SchweserNotes™

FOR THE CFA® EXAM

# CFA® 2013

Level III | Book 5

## Execution, Monitoring, and Rebalancing; Evaluation and Attribution; and Global Investment Performance Standards (GIPS®)

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# Book 5 – Execution, Monitoring, and Rebalancing; Evaluation and Attribution; and Global Investment Performance Standards (GIPS®)

SCHWESERNOTES™ 2013 CFA LEVEL III BOOK 5: EXECUTION, MONITORING, AND REBALANCING; EVALUATION AND ATTRIBUTION; AND GLOBAL INVESTMENT PERFORMANCE STANDARDS (GIPS®)



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# Readings and Learning Outcome Statements

## Readings

*The following material is a review of the Execution, Monitoring, and Rebalancing; Evaluation and Attribution; and Global Investment Performance Standards (GIPS®) principles designed to address the learning outcome statements set forth by CFA Institute.*

## Study Session 16

**Reading Assignments**
*Execution of Portfolio Decisions; Monitoring and Rebalancing*, CFA Program 2013 Curriculum, Volume 6, Level III



## Study Session 17

**Reading Assignments**
*Performance Evaluation and Attribution*, CFA Program 2013 Curriculum, Volume 6, Level III



## Study Session 18

**Reading Assignments**
*Global Investment Performance Standards*, CFA Program 2013 Curriculum, Volume 6, Level III

## Learning Outcome Statements (LOS)

*The CFA Institute learning outcome statements are listed in the following. These are repeated in each topic review. However, the order may have been changed in order to get a better fit with the flow of the review.*

## Study Session 16

*The topical coverage corresponds with the following CFA Institute assigned reading:*

**39. Execution of Portfolio Decisions**

The candidate should be able to:

a. compare market orders with limit orders, including the price and execution uncertainty of each. (page 9)
b. calculate and interpret the effective spread of a market order and contrast it to the quoted bid–ask spread as a measure of trading cost. (page 10)
c. compare alternative market structures and their relative advantages. (page 13)
d. compare the roles of brokers and dealers. (page 15)
e. explain the criteria of market quality and evaluate the quality of a market when given a description of its characteristics. (page 16)
f. explain the components of execution costs, including explicit and implicit costs, and evaluate a trade in terms of these costs. (page 17)
g. calculate and discuss implementation shortfall as a measure of transaction costs. (page 18)
h. contrast volume weighted average price (VWAP) and implementation shortfall as measures of transaction costs. (page 21)
i. explain the use of econometric methods in pretrade analysis to estimate implicit transaction costs. (page 22)
j. discuss the major types of traders, based on their motivation to trade, time versus price preferences, and preferred order types. (page 23)
k. describe the suitable uses of major trading tactics, evaluate their relative costs, advantages, and weaknesses, and recommend a trading tactic when given a description of the investor's motivation to trade, the size of the trade, and key market characteristics. (page 24)
l. explain the motivation for algorithmic trading and discuss the basic classes of algorithmic trading strategies. (page 26)
m. discuss the factors that typically determine the selection of a specific algorithmic trading strategy, including order size, average daily trading volume, bid–ask spread, and the urgency of the order. (page 27)
n. explain the meaning and criteria of best execution. (page 28)
o. evaluate a firm's investment and trading procedures, including processes, disclosures, and record keeping, with respect to best execution. (page 29)
p. discuss the role of ethics in trading. (page 29)

*The topical coverage corresponds with the following CFA Institute assigned reading:*

