Reading 20

PORTFOLIO RISK & RETURN

1. (C) **The frontier extends to the left, or northwest quadrant representing a reduction in risk while maintaining or enhancing portfolio returns.**

   Explanation

   Reducing correlation between the two assets results in the efficient frontier expanding to the left and possibly slightly upward. This reflects the influence of correlation on reducing portfolio risk.

   (Module 20.4, LOS 20.g)

2. (A) **the individual's utility curve.**

   Explanation

   The optimal portfolio for each investor is the highest indifference curve that is tangent to the efficient frontier. The optimal portfolio is the portfolio that gives the investor the greatest possible utility.

   (Module 20.2, LOS 20.c)

3. (B) **the global minimum variance portfolio.**

   Explanation

   According to the CAPM, rational, risk-averse investors will optimally choose to hold a portfolio along the capital market line. This can range from a 100% allocation to the riskfree asset to a leveraged position in the market portfolio constructed by borrowing at the risk-free rate to invest more than 100% of the portfolio equity value in the market portfolio. The global minimum variance portfolio lies below the CML and is not an efficient portfolio under the assumptions of the CAPM.

   (Module 20.4, LOS 20.g)

4. (B) **0.0375.**

   Explanation

   $Cov_{X,Y} = (r_{X,Y}) (s_X) (s_Y)$, where r = correlation coefficient, s_x = standard deviation of stock X ,and s_Y = standard deviation of stock Y

   Then, $(r_{X,Y}) = Cov_{X,Y} / (SD_X \times SD_Y) = 0.009 / (0.600 \times 0.400) = 0.0375$

   (Module 20.3, LOS 20.d)

5. (A) **B.**

   Explanation

   Portfolio B is not on the efficient frontier because it has a lower return, but higher risk, than Portfolio D.

   (Module 20.4, LOS 20.g)

6. (B) **greater.**

Explanation

Perfect positive correlation (r = +1) of the returns of two assets offers no risk reduction, whereas perfect negative correlation (r = -1) offers the greatest risk reduction.

(Module 20.4, LOS 20.f)

7. (A) **0.0007.**

Explanation

The variance of the portfolio is found by:

$[W1^2\ \sigma1^2 + W2^2\ \sigma2^2 + 2W_1W_2\sigma_1\sigma_2 r_{1,2}]$, or $[(0.15)^2(0.0071) + (0.85)^2(0.0008) + (2)(0.15)(0.85)(0.0843)(0.0283)(-0.04)] = 0.0007$.

(Module 20.3, LOS 20.e)

8. (C) **Fiona's indifference curves are flatter than Scott's.**

Explanation

Even risk-averse investors will prefer leveraged risky portfolios if the increase in expected return is enough to offset the increase in portfolio risk. Scott's portfolio selection implies that she is more risk averse than Fiona, has steeper indifference curves, and is willing to take on less additional risk for an incremental increase in expected returns than Fiona.

(Module 20.2, LOS 20.c)

9. (B) **–100.00.**

Explanation

Covariance = correlation coefficient × standard deviation $_{\text{Stock 1}}$ × standard deviation $_{\text{Stock 2}}$ = (–1.00) (10.00) (10.00) = –100.00.

(Module 20.3, LOS 20.d)

10. (A) **Investors will want to invest in the portfolio on the efficient frontier that offers the highest rate of return.**

Explanation

The optimal portfolio for each investor is the highest indifference curve that is Tangent to the efficient frontier.

(Module 20.2, LOS 20.c)

11. (C) **Treasury bills.**

Explanation

Based on data for securities in the United States from 1926 to 2008, Treasury bills exhibited a lower standard deviation of monthly returns than both large-cap stocks and long-term corporate bonds.

(Module 20.1, LOS 20.a)

12. (A) **variance of returns.**

Explanation

The Markowitz framework assumes that all investors view risk as the variability of returns. The variability of returns is measured as the variance (or equivalently standard deviation) of returns. The capital asset pricing model (CAPM) employs beta as the measure of an investment's systematic risk.

(Module 20.4, LOS 20.g)

13. (A) **beta.**

Explanation

Beta is not an input to calculate the variance of a two-asset portfolio. The formula for calculating the variance of a two-asset portfolio is:

$$\sigma_p^2 = W_A^2\sigma_A^2 + w_B^2\ \sigma_B^2 + 2w_A W_B Cov_{AB}$$

(Module 20.3, LOS 20.e)

14. (C) **Portfolio B.**

Explanation

Portfolio B is inefficient (falls below the efficient frontier) because for the same risk level (8.7%), you could have portfolio C with a higher expected return (15.1% versus 14.2%).

