CFA Institute®
Investment Foundations

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Module 7: INDUSTRY CONTROLS

Chapter 19: Performance Evaluation

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Faculty Bio

Module	Topic	Weight	LOS	Exam Qs	Hours to Study	Module Practice Qs	Chapter Practice Qs
Module 1	**Industry overview**	5%	7	6	5	28	28
Chapter 1	The Investment Industry: A Top-Down View						
Module 2	**Ethics and regulation**	10%	14	12	10	91	
Chapter 2	Ethics and Investment Professionalism						49
Chapter 3	Regulation						42
Module 3	**Inputs and tools**	20%	50	24	20	291	
Chapter 4	Microeconomics						53
Chapter 5	Macroeconomics						57
Chapter 6	Economics of International Trade						47
Chapter 7	Financial Statements						70
Chapter 8	Quantitative Concepts						64
Module 4	**Investment instruments**	20%	29	24	20	213	
Chapter 9	Debt Securities						69
Chapter 10	Equity Securities						72
Chapter 11	Derivatives						42
Chapter 12	Alternative Investments						30
Module 5	**Industry structure**	20%	27	24	20	96	
Chapter 13	Structure of the Investment Industry						28
Chapter 14	Investment Vehicles						29
Chapter 15	The Functioning of Financial Markets						39
Module 6	**Serving client needs**	5%	12	6	5	76	
Chapter 16	Investors and Their Needs						35
Chapter 17	Investment Management						41
Module 7	**Industry controls**	20%	24	24	20	154	
Chapter 18	Risk Management						51
Chapter 19	Performance Evaluation						53
Chapter 20	Investment Industry Documentation						50
	Total	**100%**	**163**	**120**	**100**	**949**	**949**

AFTER COMPLETING THIS CHAPTER, YOU SHOULD BE ABLE TO DO THE FOLLOWING:

a) Describe a performance evaluation process;
b) Describe measures of return, including holding-period returns and time-weighted rates of return;
c) Compare use of arithmetic and geometric mean rates of returns in performance evaluation;
d) Describe measures of risk, including standard deviation and downside deviation;
e) Describe reward-to-risk ratios, including the Sharpe and Treynor ratios;
f) Describe uses of benchmarks and explain the selection of a benchmark;
g) Explain measures of relative performance, including tracking error and the information ratio;
h) Explain the concept of alpha;
i) Explain uses of performance attribution.

PERFORMANCE EVALUATION PROCESS

Measure absolute returns

Adjust returns for risk

Measure relative returns

Attribute performance

LOS a: Describe a performance evaluation process.

HOLDING-PERIOD RETURN

The return for a period: a day, a month, a year, or longer

$$HPR = \frac{P_1 - P_0 + D_t}{P_0}$$

Holding period return = $\frac{\text{Capital gain or loss + Income}}{\text{Beginning value}}$

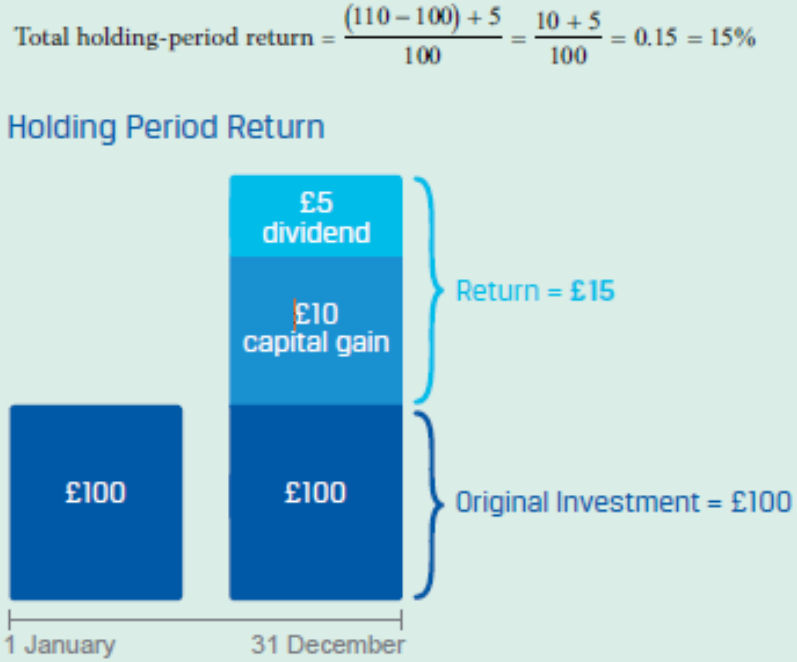
Income = Dividends and/or interest

Assume that between 1 January and 31 December, an investment increases in value from £100 to £110 and pays a £5 dividend.

Capital gain = £110 – £100 = £10
Income = £5
Holding period return = (£110 – £100 + £5)/£100 = 15%

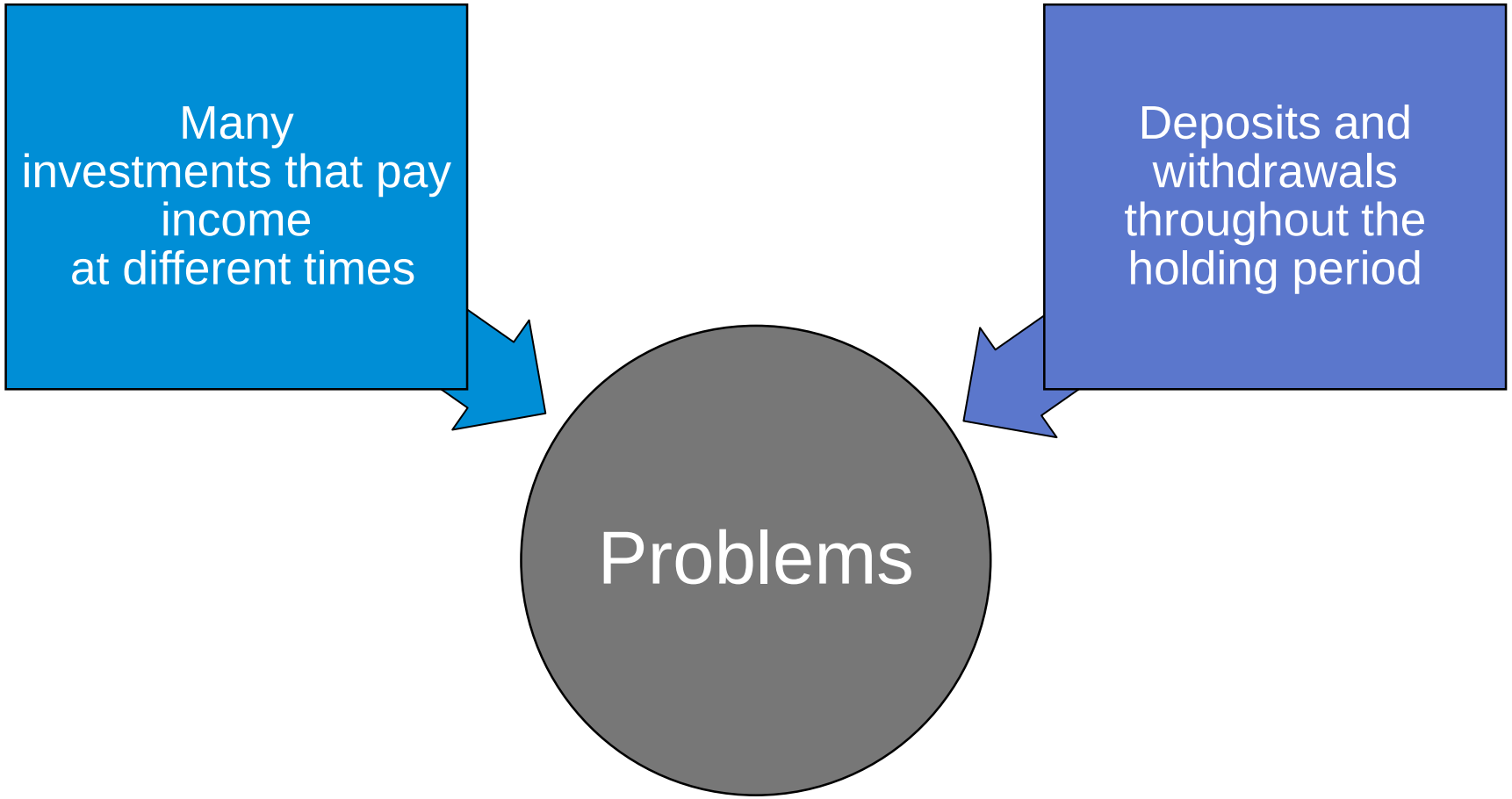
$$HPY = \frac{(Ending\ Price - Beginning\ Price + Dividends)}{Beginning\ Price}$$

