

Question 1 of 9

When choosing an appropriate benchmark for alternative investments, which attribute is *least likely* to be a key consideration?

- A. Ambiguity
- B. **Accountability**
- C. Appropriateness

Explanation

A valid **benchmark** must meet **specific criteria**, and investment managers should only be compared to benchmarks that **accurately represent** the universe of **securities available** to them. This principle applies to both traditional and alternative investments, where the individual **securities** and their respective **weights** in a benchmark must be clearly **identifiable**.

Selecting an appropriate benchmark for alternative assets can be challenging due to factors like leverage and derivatives, difficulties in monitoring and valuation, and performance biases. Nevertheless, these challenges do not prevent an alternative asset manager from taking ownership of the benchmark and its components, nor from being willing to be held accountable to it. By adopting the benchmark, the manager assumes responsibility for any discrepancies and is accountable for any differences between portfolio performance and that of the benchmark.

(Choice A) Unambiguity is more likely to be a primary consideration as alternative index constituents and their weights within the benchmark are not always clearly identifiable or transparent.

(Choice C) Appropriateness is more likely to be a primary limitation as alternative index constituents may not suitably align with a manager's targeted risk-return profile, investment style, or expertise.

Things to remember:

Choosing a benchmark for alternative assets is difficult due to leverage and monitoring challenges. Despite this, managers can still embrace the benchmark, with the manager fully responsible for identifying discrepancies and held accountable for performance differences.

Discuss tests of benchmark quality.

LOS

QUESTION 2 - 5

Julie Chevalier, an analyst with Vertex Capital Advisors, is mentoring a new junior analyst, Max Dussault. Chevalier asks Dussault to explain the roles of the Sharpe and Sortino ratios in performance measurement. In his remarks, Dussault states:

- Statement 1:** The Sortino ratio formula can be considered a type of risk premium.
- Statement 2:** The Sharpe ratio is just as effective as the Sortino ratio for appraising negatively skewed strategies
- Statement 3:** Investors focused on capital preservation should use the Sortino ratio to judge an investment strategy.

Later, Chevalier asks Dussault to determine and evaluate the upside capture and downside capture ratios of Vertex's strategy. Using the last eight years of the Vertex Global Equity portfolio's annual returns against its benchmark, the MSCI ACWI, she provides him the data shown in Exhibit 1.

Exhibit 1 Vertex Capital Advisors Global Equity

| Period (t) | $R_{(P)}$ (%) | $R_{(B)}$ (%) |
|------------|---------------|---------------|
| 1 | -2.35 | -1.24 |
| 2 | 4.62 | 4.28 |
| 3 | 6.01 | 6.95 |
| 4 | -7.04 | -8.15 |
| 5 | 10.95 | 12.34 |
| 6 | -2.03 | -1.02 |
| 7 | -5.75 | -7.02 |
| 8 | 18.52 | 15.23 |

$R_{(P)}$ (%): Annual return of Vertex Global Equity portfolio

$R_{(B)}$ (%): Annual return of MSCI ACWI benchmark

After Dussault presents his results, Chevalier comments about the capture ratio (CR):

- Comment 1:** The CR measures the asymmetry of returns and, as such, it is similar to bond convexity or option gamma.
- Comment 2:** A value of CR less than 1 indicates a convex return profile.
- Comment 3:** An asymmetrical return profile, particularly during periods when the market is not trending strongly upward, results in lower risk-adjusted returns.

Chevalier then asks Dussault to evaluate the Vertex Global Equity portfolio's results compared to two competitors over a five-year period, the Bluex Global Equity and the Rougex Global Equity, as well as the benchmark MSCI ACWI. Results are shown in Exhibit 2.