**40. Monitoring and Rebalancing**

The candidate should be able to:

a. discuss a fiduciary's responsibilities in monitoring an investment portfolio. (page 42)
b. discuss the monitoring of investor circumstances, market/ economic conditions, and portfolio holdings and explain the effects that changes in each of these areas can have on the investor's portfolio. (page 42)
c. recommend and justify revisions to an investor's investment policy statement and strategic asset allocation, given a change in investor circumstances. (page 43)
d. discuss the benefits and costs of rebalancing a portfolio to the investor's strategic asset allocation. (page 43)
e. contrast calendar rebalancing to percentage-of-portfolio rebalancing. (page 44)
f. discuss the key determinants of the optimal corridor width of an asset class in a percentage-of-portfolio rebalancing program. (page 45)
g. compare and contrast the benefits of rebalancing an asset class to its target portfolio weight versus rebalancing the asset class to stay within its allowed range. (page 46)
h. explain the performance consequences in up, down, and nontrending markets of 1) rebalancing to a constant mix of equities and bills, 2) buying and holding equities, and 3) constant proportion portfolio insurance (CPPI). (page 46)
i. distinguish among linear, concave, and convex rebalancing strategies. (page 49)
j. judge the appropriateness of constant mix, buy-and-hold, and CPPI rebalancing strategies when given an investor's risk tolerance and asset return expectations. (page 51)

## Study Session 17

*The topical coverage corresponds with the following CFA Institute assigned reading:*

**41. Evaluating Portfolio Performance**

The candidate should be able to:

a. demonstrate the importance of performance evaluation from the perspective of fund sponsors and the perspective of investment managers. (page 63)
b. explain the following components of portfolio evaluation (performance measurement, performance attribution, and performance appraisal). (page 64)
c. calculate, interpret, and contrast time-weighted and money-weighted rates of return and discuss how each is affected by cash contributions and withdrawals. (page 66)
d. identify and explain potential data quality issues as they relate to calculating rates of return. (page 70)
e. demonstrate the decomposition of portfolio returns into components attributable to the market, to style, and to active management. (page 71)
f. discuss the properties of a valid benchmark and explain the advantages and disadvantages of alternative types of performance benchmarks. (page 72)
g. explain the steps involved in constructing a custom security-based benchmark. (page 76)
h. discuss the validity of using manager universes as benchmarks. (page 76)
i. evaluate benchmark quality by applying tests of quality to a variety of possible benchmarks. (page 77)

j. discuss the issues that arise when assigning benchmarks to hedge funds. (page 78)
k. distinguish between macro and micro performance attribution and discuss the inputs typically required for each. (page 80)
l. demonstrate, justify, and contrast the use of macro and micro performance attribution methodologies to evaluate the drivers of investment performance. (page 80)
m. discuss the use of fundamental factor models in micro performance attribution. (page 88)
n. evaluate the effect of the external interest rate environment and the effect of active management on fixed-income portfolio returns. (page 90)
o. explain the management factors that contribute to a fixed-income portfolio's total return and interpret the results of a fixed-income performance attribution analysis. (page 90)
p. calculate, interpret, and contrast alternative risk-adjusted performance measures, including (in their ex post forms) alpha, information ratio, Treynor measure, Sharpe ratio, and $M^2$. (page 93)
q. explain how a portfolio's alpha and beta are incorporated into the information ratio, Treynor measure, and Sharpe ratio. (page 98)
r. demonstrate the use of performance quality control charts in performance appraisal. (page 99)
s. discuss the issues involved in manager continuation policy decisions, including the costs of hiring and firing investment managers. (page 100)
t. contrast Type I and Type II errors in manager continuation decisions. (page 101)

*The topical coverage corresponds with the following CFA Institute assigned reading:*

**42. Global Performance Evaluation**

The candidate should be able to:

a. evaluate the effect of currency movements on the portfolio rate of return, calculated in the investor's base currency. (page 125)
b. explain how portfolio return can be decomposed into yield, capital gains in local currency, and currency contribution. (page 127)
c. explain the purpose of global performance attribution and calculate the contributions to portfolio performance from market allocation, currency allocation, and security selection. (page 127)
d. explain active and passive currency management, relative to a global benchmark, and formulate appropriate strategies for hedging currency exposure. (page 138)
e. explain the difficulties in calculating a multi-period performance attribution and discuss various solutions. (page 139)
f. compare and interpret alternative measures of portfolio risk and risk-adjusted portfolio performance. (page 145)
g. explain the use of risk budgeting in global performance evaluation. (page 147)
h. discuss the characteristics of alternative global and international benchmarks used in performance evaluation. (page 148)