Total holding-period return = $\frac{(110-100)+5}{100} = \frac{10+5}{100} = 0.15 = 15\%$



LOS b: Describe measures of return, including holding-period returns and time-weighted rates of return.

PROBLEMS WITH CALCULATING A FUND'S HOLDING-PERIOD RETURN



LOS b: Describe measures of return, including holding-period returns and time-weighted rates of return.

TIME-WEIGHTED RETURNS

Assume an investment fund is worth $100 million on 1 January, $98 million on 30 June, and $110 million on 31 December. On 1 July, $5 million was added to the fund.

What is the annual time-weighted return?

- Holding-period return$_1$ = R_1 = (98 – 100)/100 = –2.0%
- Holding-period return$_2$ = R_2 = [110 – (98 + 5)]/(98 + 5) = 6.8%
- Arithmetic return = –2.0% + 6.8% = 4.8%
- Compounded return = (1 – 0.02)(1 + 0.068) – 1 = 4.66%
  Compounded return is the geometric return.

Note: Holding Period 1 = January to June.
Holding Period 2 = July to December.

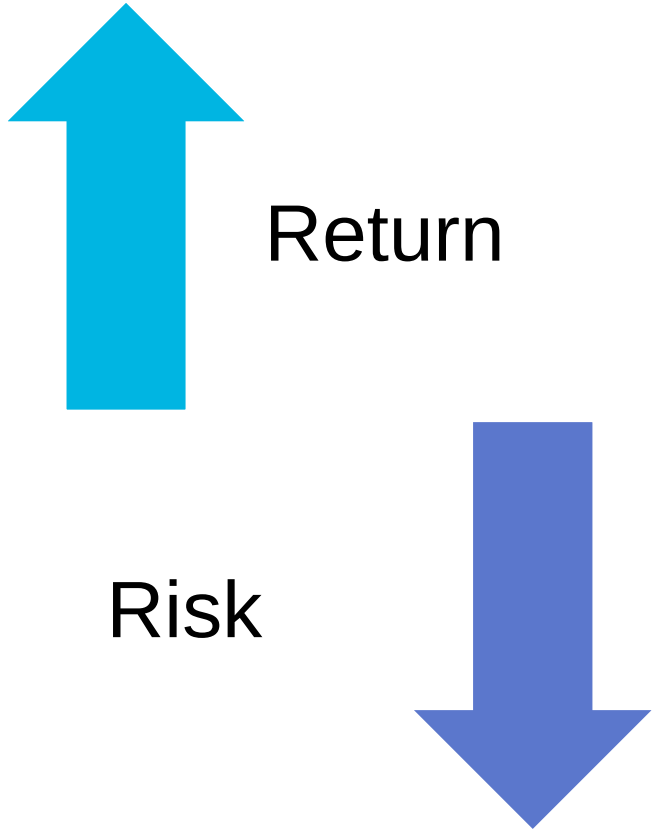
$$R = [(1 + R_1) \times (1 + R_2)] - 1$$

Geometric return < Arithmetic return when variability in returns

LOS c: Compare use of arithmetic and geometric mean rates of returns in performance evaluation.

ADJUSTING RETURNS FOR RISK

Investor Preferences:



LOS d: Describe measures of risk, including standard deviation and downside deviation.

MEASURES OF RISK: STANDARD DEVIATION

Population	Sample
$\sigma^2 = \frac{\sum_{t=1}^{T}(R_t - \mu)^2}{n}$	$s^2 = \frac{\sum_{t=1}^{T}(R_t - \bar{R})^2}{n-1}$
$\sigma = \sqrt{\sigma^2}$	$s = \sqrt{s^2}$

A common measure of volatility is the standard deviation of returns (discussed in Quantative Concepts chapter):

$$\text{Standard deviation} = \sqrt{\frac{[X_1 - E(X)]^2 + [X_2 - E(X)]^2 + \cdots + [X_n - E(X)]^2}{n - 1}}$$

Exhibits 2A and 2B in the reading show standard deviations for four equity, three bond, and two commercial property portfolios.

The standard deviation for equity funds ranged from more than 20% to about 40%.

For the European government and corporate bond funds, it is less than 5%, and for high-yield and commercial property portfolios it is less than 10%.

This result is consistent with the concept that equities are more risky than bonds.

LOS d: Describe measures of risk, including standard deviation and downside deviation.

MEASURES OF RISK: DOWNSIDE DEVIATION

- Psychologists and economists have discovered that investors dislike losses more than they like equivalent gains.
  - So, investors might be happy about a positive return of 10% but ***very unhappy*** about a loss of 10%.
- Downside deviation is calculated in almost exactly the same way as standard deviation, but instead of using all the deviations from the average, positive and negative, downside deviation is calculated using only negative deviations or by focussing on outcomes that are less than some specified return target, not necessarily the mean.

LOS d: Describe measures of risk, including standard deviation and downside deviation.