Exhibit 2 Vertex vs Competitors

| Appraisal measure | Vertex | Bluex | Rougex | MSCI ACWI |
|------------------------|--------|--------|--------|-----------|
| Annualized return | 0.0254 | 0.0268 | 0.0271 | 0.0236 |
| Annualized volatility* | 0.0827 | 0.0831 | 0.0991 | 0.0801 |
| Beta | 1.00 | 1.50 | 0.50 | -- |
| Sharpe ratio | 0.1862 | 0.2022 | 0.1726 | -- |
| Treynor ratio | 0.0154 | 0.0112 | 0.0342 | -- |
| Information ratio | 0.1182 | 0.1146 | 0.1134 | -- |

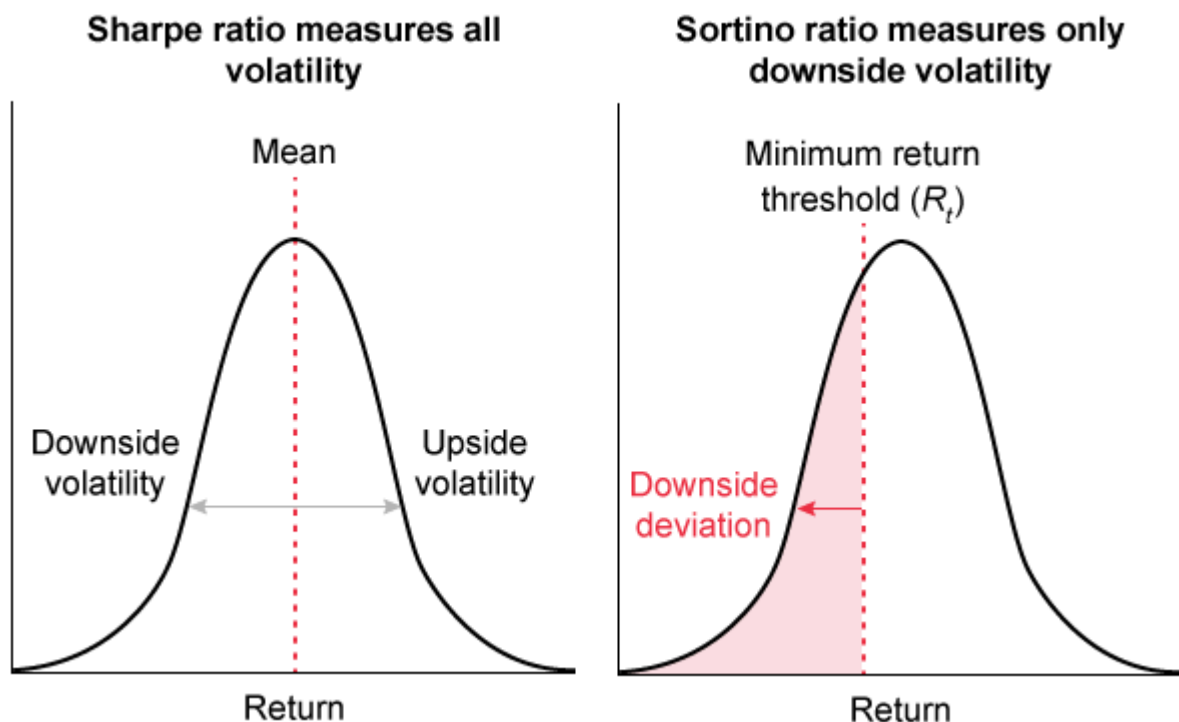
*Volatility = standard deviation

Question 2 of 9

Which of Dussault's statements is correct?

- A. Statement 1
- B. Statement 2
- C. **Statement 3**

Explanation



The Sharpe ratio measures the additional return for bearing risk in excess of the risk-free rate, stated per unit of return volatility, and it is used on an *ex post* basis to evaluate historical risk-adjusted returns.

One **weakness** of the **Sharpe ratio** is that it uses the standard deviation to measure risk and thus assumes **investors** are **indifferent** to shifts between **upside** and **downside volatility**. For an investor looking for a high-reward investment, upside volatility is not necessarily viewed negatively.

Similarly, **risk-averse investors concerned** with **capital preservation** are most anxious about **downside risk**. The Sortino ratio is a modification of the Sharpe ratio that includes only those returns lower than a user-specified return (ie, a minimum return threshold). The Sortino ratio uses a measure of downside risk known as target semi-standard deviation or target semideviation as the denominator. Using this value, the Sortino ratio measures "harmful" volatility as return per unit of downside risk.