## STUDY SESSION 18

*The topical coverage corresponds with the following CFA Institute assigned reading:*

43. **Global Investment Performance Standards**

The candidate should be able to:

a. discuss the reasons for the creation of the GIPS standards, their evolution, and their benefits to prospective clients and investment managers. (page 169)
b. discuss the objectives, key characteristics, and scope of the GIPS standards. (page 170)
c. explain the fundamentals of compliance with the GIPS standards, including the definition of the firm and the firm's definition of discretion. (page 172)
d. explain the requirements and recommendations of the GIPS standards with respect to input data, including accounting policies related to valuation and performance measurement. (page 173)
e. discuss the requirements of the GIPS standards with respect to return calculation methodologies, including the treatment of external cash flows, cash and cash equivalents, and expenses and fees. (page 175)
f. explain the requirements and recommendations of the GIPS standards with respect to composite return calculations, including methods for asset-weighting portfolio returns. (page 184)
g. explain the meaning of "discretionary" in the context of composite construction and, given a description of the relevant facts, determine whether a portfolio is likely to be considered discretionary. (page 188)
h. explain the role of investment mandates, objectives, or strategies in the construction of composites. (page 189)
i. explain the requirements and recommendations of the GIPS standards with respect to composite construction, including switching portfolios among composites, the timing of the inclusion of new portfolios in composites, and the timing of the exclusion of terminated portfolios from composites. (page 189)
j. explain the requirements of the GIPS standards for asset class segments carved out of multi-class portfolios. (page 191)
k. explain the requirements and recommendations of the GIPS standards with respect to disclosure, including fees, the use of leverage and derivatives, conformity with laws and regulations that conflict with the GIPS standards, and noncompliant performance periods. (page 192)
l. explain the requirements and recommendations of the GIPS standards with respect to presentation and reporting, including the required timeframe of compliant performance periods, annual returns, composite assets, and benchmarks. (page 195)
m. explain the conditions under which the performance of a past firm or affiliation must be linked to or used to represent the historical performance of a new or acquiring firm. (page 195)
n. evaluate the relative merits of high/low, range, interquartile range, and equal-weighted or asset-weighted standard deviation as measures of the internal dispersion of portfolio returns within a composite for annual periods. (page 196)
o. identify the types of investments that are subject to the GIPS standards for real estate and private equity. (page 200)
p. explain the provisions of the GIPS standards for real estate and private equity. (page 201)

q. explain the provisions of the GIPS standards for Wrap fee/ Separately Managed Accounts. (page 207)
r. explain the requirements and recommended valuation hierarchy of the GIPS Valuation Principles. (page 208)
s. explain the requirements for compliance with the GIPS Advertising Guidelines. (page 210)
t. discuss the purpose, scope, and process of verification. (page 211)
u. discuss challenges related to the calculation of after-tax returns. (page 212)
v. identify and explain errors and omissions in given performance presentations, including real estate, private equity and wrap fee/ Separately Managed Account (SMA) performance presentations. (page 215)

The following is a review of the Execution of Portfolio Decisions principles designed to address the learning outcome statements set forth by CFA Institute. This topic is also covered in:

# EXECUTION OF PORTFOLIO DECISIONS[1]

Study Session 16

## EXAM FOCUS

For the exam, be able to distinguish between limit and market orders and discuss the circumstances under which each is appropriate to use. Be able to calculate midquotes, effective spreads, volume-weighted average price, and implementation shortfall costs. Motivations for trading have always been a CFA Institute favorite, so you should also be able to discuss major trader types, trading tactics, and implementation shortfall strategies.