REWARD-TO-RISK RATIOS

$$\text{Reward to Risk ratio} = = \frac{R_p}{\sigma_p}$$

$$\text{Sharpe ratio} = \frac{R_p - R_f}{\sigma_p}$$

$$\text{Treynor ratio} = \frac{R_p - R_f}{\beta_p}$$

Reward-to-Risk Ratio
$\text{Reward-to-risk ratio} = \frac{\text{Measure of portfolio return}}{\text{Measure of portfolio risk}}$
The higher the value of the reward-to-risk ratio, the better the risk-adjusted return—that is, the higher the return per unit of risk.

LOS e: Describe reward-to-risk ratios, including the Sharpe and Treynor ratios.

SHARPE RATIO

Assume: Portfolio return = 10%, R_f = 4%,
Standard deviation = 5%, and beta is 1.8

Reward-to-Risk Ratio $= \dfrac{\text{Measure of portfolio return}}{\text{Measure of portfolio risk}}$

$$\text{Sharpe Ratio} = \frac{\text{Return on portfolio} - \text{Risk–free return}}{\text{Standard deviation of portfolio returns}}$$

$$\text{Sharpe ratio} = \frac{R_p - R_f}{\sigma_p}$$

$$\text{Sharpe Ratio} = \frac{\text{Excess return on portfolio}}{\text{Standard deviation of portfolio returns}}$$

$$\text{Sharpe Ratio} = \frac{10\% - 4\%}{5\%} = 1.2$$

LOS e: Describe reward-to-risk ratios, including the Sharpe and Treynor ratios.

TREYNOR RATIO

$$\text{Sharpe ratio} = \frac{R_p - R_f}{\sigma_p}$$

$$\text{Treynor ratio} = \frac{R_p - R_f}{\beta_p}$$

Assume portfolio return = 10%, R_f = 4%,
Standard deviation = 5%, and Beta is 1.8

Reward-to-Risk Ratio $= \dfrac{\text{Measure of portfolio return}}{\text{Measure of portfolio risk}}$

$$\text{Treynor Ratio} = \frac{\text{Return on portfolio} - \text{Risk-free return}}{\text{Beta of portfolio returns}}$$

$$\text{Treynor ratio} = \frac{R_p - R_f}{\beta_p}$$

$$\text{Treynor Ratio} = \frac{\text{Excess Return on Portfolio}}{\text{Beta of Portfolio Returns}}$$

$$\text{Treynor Ratio} = \frac{10\% - 4\%}{1.8} = 3.33$$

Note: The Sharpe ratio uses standard deviation, and the Treynor ratio uses beta, a measure of the portfolio's systematic risk.

LOS e: Describe reward-to-risk ratios, including the Sharpe and Treynor ratios.

PRACTICE Q: EXPERT

A portfolio manager invests in large-cap US common stocks, such as those found in the S&P 500 Index. Which of the following is the worst measure of the manager's performance?

A. The average risk-adjusted return of the portfolio over the last five years minus the average risk-adjusted return of the S&P 500 Index over the same period.

B. The Sharpe ratio of the portfolio calculated using the last five years' returns relative to the Sharpe ratios of other large-cap stock portfolios over the same period.

C. The standard deviation of the portfolio's returns over the last five years relative to the standard deviations of other large-cap stock portfolios over the same period.

PRACTICE Q: EXPERT

A portfolio manager invests in large-cap US common stocks, such as those found in the S&P 500 Index. Which of the following is the worst measure of the manager's performance?

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B. The Sharpe ratio of the portfolio calculated using the last five years' returns relative to the Sharpe ratios of other large-cap stock portfolios over the same period.

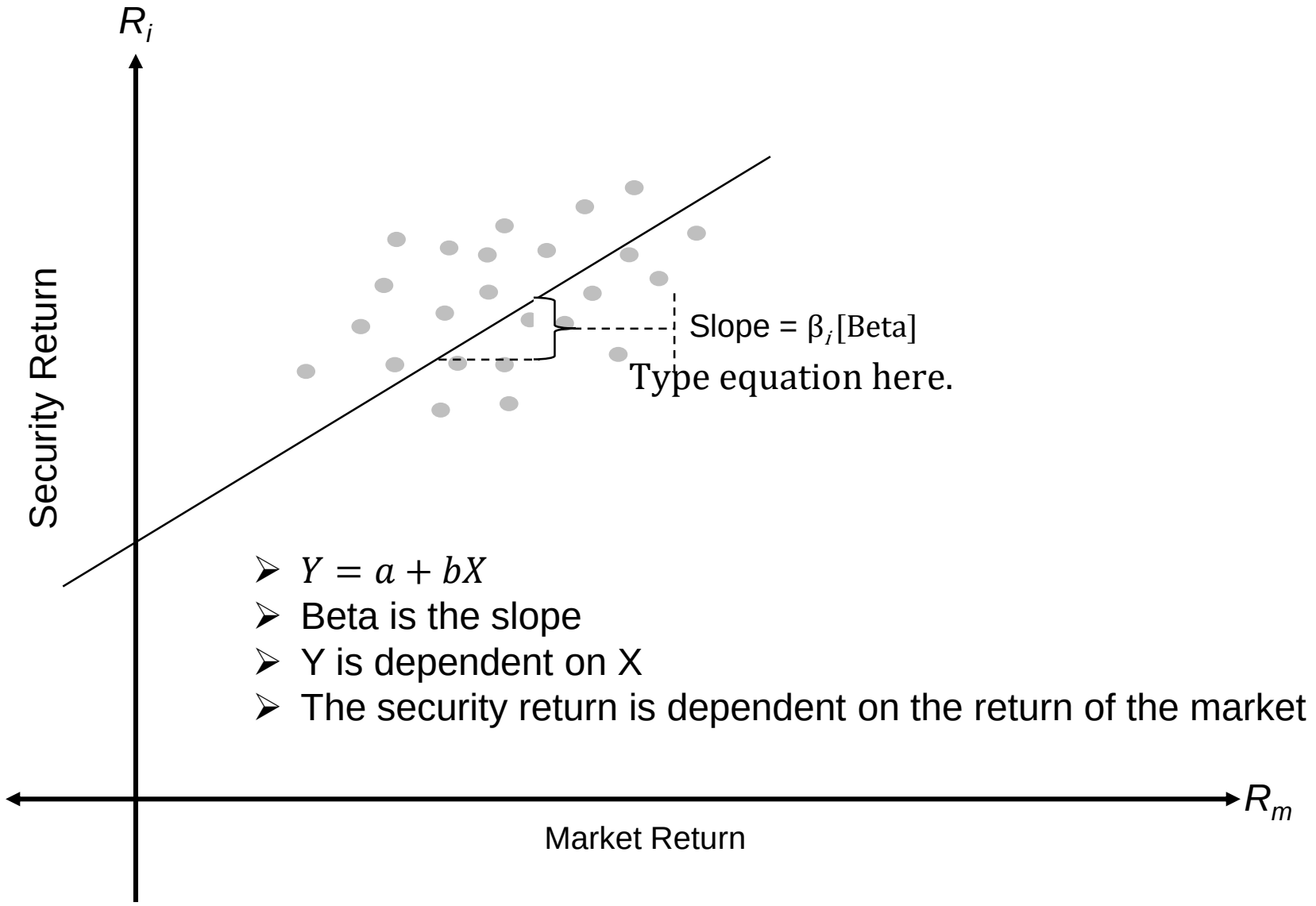
C. The standard deviation of the portfolio's returns over the last five years relative to the standard deviations of other large-cap stock portfolios over the same period.