Thus, the Sortino ratio is more useful for analyzing asymmetrical return distributions. With its underlying assumption of normally distributed returns, the Sharpe ratio does not distinguish between strategies with greater-than-normal upside volatility (ie, positively skewed strategies) and strategies with greater-than-normal downside volatility (ie, negatively skewed strategies) (**Choice B**).

(**Choice A**) The risk premium and Sortino ratio both relate to risk and return but serve different purposes. The risk premium is a measure of expected excess returns for risk taken, whereas the Sortino ratio

evaluates how efficiently returns are generated concerning only negative risks.

Things to remember:

A weakness of the Sharpe ratio is that it uses standard deviation as a measure of risk and assumes investors are indifferent between upside and downside volatility. The Sortino ratio is a modification of the Sharpe ratio that penalizes only those returns lower than a user-specified return (ie, a minimum return threshold).

Calculate and interpret the Sortino ratio, the appraisal ratio, upside/downside capture ratios, maximum drawdown, and drawdown duration.

LOS

Question 3 of 9

Based on Exhibit 1, the downside capture ratio for the Vertex portfolio is *closest* to:

- A. 97.97%
- B. 98.51%
- C. 104.94%

Explanation

Vertex Capital Advisors Global Equity

Benchmark: MSCI ACWI

| Period (t) | $R_{(P)}$ (%) | $R_{(B)}$ (%) | Downside return | |
|--|---------------|---------------|---|---------------|
| | | | $R_{(P)}$ (%) | $R_{(B)}$ (%) |
| 1 | -2.35 | -1.24 | -2.35 | -1.24 |
| 2 | 4.62 | 4.28 | | |
| 3 | 6.01 | 6.95 | | |
| 4 | -7.04 | -8.15 | -7.04 | -8.15 |
| 5 | 10.95 | 12.34 | | |
| 6 | -2.03 | -1.02 | -2.03 | -1.02 |
| 7 | -5.75 | -7.02 | -5.75 | -7.02 |
| 8 | 18.52 | 15.23 | | |
| Geometric average of downside returns | | | -4.32% | -4.41% |
| Downside capture ratio | | | $\frac{-4.32\%}{-4.41\%} \approx 97.97\%$ | |

$R_{(P)}$ (%): Annual return of Vertex portfolio

$R_{(B)}$ (%): Annual return of MSCI ACWI benchmark

During periods of negative returns, a **downside** (ie, down-market) **capture ratio** below **100%** indicates that the **portfolio lost less** than its **benchmark**. To determine the downside capture ratio, **calculate** the **geometric average** (ie, mean) of **only the negative** (annual) **returns** of **both the portfolio** and its **benchmark**. In this scenario:

| Steps | Calculations |
|---|--|
| Geometric average of returns | $= \{[(1 + r_1) \times \dots (1 + r_N)]^{1/N}\} - 1$ |
| Geometric average of portfolio's downside returns | $\{[1 + (-0.0235)] \times [1 + (-0.0704)] \times [1 + (-0.0203)] \times [1 + (-0.0575)]\}^{1/4} - 1$ $\approx 0.9568 - 1 \approx -0.0432$ |
| Geometric average of benchmark's downside returns | $\{[1 + (-0.0124)] \times [1 + (-0.0815)] \times [1 + (-0.0102)] \times [1 + (-0.0702)]\}^{1/4} - 1$ $\approx 0.9559 - 1 \approx -0.0441$ |
| Downside capture ratio | $\frac{-4.32\%}{-4.41\%} \approx 97.97\%$ |

Therefore, the downside capture ratio is approximately 97.97%. For example, this result means if the benchmark is down 10.00% during a year, the portfolio is expected to decline by 9.797% on average.

(Choice B) 98.51% incorrectly uses the arithmetic mean instead of the geometric mean to calculate the downside capture ratio.

(Choice C) 104.94% is the total capture ratio instead of the downside capture ratio.