## MARKET AND LIMIT ORDERS

### LOS 39.a: Compare market orders with limit orders, including the price and execution uncertainty of each.

*CFA® Program Curriculum, Volume 6, page 7*

**Market microstructure** refers to the structure and processes of a market that may affect the pricing of securities in relation to intrinsic value and the ability of managers to execute trades. The microstructure of the market and the objectives of the manager should affect the type of order the manager uses.

The two major types of orders are market orders and limit orders. The first offers greater certainty of execution and the second offers greater certainty of price.

A **market order** is an order to execute the trade immediately at the best possible price. If the order cannot be completely filled in one trade, it is filled by other trades at the next best possible prices. The emphasis in a market order is the speed of execution. The disadvantage of a market order is that the price it will be executed at is not known ahead of time, so it has **price uncertainty**.

A **limit order** is an order to trade at the limit price or better. For sell orders, the execution price must be higher than or equal to the limit price. For buy orders, the execution price must be lower than or equal to the limit price. The order could be good for a specified period of time and then expire or could be good until it is canceled. However, if market prices do not move to within the limit, the trade will not be completed, so it has **execution uncertainty**.

1. The terminology utilized in this topic review follows industry convention as presented in Reading 39 of the 2013 CFA Level III curriculum.

## THE EFFECTIVE SPREAD

**LOS 39.b: Calculate and interpret the effective spread of a market order and contrast it to the quoted bid–ask spread as a measure of trading cost.**

*CFA® Program Curriculum, Volume 6, page 10*

The bid price is the price a dealer will pay for a security, and the bid quantity is the amount a dealer will buy of a security. The ask or offer price is the price at which a dealer will sell a security and the ask quantity is the amount a dealer will sell of a security. The ask price minus the bid price (the **bid-ask spread**) provides the dealer's compensation. In theory it is the total cost to buy and then sell the security.

An overview of some trading terms will help illustrate some of the concepts involved in trading. The prices a dealer offers are limit orders because they specify the price at which they will transact. A dealer's offering of securities is thus termed the **limit order book**. Several dealers may transact in the same security and compete against each other for the investor's business. The best bid price (the highest bid price from the trader's perspective) is referred to as the **inside bid** or **market bid**. The best ask price (the lowest ask price from the trader's perspective) is referred to as the **inside ask** or **market ask**. The best bid price and the best ask price in the market constitute the inside or market quote. Subtracting the best bid price from the best ask price results in the **inside bid-ask spread** or **market bid-ask spread**. The average of the inside bid and ask is the **midquote**.

The **effective spread** is an actual transaction price versus the midquote of the market bid and ask prices. This difference is then doubled. If the effective spread is less than the market bid-asked spread, it indicates good trade execution or a liquid security. More formally:

effective spread for a buy order = 2 × (execution price – midquote)

effective spread for a sell order = 2 × (midquote – execution price)

Effective spread is a better measure of the effective round trip cost (buy and sell) of a transaction than the quoted bid-asked spread. Effective spread reflects both **price improvement** (some trades are executed at better than the bid-asked quote) and **price impact** (other trades are done outside the bid-asked quote).

**Example: Effective spread**

Suppose a trader is quoted a market bid price of $11.50 and an ask of $11.56. **Calculate** and **interpret** the effective spread for a buy order, given an executed price of $11.55.

**Answer:**

The *midquote* of the quoted bid and ask prices is \$11.53 [= (11.50 + 11.56) / 2]. The *effective spread* for this buy order is: 2 × (\$11.55 – \$11.53) = \$0.04, which is two cents better than the quoted spread of \$0.06 (= \$11.56 – \$11.50). An effective spread that is less than the bid-asked spread indicates the execution was superior (lower cost) to the quoted spread or a very liquid market.