C is correct. Standard deviation is a measure of risk, but it does not consider return. The portfolio might have less risk than the S&P 500 (a good thing) but also have lower returns (a bad thing). Risk alone is not a good indication of performance.

A is incorrect. Comparing the risk-adjusted return of the portfolio to the risk-adjusted return of the benchmark is a good indication of the portfolio's performance relative to its benchmark (a measure of opportunity cost.) This is better than measuring risk alone.

B is incorrect. Comparing the Sharpe ratio of the portfolio to that of other actively managed portfolios investing in the same securities is a good measure of the portfolio's performance relative to other options available to an investor. This is better than measuring risk alone.

HOW TO CALCULATE A BETA



- $Y = a + bX$
- Beta is the slope
- Y is dependent on X
- The security return is dependent on the return of the market

HOW TO CALCULATE A BETA

The formula to calculate a beta is to divide the covariance of the asset and the market by the Variance of the market.

$$\beta = \frac{cov_{xy}}{\sigma^2 x}$$

$$cov_{xy} = \sum_{i=1}^{N} \frac{(x_i - \bar{x})(y_i - \bar{y})}{n-1}$$

$$Variance: \quad s^2 = \frac{\sum (x_i - \bar{x})^2}{(n-1)}$$

Recall that we can restate covariance as the correlation coefficient multiplied by the standard deviations. We used this in the formula for the standard deviation of a two-asset portfolio.

$$cov_{xy} = R_{xy}\,\sigma_x\,\sigma_y$$

$$R_{xy} = \frac{cov(X,Y)}{\sigma_x \sigma_y}$$

Also, we could rewrite $\sigma^{2\,x} = \sigma_x\ \sigma_x$

So, we can adjust the beta formula:

$$\beta = \frac{R_{xy}\,\sigma_x\,\sigma_y}{\sigma_x\ \sigma_x}$$

HOW TO CALCULATE A BETA

Simplifying the algebra by crossing out one variance of the market in the numerator against one variance of the market in the denominator:

$$\beta = \frac{R_{xy}\,\sigma_y\,\cancel{\sigma_x}}{\sigma_x\,\cancel{\sigma_x}}$$

$$\beta = \frac{R_{xy}\,\sigma_y}{\sigma_x}$$

This becomes the commonly used formula for beta when slightly rearranged:

$$\beta = R_{xy} \times \frac{\sigma_y}{\sigma_x}$$

$$\beta = \frac{cov_{xy}}{\sigma^2 x}$$

1) Calculate Average Return for Index	*Need a time p		0.74
2) Calculate Average Return for Stock			1.45
3) Calculate Covariance			3.90
4) Calculate Variance Market			4.38
5) Beta = Covariance / Variance Mkt			0.89

HOW TO CALCULATE A BETA

		GE		1	Variance	S&P 500		2	Variance		1 x 2
N	Date	Closing price	Rate of return %	R - ER	(R-ER)2	Closing price	Rate of return %	R - ER	(R-ER)2	Covariance	$\frac{(x_i-\bar{x})(y_i-\bar{y})}{n-1}$ (R-ER)*(R-ER)
0	Dec-03	30.98	y_i	$y_i-\bar{y}$	$(y_i-\bar{y})^2$	1,111.92	x_i	$x_i-\bar{x}$	$(x_i-\bar{x})^2$		
1	Jan-04	33.63	8.55	7.11	50.50	1,131.13	1.73	0.99	0.97		7.02
2	Feb-04	32.52	-3.30	-4.75	22.55	1,144.94	1.22	0.48	0.23		-2.28
3	Mar-04	30.52	-6.15	-7.60	57.72	1,126.21	-1.64	-2.38	5.65		18.05
4	Apr-04	29.95	-1.87	-3.32	10.99	1,107.30	-1.68	-2.42	5.85		8.02
5	May-04	31.12	3.91	2.46	6.05	1,120.68	1.21	0.47	0.22		1.15
6	Jun-04	32.4	4.11	2.67	7.11	1,140.84	1.80	1.06	1.12		2.82
7	Jul-04	33.25	2.62	1.18	1.38	1,101.72	-3.43	-4.17	17.38		-4.90
8	Aug-04	32.79	-1.38	-2.83	8.01	1,104.24	0.23	-0.51	0.26		1.45
9	Sep-04	33.58	2.41	0.96	0.92	1,114.58	0.94	0.20	0.04		0.19
10	Oct-04	34.12	1.61	0.16	0.03	1,130.20	1.40	0.66	0.44		0.11
11	Nov-04	35.36	3.63	2.19	4.78	1,173.82	3.86	3.12	9.73		6.82
12	Dec-04	36.5	3.22	1.78	3.16	1,211.92	3.25	2.51	6.28		4.45
			17.37		173	sum	8.88		48	sum	43
	$\bar{y}$	Average =	1.45	Variance $\frac{\sum(y_i-\bar{y})^2}{(n-1)}$	5.75	Expected Return	0.74	Variance $\frac{\sum(x_i-\bar{x})^2}{(n-1)}$	4.38	Covariance $\frac{(x_i-\bar{x})(y_i-\bar{y})}{(n-1)}$	3.90
		is in same units as data =		Std. Dev	3.97		$\bar{x}$	Std. Dev	2.09	Beta	0.89
				Variance	15.75			Variance	4.38		
		portfolio	50%	Std. Dev	3.97	50%		Std. Dev	2.09		

Beta

Investment Analysis and Portfolio Management by Frank K. Reilly (Author), Keith C. Brown (Author)

MEASURING RELATIVE RETURNS

LOS f: Describe uses of benchmarks and explain the selection of a benchmark.

USES OF BENCHMARKS

Some fund managers use a benchmark for assessment.

Others, such as index fund managers, may also manage their portfolios to a benchmark.

- The manager must regularly compare the composition and performance of the portfolio with the composition of a financial market index, such as the FTSE 100 Index or the S&P 500.
- For investors, knowing the financial market index that a fund manager uses as a benchmark will give them some idea of the return and risk that they can expect from investing in that fund.
- Alternatively, a manager might be given a specific mandate reflecting specific risk requirements, return targets, or style or sector preferences, such as investing in biotech companies

LOS f: Describe uses of benchmarks and explain the selection of a benchmark.