Things to remember:

The downside capture ratio measures how a portfolio performs when the benchmark declines. A downside capture ratio of less than 100% denotes a portfolio that is losing less than its benchmark in down markets. A lower ratio is usually preferred as it indicates a portfolio is better at mitigating losses during market declines.

Calculate and interpret the Sortino ratio, the appraisal ratio, upside/downside capture ratios, maximum drawdown, and drawdown duration.

LOS

Question 4 of 9

Which of Dussault's comments is correct?

- A. **Comment 1**
- B. Comment 2
- C. Comment 3

Explanation

Capture ratio

$$CR_{(p,B,t)} = \frac{UC_{(p,B,t)}}{DC_{(p,B,t)}}$$

where:

$UC_{(p,B,t)}$ = Upside capture ratio for portfolio manager (p) relative to benchmark (B) for time t

$DC_{(p,B,t)}$ = Downside capture ratio for portfolio manager (p) relative to benchmark (B) for time t

$CR_{(p,B,t)}$ = Capture ratio for portfolio manager (p) relative to benchmark (B) for time t

The **capture ratio (CR)**, defined as the ratio of upside capture to downside capture, **measures return asymmetry** akin to bond convexity and option gamma. CRs are **valuable for assessing consistency** between a **portfolio's stated investment process** and its **actual performance**.

Inconsistencies may signal potential issues with a strategy's repeatability, implementation, or compliance. In addition, investors use the CR to evaluate a strategy's robustness, particularly in relation to diversification during crises, when correlations may approach 1.

A value of CR greater than 1 suggests a convex return profile (positive asymmetry), whereas a CR less than 1 indicates a concave return profile (negative asymmetry) (**Choice B**). The CR is typically applied to cumulative upside and downside returns.

An asymmetrical return that skews positive is beneficial, especially in markets that are not strongly trending, as it can lead to higher risk-adjusted returns. Significant losses need large gains to fully recover, highlighting the impact of calculating returns from a reduced asset base after a loss (**Choice C**).

Things to remember:

The capture ratio, otherwise known as the upside/downside capture, is valuable in assessing risk-adjusted performance as it considers both the potential for gains and the risk of losses, offering a more holistic view of a manager's effectiveness.

Calculate and interpret the Sortino ratio, the appraisal ratio, upside/downside capture ratios, maximum drawdown, and drawdown duration.

LOS

Question 5 of 9

Based on Exhibit 2, which fund has produced the *greatest* risk-adjusted return relative to the benchmark?

- A. Bluex
- B. **Vertex**
- C. Rougex

Explanation

Information ratio (IR)

$$IR = \frac{E(r_p) - E(r_B)}{\sigma(r_p - r_B)}$$

where, $\sigma(r_p - r_B) =$ Tracking risk

The information ratio (IR) measures a portfolio's excess return relative to a benchmark, adjusted for the additional risk taken. It is the ratio of the portfolio's active return (return above the benchmark) to its tracking risk (standard deviation of active returns), indicating the efficiency of the portfolio's active management.

Unlike the Sharpe ratio or the Treynor ratio, which use the risk-free rate as a hurdle of performance, the **IR indicates** how well the **manager** has consistently performed with **excess returns relative** to the **benchmark** after **accounting** for the **differences** in the **volatility** of the portfolio and the benchmark. Since the IR is a simple measure that allows the evaluator to assess performance, scaled by risk, this behavior makes the IR a superior measure of evaluating performance, assuming implicit assumption is the chosen benchmark is well matched to the risk of the investment strategy.

In this scenario, Vertex has the highest IR, indicating it has produced the greatest risk-adjusted return relative to the benchmark (**Choices A and C**).

Things to remember:

The information ratio measures a portfolio's excess return relative to a benchmark adjusted for the additional risk taken. It is the ratio of the portfolio's active return (return above the benchmark) to its tracking risk (standard deviation of active returns), indicating the efficiency of the portfolio's active management.

Calculate and interpret the Sortino ratio, the appraisal ratio, upside/downside capture ratios, maximum drawdown, and drawdown duration.

