

Question 1

L2R53TB-AC004-1512

LOS: LOS-10740

Lesson Reference: Lesson 2: Types of Multifactor Models and Selected Applications

Difficulty: medium

A fund returns 15% while its benchmark returns 12% during the same time period. The fund has higher volatility than the benchmark and the standard deviation of the time series of differences between the fund and the benchmark is 4%. Which of the following is *most likely* to increase the fund manager's tracking risk?

- ☐ An increase in the information ratio.
- ☐ A shift to an enhanced index strategy.
- ☒ An increase in the standard deviation of the time series.

Rationale

 **An increase in the information ratio.**

Tracking risk is calculated as follows:

$$\text{Tracking risk} = (R_p - R_B) \times s$$

Any increase in standard deviation of the time series, represented by s in the formula, will increase tracking risk.

Rationale

 **A shift to an enhanced index strategy.**

Tracking risk is calculated as follows:

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Any increase in standard deviation of the time series, represented by s in the formula, will increase tracking risk.

Rationale

 **An increase in the standard deviation of the time series.**

Tracking risk is calculated as follows:

$$\text{Tracking risk} = (R_p - R_B) \times s$$

Any increase in standard deviation of the time series, represented by s in the formula, will increase tracking risk.

Question 2

L2R53TB-ITEMSET-AC001-1512

LOS: LOS-10730

LOS: LOS-10720

LOS: LOS-10750

Lesson Reference: Lesson 1: Introduction and Arbitrage Pricing Theory

Difficulty: N/A

Use the following information to answer the next 3 questions:

Ross Thomas, CFA, has developed a factor model for describing equity returns in Sweden. Thomas has found that Swedish stock returns are most sensitive to surprises in inflation and exports. Thomas has a client who wants to add two Swedish stocks to her portfolio because of the perceived diversification benefits and her confidence in Thomas and his ability to locate undervalued stocks. He has identified Lars Petrol and Bay Financial and estimates a zero correlation coefficient with these two and the rest of her U.S. portfolio.

The factor model developed by Thomas takes the form:

$$\begin{aligned}R_{\text{LARS}} &= 0.08 - 1.2 F_{\text{INFL}} + 1.8 F_{\text{EXP}} + \varepsilon_{\text{LARS}} \\R_{\text{BAY}} &= 0.06 - 0.9 F_{\text{INFL}} + 1.7 F_{\text{EXP}} + \varepsilon_{\text{BAY}}\end{aligned}$$

Thomas believes a 40% allocation to Lars and 60% allocation to Bay is optimal. He also expects surprises in both factors to be 1% and the surprise in the error terms to be 0.7% each.

After Thomas meets with this client and explains his model to her, he offers the following comments:

Comment 1: You should realize significant diversification benefits with the addition of these two Swedish stocks even though their individual standard deviations are higher than any U.S. stock in your portfolio.

Comment 2: The error terms in the model represents the amount of return that cannot be explained by the intercept and slope coefficients in the model.

i.

Thomas is *most likely* utilizing a:

- ☐ statistical factor model.
- ☐ fundamental factor model.
- ☒ macroeconomic factor model.

Rationale

✔ This Answer is Correct

Inflation and exports are variables used in a macroeconomic factor model.

Rationale

✔ **This Answer is Correct**

Inflation and exports are variables used in a macroeconomic factor model.

Rationale

✔ **This Answer is Correct**

Inflation and exports are variables used in a macroeconomic factor model.

ii.

The expected return on the portfolio is *closest to*:

- ☒ 8.2%
☐ 10.3%
☐ 16.8%

Rationale

✘ **This Answer is Incorrect**

The expected return is:

$$R_i = 0.40(a_i + b_{i,1}F_{INFL} + b_{i,2}F_{EXP} + \varepsilon_{LARS}) + 0.60(a_i + b_{i,1}F_{INFL} + b_{i,2}F_{EXP} + \varepsilon_{BAY})$$

Choice B is a mathematical error that considers the first factor positive, not negative; choice C does not adjust the returns for the 40/60 allocation.