CRITERIA FOR SELECTING A BENCHMARK

Investability	It should be made up of assets that the manager can buy and sell.
Compatibility	It should match the investor's objectives.
Clarity	The rules for construction of the benchmark should be clear.
Pre-specification	It should be specified in advance.

LOS f: Describe uses of benchmarks and explain the selection of a benchmark.

PRACTICE Q: EXPERT

An investor's portfolio is managed to a custom benchmark for emerging market equities that uses complex methods for weighting various countries in the benchmark and calculating benchmark returns. These methods are well defined and can be found on the portfolio manager's website. These facts suggest that the benchmark meets which of the following criteria?

A. Clarity
B. Compatibility
C. Pre-specification

PRACTICE Q: EXPERT

An investor's portfolio is managed to a custom benchmark for emerging market equities that uses complex methods for weighting various countries in the benchmark and calculating benchmark returns. These methods are well defined and can be found on the portfolio manager's website. These facts suggest that the benchmark meets which of the following criteria?

A. Clarity

B. Compatibility

C. Pre-specification

A is correct. A benchmark meets the clarity criteria if the rules governing its construction are clear and unambiguous.

B is incorrect. A benchmark meets the compatibility criterion if it is appropriate for the investor’s needs and desires.

C is incorrect. A benchmark meets the pre-specification criterion if it is specified in advance.

TRACKING ERROR AND THE INFORMATION RATIO

Average of the periodic differences

$$\text{Information ratio} = = \frac{\bar{\alpha}_p}{\sigma_{\alpha_p}}$$

Tracking error of the fund

1. Calculate the **periodic differences** between the returns on the fund and the returns on its benchmark. (Alpha). α_p
2. **Tracking error of the fund** = Standard deviation of those periodic differences (Alpha).
   - The larger the tracking error, the larger the deviations between the fund and the benchmark.
3. **Information ratio** = **Average of the periodic differences divided by the tracking error of the fund.**
   - If the information ratio is negative, the fund underperformed its benchmark over the period.
   - If positive, it outperformed its benchmark.

LOS g: Explain measures of relative performance, including tracking error and the information ratio.

TRACKING ERROR AND THE INFORMATION RATIO

Year	UK Equity Portfolio Total Return		FTSE All-Share Index Total Return	Difference α_p
2001	5.00%	<	5.05%	–0.05%
2002	–15.00%	>	–15.30%	0.30%
2003	–28.00%	>	–28.56%	0.56%
2004	32.00%	<	32.96%	–0.96%
2005	15.00%	<	15.45%	–0.45%
2006	24.00%	<	26.40%	–2.40%
2007	13.00%		14.30%	–1.30%
2008	–3.00%		–3.02%	0.02%
2009	–29.00%		–29.15%	0.15%
2010	36.00%		36.36%	–0.36%
Mean	**5.00%**		**5.45%**	
			Average Deviation	**–0.45%**
			Tracking Error	**0.84%**
			Information Ratio	**–0.53**

LOS g: Explain measures of relative performance, including tracking error and the information ratio.

TRACKING ERROR AND THE INFORMATION RATIO

				R_t	$(R_t - \mu)$	$(R_t - \mu)^2$		
		UK Equity Portfolio	FTSE All-Share Index	Difference				
n	Year	Total Return	Total Return					
1	2001	5.00%	5.05%	-0.05%	0.40%	0.0056100100%		
2	2002	-15.00%	-15.30%	0.30%	0.75%	0.0101808100%		
3	2003	-28.00%	-28.56%	0.56%	1.01%	0.0026112100%		
4	2004	32.00%	32.96%	-0.96%	-0.51%	0.0000000100%		
5	2005	15.00%	15.45%	-0.45%	0.00%	0.0380640100%		
6	2006	24.00%	26.40%	-2.40%	-1.95%	0.0072420100%		
7	2007	13.00%	14.30%	-1.30%	-0.85%	0.0021996100%		
8	2008	-3.00%	-3.02%	0.02%	0.47%	0.0035880100%		
9	2009	-29.00%	-29.15%	0.15%	0.60%	0.0000792100%		
10	2010	36.00%	36.36%	-0.36%	0.09%	0.0000792100%		
	Mean	**5.00%**	**5.45%**		0.09%	**0.0696541000%**		
		μ	**Average Deviation**	**-0.45%**		0.007%	$\sigma^2 = \frac{\sum_{t=1}^{T}(R_t - \mu)^2}{n}$	Variance
			Tracking Error	**0.84%**		0.83%	$\sigma = \sqrt{\sigma^2}$	Standard Deviation
			Information Ratio	**–0.53**		**-0.538**		

Microsoft Excel Worksheet

LOS g: Explain measures of relative performance, including tracking error and the information ratio.

PRACTICE Q: EXPERT

A fund manager's portfolio has a negative information ratio for the most recent five-year period. The negative information ratio can be attributed to:

A. a negative fund tracking error.

B. a high portfolio standard deviation.

C. the fund underperforming its benchmark.

PRACTICE Q: EXPERT

A fund manager's portfolio has a negative information ratio for the most recent five-year period. The negative information ratio can be attributed to:

A. a negative fund tracking error.

B. a high portfolio standard deviation.

C. the fund underperforming its benchmark.

Average of the periodic differences

$$\text{Information ratio} = = \frac{\bar{\alpha}_p}{\sigma_{\alpha_p}}$$

Tracking error of the fund

$$\text{Information ratio} = = \frac{\bar{\alpha}_p}{\sigma_{\alpha_p}}$$

$-\alpha_p$

CAN HAVE NEGATIVE APLHA!

C is correct. The information ratio is calculated by dividing the difference in average return between the portfolio and the benchmark by the portfolio tracking error. The numerator is positive if the portfolio outperforms the benchmark and negative if it underperforms the benchmark. The tracking error is the standard deviation of differences between the portfolio and the benchmark. Tracking error cannot have a negative value.

3. **Information ratio** = Average of the periodic differences divided by the tracking error of the fund.
   - If the information ratio is negative, the fund underperformed its benchmark over the period.
   - If positive, it outperformed its benchmark.