Effective spread on a single transaction may indicate little but be more meaningful when averaged over all transactions during a period in order to calculate an average effective spread. Lower average effective spreads indicate better liquidity for a security or superior trading.

**Example: Average effective spread**

Suppose there are three sell orders placed for a stock during a day. Figure A shows bid and ask quotes at various points in the day.

**Figure A: Trade Quotes During a Trading Day**

| *Time* | *Bid Price* | *Bid Size* | *Ask Price* | *Ask Size* |
|---|---|---|---|---|
| 10 a.m. | \$12.10 | 300 | \$12.16 | 400 |
| 1 p.m. | \$12.00 | 300 | \$12.07 | 400 |
| 2 p.m. | \$11.80 | 300 | \$11.88 | 400 |

Assume the following trades take place:

- At 10 a.m. the trader placed an order to sell 100 shares. The execution price was \$12.11.
- At 1 p.m. the trader placed an order to sell 300 shares. The execution price was \$12.00.
- At 2 p.m. the trader placed an order to sell 600 shares. The average execution price was \$11.75.

**Calculate** the quoted and effective spreads for these orders. **Calculate** the average quoted and average effective spread. **Analyze** the results.

**Answer:**

The quoted spread in Figure B for each order is the difference between the ask and bid prices.

**Figure B: Calculated Quoted Spreads**

| *Time of Trade* | *Ask Minus Bid Price* | *Quoted Spread* |
|---|---|---|
| 10 a.m. | \$12.16 – \$12.10 | \$0.06 |
| 1 p.m. | \$12.07 – \$12.00 | \$0.07 |
| 2 p.m. | \$11.88 – \$11.80 | \$0.08 |

The average quoted spread is a simple average of the quoted spreads: (\$0.06 + \$0.07 + \$0.08) / 3 = \$0.07.

The effective spread for a sell order is twice the midquote of the market bid and ask prices minus the execution price.

The midquote for each trade is calculated as in Figure C.

**Figure C: Calculated Midquotes**

| *Time of Trade* | *Midquote* |
|---|---|
| 10 a.m. | (\$12.16 + \$12.10) / 2 = \$12.13 |
| 1 p.m. | (\$12.07 + \$12.00) / 2 = \$12.035 |
| 2 p.m. | (\$11.88 + \$11.80) / 2 = \$11.84 |

The effective spread for each sell order is shown in Figure D.

**Figure D: Calculated Effective Spreads**

| *Time of Trade* | *2 × (Midquote – Execution Price) = Effective Spread* |
|---|---|
| 10 a.m. | 2 × (\$12.13 – \$12.11) = \$0.04 |
| 1 p.m. | 2 × (\$12.035 – \$12.00) = \$0.07 |
| 2 p.m. | 2 × (\$11.84 – \$11.75) = \$0.18 |

The average effective spread is (\$0.04 + \$0.07 + \$0.18) / 3 = \$0.0967.

A weighted-average effective spread can also be calculated using the relative sizes of the orders. The total number of shares transacted over the day is 1,000 shares (100 + 300 + 600). The weighted-average effective spread is then (100 / 1,000)(\$0.04) + (300 / 1,000)(\$0.07) + (600 / 1,000)(\$0.18) = \$0.133.

**Analysis:**

In the first trade, there was price improvement because the sell order was executed at a bid price higher than the quoted price. Hence, the effective spread was lower than the quoted spread. In the second trade, the quoted price and execution price were equal as were the quoted and effective spread. In the last trade, the trade size of 600 was larger than the bid size of 300. The trader had to "walk down" the limit order book to fill the trade at an average execution price that was less favorable than that quoted. Note that the effective spread in this case was higher than that quoted.

Overall, the average effective spreads (both simple and weighted) were higher than the average quoted spread, reflecting the high cost of liquidity in the last trade.