Rationale

✘ **This Answer is Incorrect**

The expected return is:

$$R_i = 0.40(a_i + b_{i,1}F_{INFL} + b_{i,2}F_{EXP} + \varepsilon_{LARS}) + 0.60(a_i + b_{i,1}F_{INFL} + b_{i,2}F_{EXP} + \varepsilon_{BAY})$$

Choice B is a mathematical error that considers the first factor positive, not negative; choice C does not adjust the returns for the 40/60 allocation.

Rationale

✘ **This Answer is Incorrect**

The expected return is:

$$R_i = 0.40(a_i + b_{i,1}F_{INFL} + b_{i,2}F_{EXP} + \varepsilon_{LARS}) + 0.60(a_i + b_{i,1}F_{INFL} + b_{i,2}F_{EXP} + \varepsilon_{BAY})$$

Choice B is a mathematical error that considers the first factor positive, not negative; choice C does not adjust the returns for the 40/60 allocation.

iii.

With respect to his comments, Thomas is *most likely* correct in making:

- ☒ both comments.
- ☐ Comment 2, only.
- ☐ Comment 1, only.

Rationale

This Answer is Incorrect

The individual standard deviations are not nearly as important as the covariance between Swedish stocks and U.S. stocks. With zero correlations, and therefore, zero covariance, it is highly likely that there will be significant diversification benefits. Consequently, Comment 1 is accurate. The error terms represent the component of return that is unexplained by the model, so Comment 2 is also accurate.

Rationale

This Answer is Incorrect

The individual standard deviations are not nearly as important as the covariance between Swedish stocks and U.S. stocks. With zero correlations, and therefore, zero covariance, it is highly likely that there will be significant diversification benefits. Consequently, Comment 1 is accurate. The error terms represent the component of return that is unexplained by the model, so Comment 2 is also accurate.

Rationale

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Question 3

L2R53TB-AC003-1512

LOS: LOS-10720

Lesson Reference: Lesson 1: Introduction and Arbitrage Pricing Theory

Difficulty: medium

An analyst develops a two-factor economic model to predict returns in the financial services industry, using FED outlook and Leverage as relevant factors. The analyst finds the risk-free rate to be 3.8% and constructs the following table:

Factor	Factor Sensitivity	Risk Premium
FED Outlook	0.46	3.63
Leverage	1.65	4.11

The expected return on the industry is *closest to*:

- ☐ 8.45%
- ☒ 12.25%
- ☐ 15.75%

Rationale

 **8.45%**

The expected return is:

$$R_i = a_i + b_{i,1}F_1 + b_{i,2}F_2 + \dots + b_{i,K}F_K + \varepsilon_i$$
$$R_{\text{FIN SERV}} = 0.038 + (0.46)(0.0363) + (1.65)(0.0411) = 0.1225 = 12.25\%$$

The first option omits adding the first term, the risk-free rate; the third option incorrectly squares the sensitivity factors in the formula.

Rationale

 **12.25%**

The expected return is:

$$R_i = a_i + b_{i,1}F_1 + b_{i,2}F_2 + \dots + b_{i,K}F_K + \varepsilon_i$$
$$R_{\text{FIN SERV}} = 0.038 + (0.46)(0.0363) + (1.65)(0.0411) = 0.1225 = 12.25\%$$

The first option omits adding the first term, the risk-free rate; the third option incorrectly squares the sensitivity factors in the formula.

Rationale

✖ 15.75%

The expected return is:

$$R_i = a_i + b_{i,1}F_1 + b_{i,2}F_2 + \dots + b_{i,K}F_K + \varepsilon_i$$
$$R_{\text{FIN SERV}} = 0.038 + (0.46)(0.0363) + (1.65)(0.0411) = 0.1225 = 12.25\%$$

The first option omits adding the first term, the risk-free rate; the third option incorrectly squares the sensitivity factors in the formula.