(Module 20.4, LOS 20.g)

15. (A) **level of risk aversion in the market.**

Explanation

The level of risk aversion in the market is not a required input. The model requires that investors know the expected return and variance of each security as well as the covariance between all securities.

(Module 20.4, LOS 20.g)

16. (A) **the correlation coefficient between the assets is less than 1.**

Explanation

There are benefits to diversification as long as the correlation coefficient between the assets is less than 1.

(Module 20.4, LOS 20.f)

17. (A) **the set of portfolios that dominate all others as to risk and return.**

Explanation

The efficient set is the set of portfolios that dominate all other portfolios as to risk and return. That is, they have highest expected return at each level of risk.

(Module 20.4, LOS 20.g)

18. (B) Portfolio C.

Explanation

Portfolio C cannot lie on the frontier because it has the same return as Portfolio D, but has more risk.

(Module 20.4, LOS 20.g)

19. (B) B.

Explanation

Portfolio B has a lower expected return than Portfolio C with a higher standard deviation.

(Module 20.4, LOS 20.g)

20. (C) 0.0264.

Explanation

$Cov_{1,2} = 0.75 \times 0.16 \times 0.22 = 0.0264$ = covariance between A and B.

(Module 20.3, LOS 20.d)

21. (B) If the correlation coefficient were 0, a zero-variance portfolio could be constructed.

Explanation

A correlation coefficient of zero means that there is no relationship between the stock's returns. The other statements are true.

(Module 20.4, LOS 20.f)

22. (C) The slope of the efficient frontier increases steadily as risk increases.

Explanation

The slope of the efficient frontier decreases steadily as risk and return increase. The efficient frontier is the set of portfolios with the greatest expected return for a given level of risk as measured by standard deviation of returns. That is, for a given level of risk, an expected return greater than that of the portfolio on the efficient frontier is not attainable, and a portfolio with a lower expected return is inefficient.

(Module 20.4, LOS 20.g)

23. (B) a positive relationship.

Explanation

In most markets and for most asset classes, higher average returns have historically been associated with higher risk (standard deviation of returns).

(Module 20.1, LOS 20.a)

24. (A) 6.

Explanation

The formula for the covariance for historical data is:

$COV_{1,2} = \{\Sigma[(R_{stock\ A} - \text{Mean } R_A)(R_{stock\ B} - \text{Mean } R_B)]\} / (n - 1)$

Mean $R_A = (10 + 6 + 8) / 3 = 8$, Mean $R_B = (15 + 9 + 12) / 3 = 12$

Here, $cov_{1,2} = [(10 - 8)(15 - 12) + (6 - 8)(9 - 12) + (8 - 8)(12 - 12)] / 2 = 6$

(Module 20.3, LOS 20.d)

25. (B) Variance = 0.03836; Standard Deviation = 19.59%.

Explanation

$(0.40)^2(0.18)^2 + (0.60)^2(0.24)^2 + 2(0.4)(0.6)(0.18)(0.24)(0.6) = 0.03836.$

$0.03836^{0.5} = 0.1959$ or 19.59%.

(Module 20.3, LOS 20.e)

26. (B) decrease.

Explanation

If the correlation coefficient is less than 1, there are benefits to diversification. Thus, adding the stock will reduce the portfolio's standard deviation.

(Module 20.4, LOS 20.f)

27. (B) B, C, and F.

Explanation

Portfolio B cannot lie on the frontier because its risk is higher than that of Portfolio A's with lower return. Portfolio C cannot lie on the frontier because it has higher risk than Portfolio D with lower return. Portfolio F cannot lie on the frontier cannot lie on the frontier because its risk is higher than Portfolio D.

(Module 20.4, LOS 20.g)

28. (C) higher rates of return.

Explanation

Investors are risk averse. Given a choice between two assets with equal rates of return, the investor will always select the asset with the lowest level of **risk. This means that there is a positive relationship between expected returns (ER) and expected risk (Eσ)** and the risk return line (capital market line [CML] and security market line [SML]) is upward sweeping.

(Module 20.2, LOS 20.c)

29. (A) decrease.

Explanation

$P_{1,2} = 0.048/(0.026^{0.5} \times 0.188^{0.5}) = 0.69$ which is lower than the original 0.79.

(Module 20.3, LOS 20.d)

30. (C) more risk averse than Jones and will choose an optimal portfolio with a lower expected return.

Explanation

Steeply sloped risk-return indifference curves indicate that a greater increase in expected return is required as compensation for assuming an additional unit of risk, compared to less-steep indifference curves. The more risk-averse Smith will choose an optimal portfolio with lower risk and a lower expected return than the less risk-averse Jones's optimal portfolio.