PRACTICE Q: EXPERT

If a portfolio's tracking error increases, its information ratio will:

A. grow larger.
B. not be affected.
C. move closer to zero

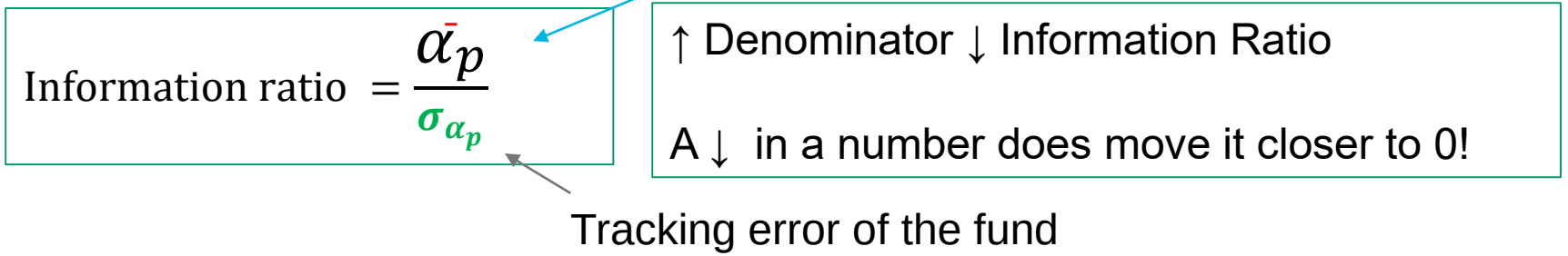
PRACTICE Q: EXPERT

If a portfolio's tracking error increases, its information ratio will:

A. *grow larger.*

B. not be affected.

C. move closer to zero

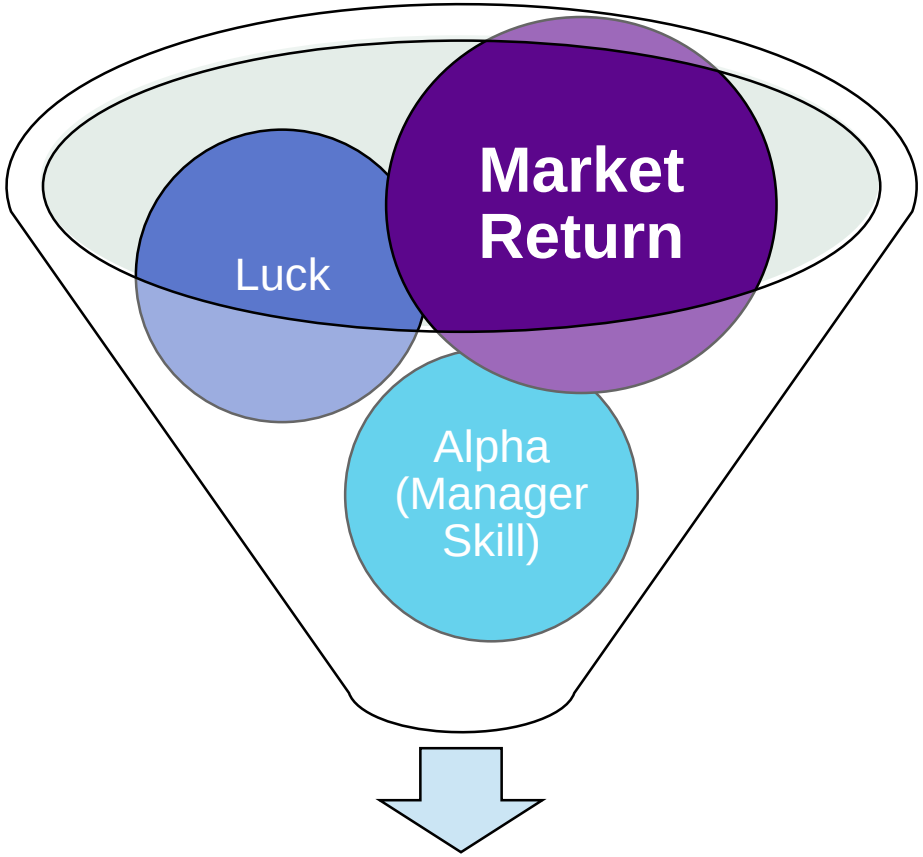


C is correct. The information ratio is the ratio of a portfolio's average excess return over the benchmark to its tracking error. As the tracking error grows larger, the information ratio will move closer to zero. **GROW SMALLER.**

B is incorrect. The information ratio is the ratio of a portfolio's average excess return over the benchmark to its tracking error, so if the tracking error changes, so will the information ratio.

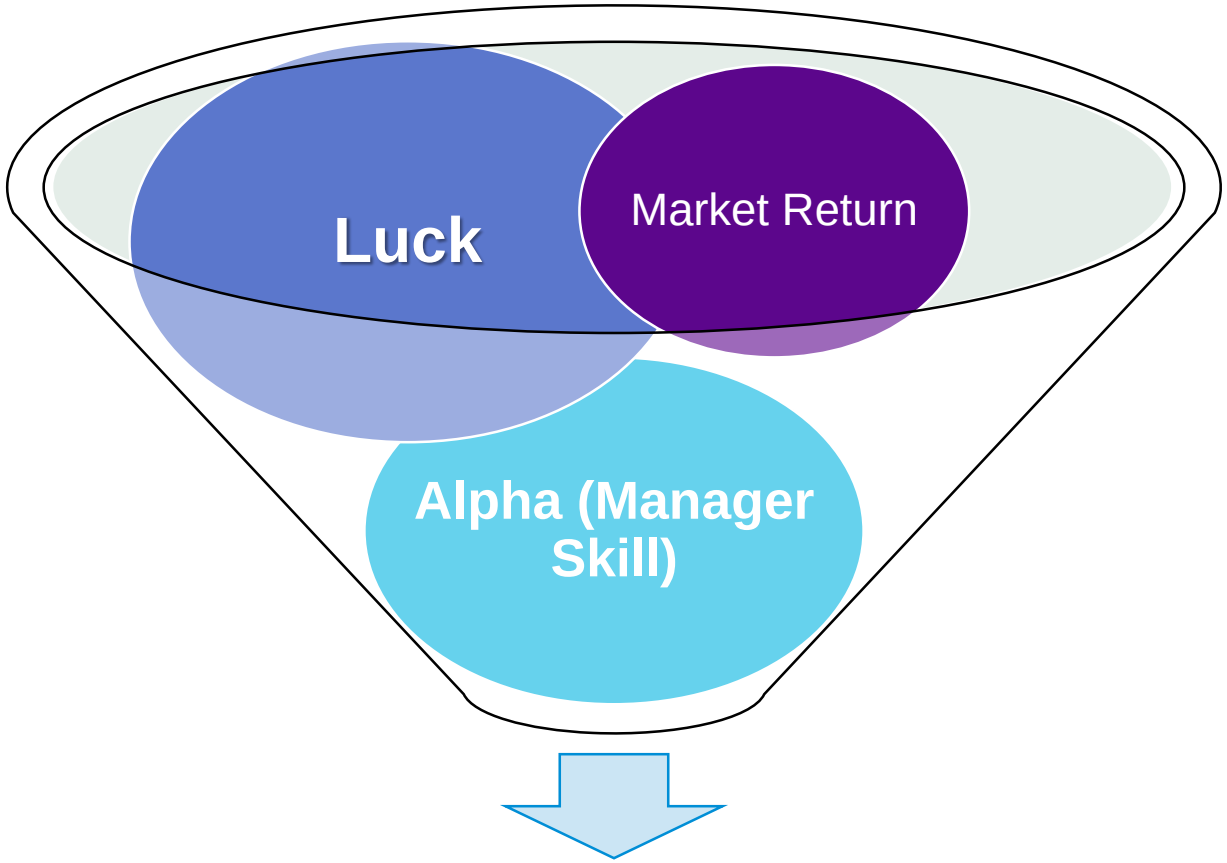
A is incorrect. The information ratio is the ratio of a portfolio's average excess return over the benchmark to its tracking error, so if the tracking error increases, the information ratio will fall if excess return is positive and rise if excess return is negative (in both cases moving closer to zero.)