Question 4

L2R53TB-AC006-1512

LOS: LOS-10750

Lesson Reference: Lesson 2: Types of Multifactor Models and Selected Applications

Difficulty: medium

A forty-year old investor with significant labor income who believes he is exposed to two types of systematic risks will *most likely* allocate funds to the risk-free asset plus the market portfolio plus a(an):

- ☐ passive defensive fund.
- ☒ actively-managed fund over-weighted in counter cyclical stocks.
- ☐ actively-managed fund over-weighted in both defensive stocks and procyclical stocks.

Rationale

 **passive defensive fund.**


A labor-intensive investor wants his portfolio to be subject to different risks than his income, so he would benefit from an actively-managed fund that was allocated in stocks that rise in value during tougher economic times. This will prevent a double loss of employment and portfolio value.

Rationale

 **actively-managed fund over-weighted in counter cyclical stocks.**

A labor-intensive investor wants his portfolio to be subject to different risks than his income, so he would benefit from an actively-managed fund that was allocated in stocks that rise in value during tougher economic times. This will prevent a double loss of employment and portfolio value.

Rationale

 **actively-managed fund over-weighted in both defensive stocks and procyclical stocks.**

A labor-intensive investor wants his portfolio to be subject to different risks than his income, so he would benefit from an actively-managed fund that was allocated in stocks that rise in value during tougher economic times. This will prevent a double loss of employment and portfolio value.

Question 5

L2PM-PQ5305-1511

LOS: LOS-10730

Lesson Reference: Lesson 2: Types of Multifactor Models and Selected Applications

Difficulty: medium

Juan Diaz is analyzing the returns on a portfolio of two stocks, Alpha Ltd. (AL) and Beta Ltd. (BL). The following macroeconomic model results are provided:

$$R_{AL} = 0.20 + 3F_1 - 6F_2 + \varepsilon_{AL}$$

$$R_{BL} = 0.15 + 6F_1 + 3F_2 + \varepsilon_{BL}$$

Thirty percent of the portfolio is invested in AL, and 70% is invested in BL. Given that F_1 and F_2 equal 1% and 2%, respectively, and that the error terms for both stocks equal 0.2%, then the expected return and actual return on the portfolio are *closest* to:

	Expected Return	Actual Return
A.	17.50%	19.20%
B.	16.50%	22.40%
C.	22.40%	16.50%

☐ Row A

☒ Row B

☐ Row C

Rationale

 **This Answer is Correct**

$$\text{Expected return} = (0.2 \times 0.3) + (0.15 \times 0.7) = 16.5\%$$

$$\text{Portfolio's sensitivity to } F_1 = (3 \times 0.3) + (6 \times 0.7) = 5.1$$

$$\text{Portfolio's sensitivity to } F_2 = (-6 \times 0.3) + (3 \times 0.7) = 0.3$$

$$\text{Macroeconomic model for the portfolio: } R = 0.165 + 5.1F_1 + 0.3F_2 + 0.3\varepsilon_{AL} + 0.7\varepsilon_{BL}$$

$$0.165 + (5.1 \times 0.01) + (0.3 \times 0.02) + (0.3 \times 0.002) + (0.7 \times 0.002) = 22.40\%$$

Question 6

L2PM-PQ5301-1511

LOS: LOS-10700

LOS: LOS-10710

LOS: LOS-10720

Lesson Reference: Lesson 1: Introduction and Arbitrage Pricing Theory

Difficulty: medium

Consider the following statements:

Statement 1: The intercept term in the APT equation is alpha, or excess return.

Statement 2: The explanatory variables in the APT equation are all systematic risk factors.

Which of the following is *most* likely?

- ☐ Only Statement 1 is correct.
- ☒ Only Statement 2 is correct.
- ☐ Both statements are incorrect.