(Module 20.2, LOS 20.c)

31. (A) the highest expected return for any given level of risk.

Explanation

The efficient frontier is the set of efficient portfolios that gives investors the highest expected return for any given level of risk, or the lowest risk for any given level of expected return. Efficient portfolios have low diversification ratios.

(Module 20.4, LOS 20.g)

32. (A) is the portfolio that gives the investor the maximum level of return.

Explanation

This statement is incorrect because it does not specify that risk must also be considered.

(Module 20.2, LOS 20.c)

33. (B) 0.370.

Explanation

σ portfolio = $[W_1^2\sigma_1^2 + W_2^2\sigma_2^2 + 2W1W2\sigma1\sigma2r1,2]^{1/2}$ given $r_{1,2} = +1$

$\sigma = [W_12\sigma_12 + W_2^2\sigma_2^2 + 2W1W2\sigma1\sigma_2]^{1/2} = (W_1\sigma_1 + W_2\sigma_2)^2]^{1/2}$

$\sigma = (W_1\sigma_1 + W_2\sigma_2) = (0.3)(0.3) + (0.7)(0.4) = 0.09 + 0.28 = 0.37$

(Module 20.3, LOS 20.e)

34. (A) -0.80.

Explanation

Correlation = (covariance of X and Y) / [(standard deviation of X)(standard deviation of Y)]= –0.0031 / [(0.072)(0.054)] = –0.797.

(Module 20.3, LOS 20.d)

35. (A) 100% in Bridgeport.

Explanation

First, calculate the correlation coefficient to check whether diversification will provide any benefit.

$r_{Bridgeport,\ Rockaway} = cov_{Bridgeport,Rockaway}/[(\sigma_{Bridgeport}) \times (\sigma_{Rockaway})]$ =0.0325 / (0.13 × 0.25) = 1.00

Since the stocks are perfectly positively correlated, there are no diversification benefits and we select the stock with the lowest risk (as measured by variance or standard deviation), which is Bridgeport.

(Module 20.4, LOS 20.g)

36. (A) higher average annual returns and higher standard deviation of returns.

Explanation

Based on data for securities in the United States from 1926 to 2008, both small-cap stocks and large-cap stocks have exhibited higher average annual returns and higher standard deviations of returns than long-term corporate bonds and long-term government bonds. Results over long periods of time have been similar in other developed markets.

(Module 20.1, LOS 20.a)

37. (B) 0.40.

Explanation

$Cov_{A,B} = (r_{A,B})(SD_A)(SD_B)$, where r = correlation coefficient and SD_x = standard deviation of stock x

Then, $(r_{A,B}) = Cov_{A,B} / (SD_A \times SD_B) = 0.008 / (0.100 \times 0.200) = 0.40$

Remember: The correlation coefficient must be between -1 and 1.

(Module 20.3, LOS 20.d)

38. (B) 0.00724.

Explanation

$0.8^2(0.0081) + 0.2^2(0.07^2) + 2(0.8)(0.2)(0.0058) = 0.00724.$

(Module 20.3, LOS 20.e)

39. (C) their rates of return tend to change in the same direction.

Explanation

For two stocks with positive covariance, their prices will tend to move together over time and they will tend to produce rates of return greater than their mean returns at the same time and produce rates of return less than their mean returns at the same time. Positive covariance does not necessarily imply strong positive correlation. Two stocks need not be in the same industry to have a positive covariance.

(Module 20.3, LOS 20.d)

40. (A) 100% in Stock B.

Explanation

Since the stocks are perfectly correlated, there is no benefit from diversification. So, invest in the stock with the lowest risk.

(Module 20.4, LOS 20.f)

41. (B) Jones or Lewis, but not Kelly.

Explanation

Risk aversion means that to accept greater risk, an investor must be compensated with a higher expected return. A risk-averse investor will not select a portfolio if another portfolio offers a higher expected return with the same risk, or lower risk with the same expected return. Thus a rational investor would always choose Lewis over Kelly, because Lewis has both a higher expected return and lower risk than Kelly. Neither Lewis nor Kelly is necessarily preferable to Jones, because although Jones has a lower expected return, it also has lower risk. Therefore, either Jones or Lewis might be selected by a rational investor, but Kelly would not be.

(Module 20.2, LOS 20.b)

42. (B) 0.25.