LOS

QUESTION 6 - 9

Joshua Reems is a new junior performance analyst on the investment staff that manages the VenturePath US large-cap growth mutual fund. Under the supervision of portfolio manager Mika Lefèvre, Reems is still learning how VenturePath uses performance evaluation in examining its large-cap fund. Lefèvre states:

- Statement 1:** Performance attribution often includes the use of risk-adjusted measures like the Sharpe ratio or the information ratio.
- Statement 2:** Performance appraisal usually includes looking at the alignment of performance with the fund's stated objectives.
- Statement 3:** Performance measurement typically includes measuring the impact of asset allocation and security selection decisions on overall performance.

Lefèvre asks Reems to review a competitor's fund, the Ascend Capital Growth Fund. Reems uses the fund's performance report for the last quarter, found on Ascend's public website. Ascend's performance attribution approach is based on the Brinson-Hood-Beebower (BHB) methodology. Selected data from the report are shown in Exhibit 1:

Exhibit 1 Ascend Capital Growth Fund – Data for the Quarter Ending Mar 31, 20XX

| Sector | Portfolio Weight | Benchmark Weight | Portfolio Return | Benchmark Return |
|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Energy | 15% | 10% | 9% | 11% |
| Information technology | 25% | 30% | 20% | 14% |
| Consumer discretionary | 30% | 25% | 5% | 4% |
| Health care | 20% | 20% | 7% | 8% |
| Financials | 10% | 15% | 3% | 7% |
| Total | 100% | 100% | 9.55% | 8.95% |

Question 6 of 9

Which of Lefèvre's statements is *correct*?

- A. Statement 1
- B. **Statement 2**
- C. Statement 3

Explanation

Portfolio evaluation

| | |
|--------------------------------|---|
| Performance measurement | <ul style="list-style-type: none">• Involves quantifying portfolio returns over a specific period• Metrics include total return; risk-adjusted return; alpha, beta, etc.; measuring both absolute and relative performance• Primary goal is understanding a portfolio's performance in terms of returns, providing a basis for further analysis |
| Performance attribution | <ul style="list-style-type: none">• Goes beyond measurement to explain why a portfolio performed as it did by breaking down performance into components• Usually involves analyzing the impact of asset allocation, security selection, market timing, and other performance factors• Aims to identify sources of performance (eg, portfolio manager decisions, broader market movements) |
| Performance appraisal | <ul style="list-style-type: none">• Process of evaluating how well a portfolio manager performed relative to benchmarks, peers, or stated investment objectives• Risk-adjusted measures like the Sharpe ratio or the information ratio are often used• Goal is to assess a manager's skill and effectiveness, which may involve looking at consistency of returns and risk management |

Performance **measurement**, performance **attribution**, and performance **appraisal** are **distinct** but **interrelated** concepts. They **help** investors and portfolio managers **understand** how well a **portfolio is doing**, why it is performing the way it is, and how the performance aligns with expectations and objectives.

In this example, Statement 2 regarding performance appraisal is correct. Performance appraisal involves evaluating a portfolio's performance, which includes using risk-adjusted measures such as the Sharpe ratio or the information ratio to evaluate a manager's performance and the portfolio's performance relative to its stated objectives or to a benchmark (**Choice A**).

(**Choice C**) Statement 3 is incorrect. Measuring the impact of asset allocation and security selection decisions is a function of performance attribution, not performance measurement.

Things to remember:

Performance measurement, performance attribution, and performance appraisal are distinct but interrelated concepts in evaluating a portfolio. These steps help investors and portfolio managers understand how well a portfolio is doing, why it is performing the way it is, and how the performance aligns with expectations and objectives.

Explain the following components of portfolio evaluation and their interrelationships: performance measurement, performance attribution, and performance appraisal.