ALPHA VS. BETA VS. LUCK



LOS h: Explain the concept of alpha.

MANAGING OPERATIONAL RISKS



LOS h: Explain the concept of alpha.

DISTINGUISHING BETWEEN SOURCES OF RETURN

Performance evaluators try to distinguish between these three sources of fund manager return using **factor models** to determine the factors that make up returns and the importance of each factor.

One such model is the **Capital Asset Pricing Model (CAPM)**, from which comes the term *alpha*.

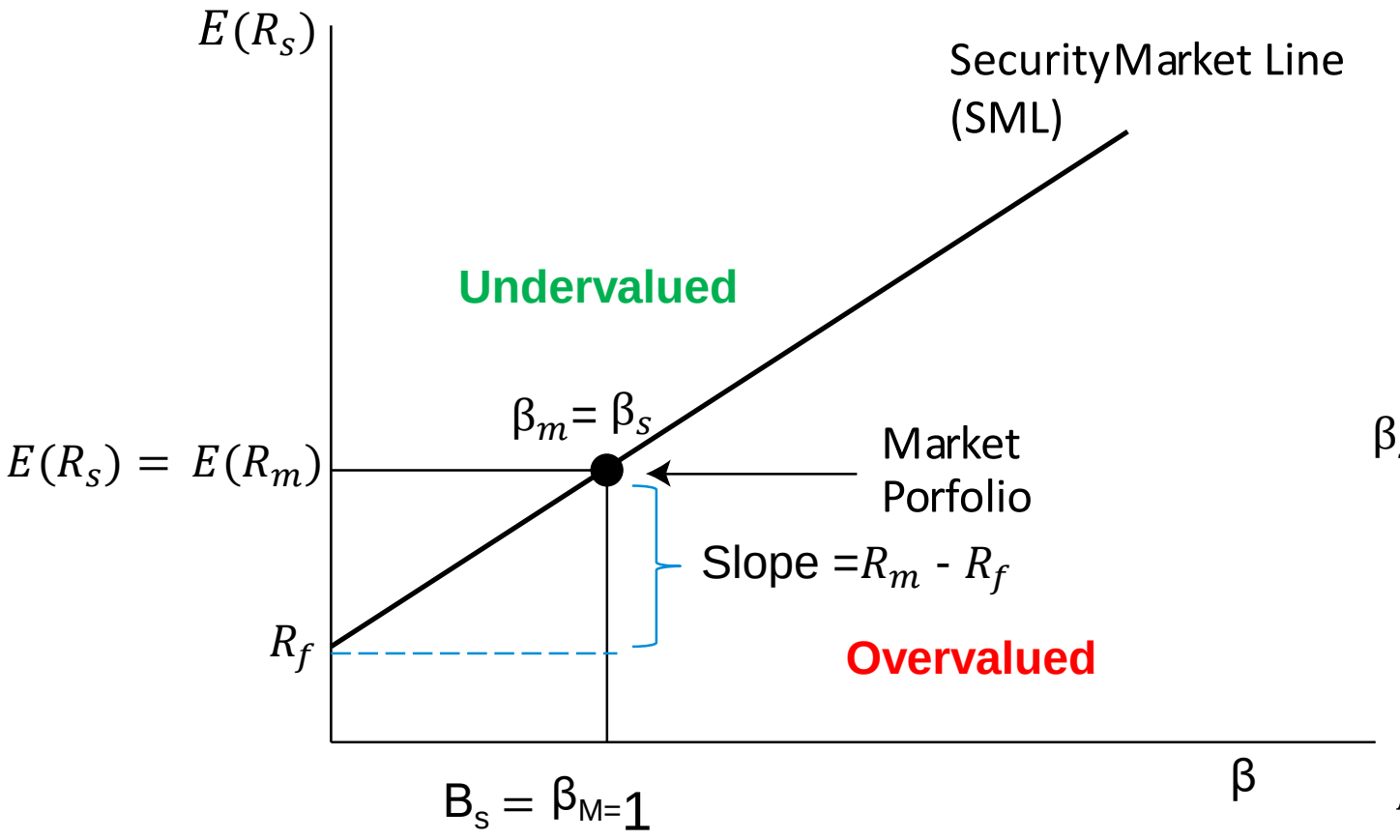
- This model also gave rise to a **measure of systematic risk** (also called market risk or non-diversifiable risk)**: beta**.

Factor models, such as the CAPM, separate the fund's performance into return from

- market performance (beta),
- luck or randomness, or
- the investment skills of the fund manager (alpha).

LOS h: Explain the concept of alpha.

CAPM: BETA & THE SECURITY MARKET LINE $E(R_s) = R_{f+}\beta_s(E(R_m) - R_f)$



Start with when the beta is 1: Both sides will be equal:

$$\frac{(E(R_m) - R_f)}{\beta_m = 1} = \frac{(E(R_s) - R_f)}{\beta_s = 1}$$

Multiply Both sides by : β_s

$$\beta_s \frac{(E(R_m) - R_f)}{\beta_m = 1} = \frac{E(R_s) - R_f}{\cancel{\beta_s}} \cancel{\beta_s}$$

Rearrange Algebra to move r_f

$$R_{f+}\beta_s \frac{(E(R_m) - R_f)}{\cancel{1}} = E(R_s)$$

$$E(R_s) = R_{f+}\beta_s(E(R_m) - R_f)$$

So if a security is "Fairly Priced" it will be "on the line

$$E(R_s) = R_{f+}\beta_s(E(R_m) - R_f)$$

PORTFOLIO PERFORMANCE EVALUATION

Jensen's Alpha

Jensen's alpha = $R_p - [R_f + \beta_p(R_m - R_f)]$

$$\alpha_p = R_p - \left[R_f + \beta_p \left(R_m - R_f \right) \right]$$

Like the Treynor ratio, Jensen's alpha is based on systematic risk.

Jensen's alpha is also the vertical distance from the SML measuring the excess return for the same risk as that of the market.