Explanation

The formula for the variance of a 2-stock portfolio is:

$s^2 = [W_A^2\sigma_A^2 + W_B^2\sigma_B^2 + 2W_AW_B\sigma_A\sigma_B r_{A,B}]$

Since $\sigma_A\sigma_B r_{A,B} = Cov_{A,B}$, then

$s^2 = [(0.7^2 \times 0.55^2) + (0.3^2 \times 0.85^2) + (2 \times 0.7 \times 0.3 \times 0.09)] = [0.1482 + 0.0650 + 0.0378] = 0.2511.$

(Module 20.3, LOS 20.e)

43. (B) 14.45%.

Explanation

The standard deviation of returns for the overall portfolio is as follows:

$$\sqrt{0.6^2(0.04)+0.4^2(0.0081)+2(0.6)(0.4)(0.0108)} = 14.4499\%$$

(Module 20.3, LOS 20.d)

44. (C) 0.5795.

Explanation

The portfolio standard deviation

$= [(0.4)^2(0.25) + (0.6)^2(0.4) + 2(0.4)(0.6)1(0.25)^{0.5}(0.4)^{0.5}]^{0.5} = 0.5795$

(Module 20.3, LOS 20.e)

45. (A) +1.

Explanation

The formula is: (Covariance of A and B) / [(Standard deviation of A)(Standard Deviation of B)]

= (Correlation Coefficient of A and B) = (0.015476) / [(0.106)(0.146)] = 1.

(Module 20.3, LOS 20.d)

46. (C) +1.00.

Explanation

Adding any stock that is not perfectly correlated with the portfolio (+1) will reduce the risk of the portfolio.

(Module 20.4, LOS 20.f)

47. (A) Flatter.

Explanation

Investors who are less risk averse will have flatter indifference curves, meaning they are willing to take on more risk for a slightly higher return. Investors who are more risk averse require a much higher return to accept more risk, producing steeper indifference curves.

(Module 20.2, LOS 20.c)

48. (C) 18.4%.

Explanation

The expected standard deviation of portfolio returns is:

$[0.40^2 \times 0.15^2 + 0.60^2 \times 0.25^2 + 2(0.40 \times 0.60 \times 0.0158)]^{1/2} = 18.35\%$.

(Module 20.3, LOS 20.e)

49. (B) **investor's highest utility curve is tangent to the efficient frontier.**

Explanation

The optimal portfolio for an investor is determined as the point where the investor's highest utility curve is tangent to the efficient frontier.

(Module 20.2, LOS 20.c)

50. (C) **There is a portfolio that has a lower risk for the same return.**

Explanation

The efficient frontier outlines the set of portfolios that gives investors the highest return for a given level of risk or the lowest risk for a given level of return. Therefore, if a portfolio is not on the efficient frontier, there must be a portfolio that has lower risk for the same return. Equivalently, there must be a portfolio that produces a higher return for the same risk.

(Module 20.4, LOS 20.g)

51. (A) **more if she bought Branton Co.**

Explanation

In portfolio composition questions, return and standard deviation are the key variables. Here you are told that both returns and standard deviations are equal. Thus, you just want to pick the companies with the lowest covariance, because that would mean you picked the ones with the lowest correlation coefficient.

$\sigma_{portfolio}$ = $[W_1^2\ \sigma_1^2 + W_2^2\ \sigma_2^2 + 2W_1\ W_2\ \sigma_1\ \sigma_2 r_{1,2}]^{½}$ where $\sigma_{Randy} = Y_{Branton} = \sigma_{XYZ}$ so you want to pick the lowest covariance which is between Randy and Branton.

(Module 20.4, LOS 20.f)

52. (B) 100% 0%

Explanation

Because there is a perfectly positive correlation, there is no benefit to diversification. Therefore, the investor should put all his money into Stock A (with the lowest standard deviation) to minimize the risk (standard deviation) of the portfolio.

(Module 20.4, LOS 20.f)

53. (C) 0.05830.

Explanation

$Cov_{A,B} = (r_{A,B})(SD_A)(SD_B)$, where r = correlation coefficient and SDx = standard deviation of stock x

Then, $(r_{A,B}) = Cov_{A,B} / (SD_A \times SD_B) = 0.007 / (0.400 \times 0.300) = 0.0583$

(Module 20.3, LOS 20.d)

54. (C) Portfolio X.

Explanation

Portfolio X has a lower expected return and a higher standard deviation than Portfolio Y. X must be inefficient.

(Module 20.4, LOS 20.g)

55. (A) capital allocation line.

Explanation

The line that represents possible combinations of a risky asset and the risk-free asset is referred to as a capital allocation line (CAL). The capital market line (CML) represents possible combinations of the market portfolio with the risk-free asset. A characteristic line is the best fitting linear relationship between excess returns on an asset and excess returns on the market and is used to estimate an asset's beta.