## MARKET STRUCTURES

### LOS 39.c: Compare alternative market structures and their relative advantages.

*CFA® Program Curriculum, Volume 6, page 10*

Securities markets serve several purposes: **liquidity**—minimal cost and timely trading; **transparency**—correct and up-to-date trade and market information; **assurity of completion**—trouble-free trade settlement (i.e., the trade is completed and ownership is transferred without problems).

There are three main categories of securities markets:

1. Quote-driven: Investors trade with dealers.
2. Order-driven markets: Investors trade with each other without the use of intermediaries.
3. Brokered markets: Investors use brokers to locate the counterparty to a trade.

A fourth market, a hybrid market, is a combination of the other three markets. Additionally, new trading venues have evolved, and the electronic processing of trades has become more common.

### Quote-Driven Markets

Quote-driven markets offer liquidity. Traders transact with dealers (a.k.a. *market makers*) who post bid and ask prices, so quote-driven markets are sometimes called **dealer markets**. A dealer maintains an inventory of securities and posts bid and ask prices where he will buy or sell. The dealer is providing liquidity by being willing to buy or sell and seeking to earn a profit from the spread.

Many markets that trade illiquid securities (e.g., bond markets) are organized as dealer markets because the level of natural liquidity (trading volume) is low. In such markets,

dealers can provide immediate liquidity when none would otherwise exist because they are willing to maintain an inventory of securities. Dealers also provide liquidity for securities whose terms are negotiated (e.g., swap and forward markets). Note that the dealer that offers the best price is not always the one to get a trader's business because credit risk is more important in some markets (e.g., currency markets) than price.

In some dealer markets, the limit order book is closed to the average investor. In these **closed-book** markets, an investor must hire a broker to locate the best quote.

## Order-Driven Markets

Order-driven markets may have more competition resulting in better prices. Traders transact with other traders. There are no intermediary dealers as there are in quote-driven markets. Dealers may trade in these markets but as a trader, prices are set by supply and demand. The disadvantage is that because there may not be a dealer willing to maintain an inventory of a security, liquidity may be poor. In an order-driven market, orders drive the market and the activity of traders determines the liquidity for a security. Execution of a trade is determined by a mechanical rule, such as matching prices between a willing buyer and seller.

There are three main types of order-driven markets: electronic crossing networks, auction markets, and automated auctions. In an **electronic crossing network**, the typical trader is an institution. Orders are batched together and crossed (matched) at fixed points in time during the day at the average of the bid and ask quotes. The costs of trading are low because commissions are low and traders do not pay a dealer's bid-ask spread. A trade may not be filled or may be only partially filled if there is insufficient trading activity.

The trader usually does not know the identity of the counterparty or the counterparty's trade size in an electronic crossing network. Because of this, there is no price discovery (i.e., prices do not adjust to supply and demand conditions). This also results in trades unfilled or only partially filled because prices do not respond to fill the traders' orders.

In an **auction market**, traders put forth their orders to compete against other orders for execution. An auction market can be a periodic (a.k.a. batch) market, where trading occurs at a single price at a single point during the day, or a continuous auction market, where trading takes place throughout the day. An example of the former is the open and close of some equity markets. Auction markets provide price discovery, which results in less frequent partial filling of orders than in electronic crossing networks.

**Automated auctions** are also known as electronic limit-order markets. Examples include the electronic communication networks (ECNs) of the NYSE Arca Exchange in the United States and the Paris Bourse in France. These markets trade throughout the day and trades are executed based on a set of rules. They are similar to electronic crossing networks in that they are computerized and the identity of the counterparty is not known. Unlike electronic crossing networks, they are auction markets and thus provide price discovery.

### Brokered Markets

In brokered markets, brokers act as traders' agents to find counterparties for the traders. (See the list below under LOS 39.d for the advantages).

### Hybrid Markets

Hybrid markets combine features of quote-driven, order-driven, and broker markets. The New York Stock Exchange, for example, has features of both quote-driven and order-driven markets. It has specialist dealers so it trades as a quote-driven market. It also trades throughout the day as in a continuous auction market and trades as a batch auction market at the opening of the exchange.