LOS

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Question 7 of 9

Based on Exhibit 1, the sector with the *greatest negative* contribution to the allocation effect for the Ascend Capital Growth Fund's performance for the quarter was:

- A. energy.
- B. financials.
- C. **information technology.**

Explanation

BHB* method: allocation effect

$$A_i = (w_i - W_i)B_i$$

A_i = Contribution to allocation

w_i = Weight of the i th sector in the portfolio

W_i = Weight of the i th sector in the benchmark

B_i = Benchmark return in the i th sector

*BHB = Brinson-Hood-Beebower

The **BHB model** is a widely recognized method for **performance attribution** in investment portfolios. The model starts by defining a benchmark portfolio that reflects a passive investment strategy with a predefined asset allocation. **Comparison** with the **benchmark** can be used to **attribute performance to decisions made** by a portfolio manager, including **asset** (or sector) **allocation**, **security selection**, and the interaction between the two. The model provides insights into the effectiveness of a manager's strategies.

The allocation effect confirms whether a portfolio's excess return was achieved by a portfolio manager choosing to:

- overweight a sector that outperformed the benchmark, or
- underweight a sector that underperformed the benchmark.

In this scenario, the sector allocation effect of the Ascend Capital Growth Fund for the quarter can be calculated as:

Ascend Capital Growth Fund: allocation effect

| Sector | $A_j = (w_j - W_j)B_j$ |
|----------------------------------|--|
| Energy | $0.55 = (15 - 10)0.11$ |
| Information technology | $-0.70 = (25 - 30)0.14$ |
| Consumer discretionary | $0.20 = (30 - 25)0.04$ |
| Health care | $0 = (20 - 20)0.08$ |
| Financials | $-0.35 = (10 - 15)0.07$ |
| Total – allocation effect | -0.30% or 30 basis points |

Note: Portfolio and benchmark weights are shown as percentages. Benchmark returns are shown as the decimalized form of a percentage.

In this example, the sector allocation effect reduced the portfolio's excess return by 0.30% (30 basis points). The fund's *underweighting* of the information technology sector (compared with the benchmark) detracted 0.70% from the excess return for the quarter. This was the greatest negative contribution among the five sectors of the fund. Although the fund's information technology sector return (20%) was greater than the benchmark's information technology return (14%), the manager's underweighting that sector was significant enough to negatively impact excess returns.

(Choice A) The decision to *overweight* the energy sector *added* 0.55% to the fund's relative return.

(Choice B) The decision to *underweight* the financials sector *detracted* 0.35% from the fund's relative return.

Things to remember:

The BHB model is used to attribute performance to portfolio manager decisions, including asset (or sector) allocation, security selection, and the interaction between the two. The allocation effect refers to the value the manager adds (or detracts) by using portfolio sector weights that are different from the benchmark sector weights.

Interpret the sources of portfolio returns using a specified attribution approach.

LOS

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Based on Exhibit 1, the sector with the *greatest negative* contribution to the security selection effect for the Ascend Capital Growth Fund's performance for the quarter was:

- A. energy.
- B. **financials.**
- C. health care.

Explanation

BHB* method: security selection effect

$$S_i = W_i(R_i - B_i)$$

S_i = Contribution to security selection

W_i = Weight of the i th sector in the benchmark

R_i = Portfolio return in the i th sector

B_i = Benchmark return in the i th sector

*BHB = Brinson-Hood-Beebower

In the **BHB** model, the **security selection effect** confirms **whether excess** return was **achieved** by the portfolio manager **selecting securities** that **performed well** relative to the benchmark and/or by **avoiding benchmark securities** that **performed** relatively **poorly**. The contribution from security selection is determined by evaluating the performance difference that arises purely from the securities chosen within each sector.

In this scenario, the security selection effect of the Ascend Capital Growth Fund for the quarter can be calculated as:

Ascend Capital Growth Fund: security selection effect

| Sector | $S_i = W_i(R_i - B_i)$ |
|--|---|
| Energy | $-0.20 = 10(0.09 - 0.11)$ |
| Information technology | $1.80 = 30(0.20 - 0.14)$ |
| Consumer discretionary | $0.25 = 25(0.05 - 0.04)$ |
| Health care | $-0.20 = 20(0.07 - 0.08)$ |
| Financials | $-0.60 = 15(0.03 - 0.07)$ |
| Total – security selection effect | 1.05% or 105 basis points |

Note: Benchmark weights are shown as percentages. Portfolio and benchmark returns are shown as the decimalized form of a percentage.