(Module 20.2, LOS 20.c)

56. (B) Z.

Explanation

Portfolio Z must be inefficient because its risk is higher than Portfolio Y and its expected return is lower than Portfolio Y.

(Module 20.4, LOS 20.g)

57. (A) 0.25.

Explanation

The correlation between the two stocks is:

$\rho_{A,B} = COV_{A,B} / (\sigma_A \times \sigma_B) = 0.001 / (0.05 \times 0.08) = 0.001 / (0.004) = 0.25$

Note that the formula uses the standard deviations, not the variances, of the returns on the two securities.

(Module 20.1, LOS 20.a)

58. (A) 0.1600.

Explanation

The formula for the standard deviation of a 2-stock portfolio is:

$\sigma = [W_A^2\sigma A^2 + W_B^2\sigma_B^2 + 2W_AW_B\sigma_A\sigma_B\rho_{A,B}]^{1/2}$

$\sigma = [(0.7^2 \times 0.2^2) + (0.3^2 \times 0.15^2) + (2 \times 0.7 \times 0.3 \times 0.2 \times 0.15 \times 0.32)]^{1/2} = [0.0196 + 0.002025 + 0.004032]^{1/2} = 0.02565701/2 = 0.1602$, or approximately **16.0%.**

(Module 20.3, LOS 20.e)

59. (C) highest utility.

Explanation

The optimal portfolio in the Markowitz framework occurs when the investor achieves the diversified portfolio with the highest utility.

(Module 20.2, LOS 20.c)

60. (C) When the return on an asset added to a portfolio has a correlation coefficient of less than one with the other portfolio asset returns but has the same risk, adding the asset will not decrease the overall portfolio standard deviation.

Explanation

When the return on an asset added to a portfolio has a correlation coefficient of less than one with the other portfolio asset returns but has the same risk, adding the asset will decrease the overall portfolio standard deviation. Any time the correlation coefficient is less than one, there are benefits from diversification. The other choices are true.

(Module 20.4, LOS 20.f)

61. (C) if they have the same expected return.

Explanation

Investors are risk averse. Given a choice between assets with equal rates of expected return, the investor will always select the asset with the lowest level of risk. Risk aversion does not imply that an investor will choose the less risky of two assets in all cases, or that an investor is unwilling to accept greater risk to achieve a greater expected return.

(Module 20.2, LOS 20.b)

62. (A) A and B.

Explanation

Portfolios A and B have the lowest correlation coefficient and will thus create the lowestrisk portfolio.

The standard deviation of a portfolio = $[W1^2\sigma1^2 + W2^2\sigma2^2 + 2W_1W_2\sigma_1\sigma_2r_{1,2}]^{1/2}$

The correlation coefficient, $r_{1,2}$, varies from + 1 to - 1. The smaller the correlation coefficient, the smaller $\sigma_{portfolio}$ can be. If the correlation coefficient were - 1, it would be possible to make $\sigma_{portfolio}$ go to zero by picking the proper weightings of W_1 and W_2

(Module 20.3, LOS 20.e)

63. (A) risk averse.

Explanation

Given two investments with the same expected return, a risk averse investor will prefer the investment with less risk. A risk neutral investor will be indifferent between the two investments. A risk seeking investor will prefer the investment with more risk.

(Module 20.2, LOS 20.b)

64. (B) If the covariance is negative, the rates of return on two investments will always move in different directions relative to their means.

Explanation

Negative covariance means rates of return for one security will tend to be above its mean return in periods when the other is below its mean return, and vice versa. Positive covariance means that returns on both securities will tend to be above (or below) their mean returns in the same time periods. For the returns to always move in opposite directions, they would have to be perfectly negatively correlated. Negative covariance by itself does not imply anything about the strength of the negative correlation, it must be standardized by dividing by the product of the securities' standard deviations of return.

(Module 20.3, LOS 20.d)

65. (B) 0.0022.

Explanation

The formula is: (correlation)(standard deviation of A)(standard deviation of B) = (0.20)(0.122) (0.089) = 0.0022.

(Module 20.3, LOS 20.d)

66. (C) Investor X is less risk-averse than Investor Y.

Explanation

Investor X has a steep indifference curve, indicating that he is risk-averse. Flatter indifference curves, such as those for Investor Y, indicate a less risk-averse investor. The other choices are true. A more risk-averse investor will likely obtain lower returns than a less risk-averse investor.

(Module 20.2, LOS 20.c