## BROKERS AND DEALERS

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### LOS 39.d: Compare the roles of brokers and dealers.

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*CFA® Program Curriculum, Volume 6, page 17*

**Dealers** are just other traders in the market seeking to earn a profit by offering a service. When taking the other side of a transaction, the dealer is an adversary in the sense that any buyer and seller are adversaries seeking to earn profit. The dealer, as discussed earlier, offers liquidity.

A **broker** also seeks to earn a profit in exchange for service but the broker has a **principal and agent relationship with the trader**. The broker acts as the trader's agent, which imposes a legal obligation to act in the best interests of the trader (the principal). As the trader's agent the broker can:

- **Represent the order** and advise the trader on likely prices and volume that could be executed.
- **Find counterparties to the trade.** The broker will frequently have contacts and knowledge of others who may be interested in taking the other side of the trade. The broker could even step into the role of the dealer and take the other side of the trade. It would be important to know if this is occurring because the broker now becomes a dealer and reverts to the typical adversarial buyer versus seller role.
- **Provide secrecy**. A trader may not want others to know their identity. Perhaps their ultimate goal is to acquire the company. As an agent, the broker keeps the trader anonymous.
- **Provide other services** such as record keeping, safe keeping of securities, cash management, and so forth; but not liquidity, which is the role of a dealer.
- **Support the market.** While not a direct benefit to any single client, brokers help markets function.

## MARKET QUALITY

**LOS 39.e: Explain the criteria of market quality and evaluate the quality of a market when given a description of its characteristics.**

*CFA® Program Curriculum, Volume 6, page 19*

A security market should provide *liquidity*, *transparency*, and *assurity of completion*. Accordingly, the markets should be judged to the extent that they succeed in providing these to traders.

A liquid market has small bid-ask spreads, market depth, and resilience. If a market has small spreads, traders are apt to trade more often. Market *depth* allows larger orders to trade without affecting security prices much. A market is *resilient* if asset prices stay close to their intrinsic values, and any deviations from intrinsic value are minimized quickly.

In a liquid market, traders with information trade more frequently and security prices are more efficient. Corporations can raise capital more cheaply and quickly, as more liquidity lowers the liquidity risk premium for securities. Investors, corporations, and securities increase in wealth or value in liquid markets.

There are several factors necessary for a market to be liquid, including:

- An abundance of buyers and sellers, so traders know they can quickly reverse their trade if necessary.
- Investor characteristics are diverse. If every investor had the same information, valuations, and liquidity needs, there would be little trading.
- A convenient location or trading platform which lends itself to increased investor activity and liquidity.
- Integrity as reflected in its participants and regulation, so that all investors receive fair treatment.

In a **transparent** market, investors can, without significant expense or delay, obtain both pre-trade information (regarding quotes and spreads) and post-trade information (regarding completed trades). If a market does not have transparency, investors lose faith in the market and decrease their trading activities.

When markets have **assurity of completion**, investors can be confident that the counterparty will uphold its side of the trade agreement. To facilitate this, brokers and clearing bodies may provide guarantees to both sides of the trade.

To evaluate the quality of a market, one should examine its liquidity, transparency, and assurity of completion. While transparency and assurity of completion require a qualitative assessment, liquidity can be measured by the quoted spread, effective spread, and ask and bid sizes. Lower quoted and effective spreads indicate greater liquidity and market quality. Higher bid and ask sizes indicate greater market depth, greater liquidity, and higher market quality.

## EXECUTION COSTS

**LOS 39.f: Explain the components of execution costs, including explicit and implicit costs, and evaluate a trade in terms of these costs.**

*CFA® Program Curriculum, Volume 6, page 22*

**For the Exam:** Be prepared to perform these calculations.

The **explicit costs** in a trade are readily discernible and include commissions, taxes, stamp duties, and fees. **Implicit costs** are harder to measure, but they are real. They include the bid-ask spread, market or price impact costs, opportunity costs, and delay costs (i.e., slippage costs).