PRACTICE Q: EXPERT

The return a fund earns from market performance rather than the fund manager's skill is referred to as:

A. beta.
B. alpha.
C. holding-period return.

PRACTICE Q: EXPERT

The return a fund earns from **market performance** rather than the fund manager's skill is referred to as:

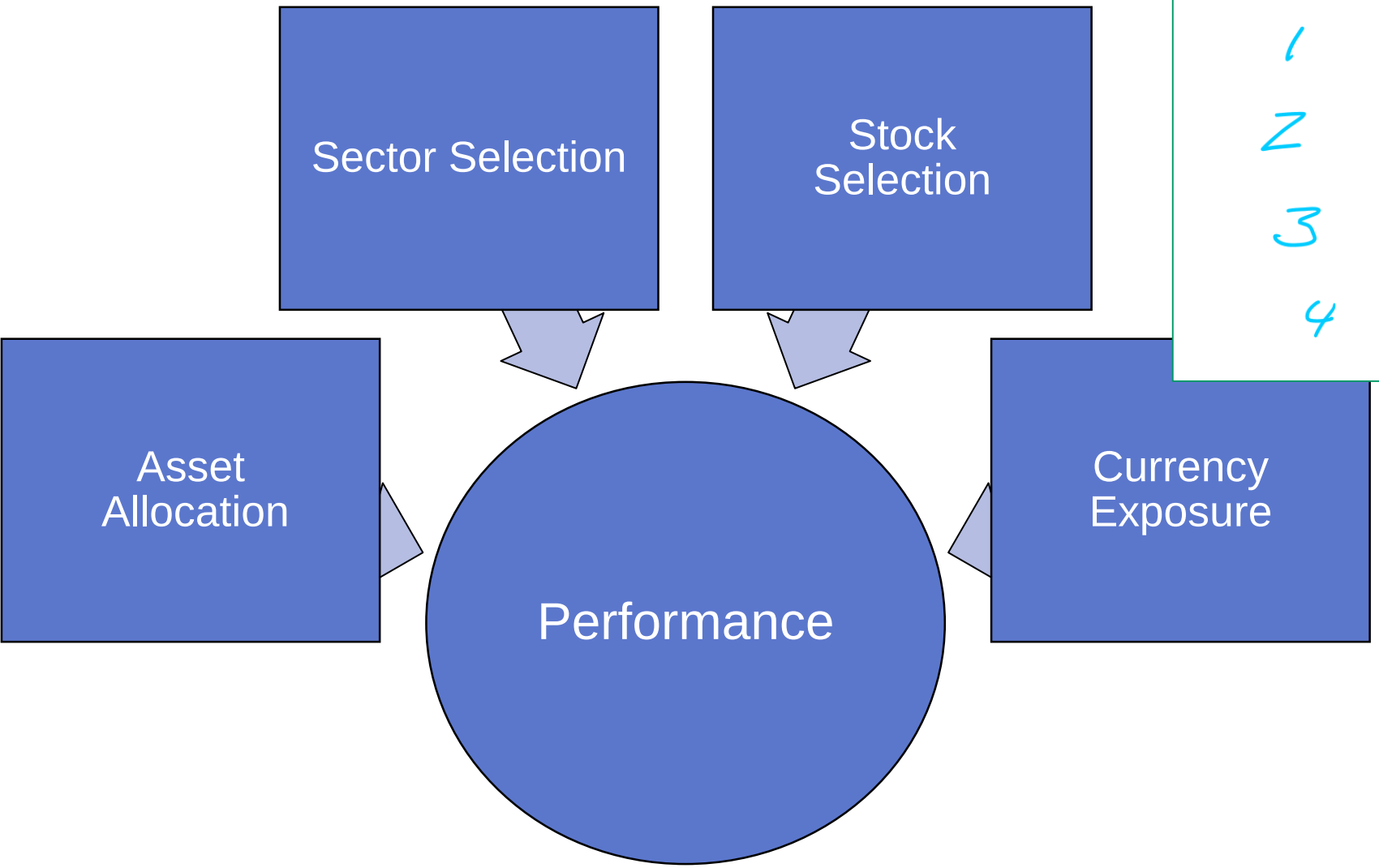
A. beta.
B. alpha.
C. holding-period return.

A is correct. The return of a portfolio can be divided into the part coming from the manager's skill, known as alpha; the part coming from market performance, known as beta; and the part coming from luck.

B is incorrect. Alpha is the part of the portfolio's return that comes from the manager's skill.

C is incorrect. The portfolio's holding period return is its total return from all sources.

ATTRIBUTING PERFORMANCE



PERFORMANCE EVALUATION PROCESS

1. Measure absolute returns
2. Adjust returns for risk
3. Measure relative returns
4. Attribute performance

LOS i: Explain uses of performance attribution.

PERFORMANCE ATTRIBUTION

Index	Benchmark Weights	Benchmark Returns	Benchmark Weighted Return	Portfolio Weights	Portfolio Weighted Return
FTSE 100	60%	10%	6.0%	40%	4%
S&P 500	40%	8%	3.2%	60%	4.8%
Total	100%	--	9.2%	100%	8.8%

Benchmark Return = (0.6 × 0.10) + (0.4 × 0.08) = 9.2%

Portfolio Asset Allocation Return
= Sum of (Portfolio weights × Benchmark returns)
= (0.4 × 0.10) + (0.6 × 0.08) = 8.8%

Therefore, the decision to put more weight into the S&P 500 stocks reduced the return by 0.4% (= 8.8% – 9.2%)

If the actual portfolio return was 9.5%, then the difference of 0.7%
(= 9.5% – 8.8%) **was from stock selection**.

LOS i: Explain uses of performance attribution.

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Continuing from the previous slide…

Portfolio return was divided into three components:

9.2% = Benchmark return

–0.4% = Asset allocation return

0.7% = Stock selection return

9.5% = Portfolio return

Note: More analysis could look at stock selection in FTSE 100 versus S&P 500 portfolios, effect of currency exchange rates, and so on.

LOS i: Explain uses of performance attribution.

PRACTICE Q: EXPERT

A fund manager's performance over the past year is being evaluated. The fund manager earned a return of 9% compared with the benchmark return of 10.6%. His portfolio consists of a 70% allocation to US large-cap stocks and a 30% allocation to UK large-cap stocks. His benchmark consists of a 60% allocation to the S&P 500 Index and a 40% allocation to the FTSE 100 Index. The return over this period was 13% for the S&P 500 and 7% for the FTSE 100. If the portfolio manager had held his allocations passively in the S&P 500 and the FTSE 100, his return would have been 11.2%. On the basis of the information provided, the manager's underperformance can be attributed to:

A. asset allocation.
B. stock selection.
C. stock selection and asset allocation.

PRACTICE Q: EXPERT

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A. asset allocation.

B. stock selection.

C. stock selection and asset allocation.

B is correct. The underperformance can be attributed to stock selection. The manager underperformed the benchmark by 1.6% (9% – 10.6% = –1.6%).

The asset allocation decision generated additional returns of 0.6% (11.2% – 10.6% = 0.6%).

But the stock selection decision cost 2.2% (9% – 11.2% = –2.2%).