Rationale

This Answer is Correct

The intercept term in the APT equation is the risk-free rate. It represents the rate of return if the portfolio has zero sensitivity to all risk factors (or zero systematic risk). Each factor in the APT model represents a priced risk.

Question 7

L2PM-PQ5306-1511

LOS: LOS-10730

Lesson Reference: Lesson 2: Types of Multifactor Models and Selected Applications

Difficulty: medium

The intercept term in the macroeconomic factor model *most* likely represents:

- ☐ Excess return.
- ☒ Expected return.
- ☐ Risk-free rate.

Rationale

This Answer is Correct

The intercept term in the macroeconomic factor model represents the expected return based on current expectations of the variables incorporated in the model.

Question 8

L2R53TB-AC005-1512

LOS: LOS-10750

Lesson Reference: Lesson 2: Types of Multifactor Models and Selected Applications

Difficulty: medium

An investor expects inflation to be lower than the market anticipates over the next year. The investor benefits from which position and would select which factor sensitivity in a factor portfolio?

Position Factor Sensitivity to Inflation

- | | |
|----------|-----|
| A. Long | 1.0 |
| B. Long | 0.0 |
| C. Short | 1.0 |

- ☒ Row A.
- ☐ Row B.
- ☐ Row C.

Rationale

✓ Row A.

The investor benefits if inflation falls more than what other investors expect. Therefore, the investor will take the long position and his holdings will appreciate as inflation falls. He will choose a factor sensitivity to inflation of 1 and factor sensitivities to other variables of 0. This will maximize his return to the surprise inflation factor.

Rationale

✗ Row B.

The investor benefits if inflation falls more than what other investors expect. Therefore, the investor will take the long position and his holdings will appreciate as inflation falls. He will choose a factor sensitivity to inflation of 1 and factor sensitivities to other variables of 0. This will maximize his return to the surprise inflation factor.

Rationale

✗ Row C.

The investor benefits if inflation falls more than what other investors expect. Therefore, the investor will take the long position and his holdings will appreciate as inflation falls. He will choose a factor sensitivity to inflation of 1 and factor sensitivities to other variables of 0. This will maximize his return to the surprise inflation factor.

Question 9

L2PM-PQ5302-1511

LOS: LOS-10700

Lesson Reference: Lesson 1: Introduction and Arbitrage Pricing Theory

Difficulty: medium

Which of the following is *least* likely an assumption of arbitrage pricing theory?

- ☐ No arbitrage opportunities exist.
- ☒ Systematic risk is diversified away.
- ☐ Asset returns are described by a factor model.

Rationale

 **This Answer is Correct**

APT assumes that all unsystematic risk is diversified away.

Question 10

L2PM-PQ5304-1511

LOS: LOS-10730

Lesson Reference: Lesson 2: Types of Multifactor Models and Selected Applications

Difficulty: medium

Antonio derives the following two-factor model to explain the returns on the stock of Global Traders (GT):

$$R_{GT} = \alpha_{GT} + 2.5F_{GDP} - 1.5F_{INFL} + \varepsilon_{GT}$$

The following information is also available:

- The expected return on the company's stock is 13%.
- Over the past year, the actual value of gross domestic product (GDP) was lower than its predicted value by 1.5%, while actual inflation was higher than its predicted value by 2%.
- Company-specific return (i.e., unrelated to GDP and the inflation rate) equals 1.25%.

The return on the company's stock for the year based on the macroeconomic factor model is *closest* to:

- ☐ 15%
- ☐ 13.50%
- ☒ 7.50%

Rationale

✔ This Answer is Correct

$$R_{GT} = \alpha_{GT} + 2.5F_{GDP} - 1.5F_{INFL} + \varepsilon_{GT}$$

$$R_{GT} = 0.13 + [2.5 \times (-0.015)] - (1.5 \times 0.02) + 0.0125$$

$$R_{GT} = 7.50\%$$