The security selection effect *added* a total of 1.05% to the portfolio's excess return, overwhelmingly driven by superior security selection in the information technology sector. However, security selection was weakest in the financials sector, where it reduced excess return by 0.60%. This was the greatest negative contribution among the five sectors of the fund.

(Choice A) Security selection in the energy sector *detracted* 0.20% from the fund's relative return.

(Choice C) Security selection in the health care sector *detracted* 0.20% from the fund's relative return.

Things to remember:

In the BHB attribution model, the security selection effect evaluates how much of the performance is due to the specific securities chosen by the manager within each sector. This component measures the effectiveness of the manager's ability to pick individual securities that outperform the benchmark and to avoid benchmark securities that underperform.

Interpret the sources of portfolio returns using a specified attribution approach.

LOS

Question 9 of 9

Based on Exhibit 1, the sector with the *greatest positive* contribution to the interaction effect for the Ascend Capital Growth Fund's performance for the quarter was:

- A. energy.
- B. **financials.**
- C. consumer discretionary.

Explanation

BHB* method: interaction effect

$$I_i = (w_i - W_i)(R_i - B_i)$$

I_i = Contribution to interaction

w_i = Weight of the i th sector in the portfolio

W_i = Weight of the i th sector in the benchmark

R_i = Portfolio return in the i th sector

B_i = Benchmark return in the i th sector

*BHB = Brinson-Hood-Beebower

In the BHB model, the **security selection** and **allocation effects do not** completely **explain** the arithmetic **difference** between the **portfolio's return** and the **benchmark return**. The **interaction effect** is the **combined effect** of asset (sector) allocation and security selection. It **represents** the **additional performance** that arises when the allocation and security selection **decisions interact** in a way **that is different** from **simply adding** their individual effects.

In this scenario, the Ascend Capital Growth Fund had a total excess return for the quarter of 0.60% (9.55% – 8.95%). The allocation effect accounted for –0.30%, and the security selection effect accounted for 1.05%. Simply adding the two would result in an excess return of 0.75%. The total excess return was 0.60%, indicating that the interaction effect *detracted* 0.15% from the excess return. Each sector's contribution, positive or negative, can be calculated as:

Ascend Capital Growth Fund: interaction effect

| Sector | $I_j = (w_j - W_j)(R_j - B_j)$ |
|-----------------------------------|---|
| Energy | $-0.10 = (15 - 10)(0.09 - 0.11)$ |
| Information technology | $-0.30 = (25 - 30)(0.20 - 0.14)$ |
| Consumer discretionary | $0.05 = (30 - 25)(0.05 - 0.04)$ |
| Health care | $0 = (20 - 20)(0.07 - 0.08)$ |
| Financials | $0.20 = (10 - 15)(0.03 - 0.07)$ |
| Total – interaction effect | -0.15% or 15 basis points |

Note: Portfolio and benchmark weights are shown as percentages. Portfolio and benchmark returns are shown as the decimalized form of a percentage.

Counterintuitively, the financials sector provided a *positive* interaction effect. The decision to underweight financials (10% versus 15%) actually enhanced returns since the fund's security selection underperformed the benchmark (ie, the fund's sector return was less than the benchmark's sector return (3% versus 7%)). This was the greatest positive contribution to the interaction effect among the five sectors.

However, the interaction effect in the information technology sector *detracted* 0.30% from the fund's excess return, more than offsetting the gain from the interaction effect of the financials sector. Therefore, the total interaction effect was negative.

(Choice A) The interaction effect from the energy sector *detracted* 0.10% from the fund's relative return.

(Choice C) The interaction effect from the consumer discretionary sector *added* 0.05% to the fund's relative return.

Things to remember:

In the BHB model, the interaction effect can contribute positively or negatively to the portfolio's performance depending on whether the selected securities in overweighted sectors outperform those in underweighted sectors.

Interpret the sources of portfolio returns using a specified attribution approach.

LOS