)/Portfolio standard deviation].
The Treynor ratio is similar to the Sharpe ratio, but instead of using volatility in the denominator, it uses the portfolio's beta. Therefore the Treynor Ratio is calculated as [(Portfolio return - Risk free return)/Portfolio's beta]. Therefore Choice 'a' is the correct answer.
Jensen's alpha is another risk adjusted performance measure. It considers only the 'alpha', or the return attributable to a portfolio manager's skill. It is the difference between the return of the portfolio, and what the portfolio should theoretically have earned. Any portfolio can be expected to earn the risk free rate (rf), plus the market risk premium (which is given by [Beta x (Market portfolio's return - Risk free rate)]. Jensen's alpha is therefore the actual return earned less the risk free rate and the beta return. Choice 'c' is the correct answer.
Refer to the tutorial on risk adjusted performance measures for more details.