**Market impact** cost is the effect of an order on market prices. For example, suppose a large sell order hits the market and a portion of it gets filled at $43.00. Before the rest of it can be filled, the security price falls $0.10 to $42.90, so the rest of the order is filled at the lower bid.

**Opportunity costs** occur when an order is not filled and the security price later moves such that the trader would have profited. For example, suppose a trader places a 1-day limit buy order at $50.00 for a security when the ask price is $50.04. The price rises and the order is left unfilled. If the security closes at $50.10, then the trader has lost out on these profits. The opportunity cost is $0.06 (= $50.10 – $50.04).

When an order sits unfilled or is only partially filled because of illiquidity, ***delay*** or ***slippage*** costs result. Delay costs can be substantial if information regarding the security is released while the order is unfilled.

### Volume-Weighted Average Price (VWAP)

Implicit costs are measured using some benchmark, such as the midquote used to calculate the effective spread. An alternative is the VWAP. VWAP is a weighted average of execution prices during a day, where the weight applied is the proportion of the day's trading volume.

For example, assume the only trades for a security during the day are:

- At 10 a.m. 100 shares trade at $12.11.
- At 1 p.m. 300 shares trade at $12.00.
- At 2 p.m. 600 shares trade at $11.75.

The total number of shares traded is 1,000, so the VWAP is:

$$\text{VWAP} = \left(\frac{100}{1{,}000}\right)\$12.11 + \left(\frac{300}{1{,}000}\right)\$12.00 + \left(\frac{600}{1{,}000}\right)\$11.75 = \$11.86$$

VWAP has shortcomings.

- It is not useful if a trader is a significant part of the trading volume. Because her trading activity will significantly affect the VWAP, a comparison to VWAP is essentially comparing her trades to herself. It does not provide useful information.
- A more general problem is the potential to "game" the comparison. An unethical trader knowing he will be compared to VWAP could simply wait until late in the day and then decide which trades to execute. For example, if the price has been moving down, only execute buy transactions which will be at prices below VWAP. If prices are moving up for the day, only execute sales.
- This is related to the more general problem that VWAP does not consider missed trades.

## Implementation Shortfall

### LOS 39.g: Calculate and discuss implementation shortfall as a measure of transaction costs.

*CFA® Program Curriculum, Volume 6, page 24*

**Implementation shortfall** is considerably more complicated to implement but can address the shortcomings of VWAP. It is the difference between the actual portfolio's return and a hypothetical paper portfolio's return of trades executed at no cost. The return on the paper portfolio is based on the decision price.

The **decision price** (also called the **arrival price** or **strike price**) is the market price of the security at the time the decision to trade is made. If the decision to trade is made after the market closes it is taken to be the previous closing price. Once the decision price is set, it does not change.

Implementation shortfall can be calculated as a total nominal value or as a percentage. The total can also be broken down into four elements of cost:

1. **Explicit costs** are commissions, taxes, fees, et cetera.

2. **Realized profit/loss** is the difference between the execution price or prices if more than one trade execution is made and the relevant decision price (usually the previous day's close).

3. **Delay or slippage cost** is the cost from not being able to fill the order immediately. It is the market close-to-close price movement from the day an order was entered (if not executed) until filled.

4. **Missed trade opportunity cost** is an opportunity loss or gain due to the inability to complete the trade. It is the difference between the cancelation price of the order and the decision price.

Each of the components can be stated as a nominal amount or as a percentage related to decision price. Each component must be weighted by the number of shares involved. An example is required to understand the calculations.

**Example: Of implementation shortfall and decomposition**

- On Wednesday, the stock price for Megabites closes at $20 a share.
- On Thursday morning before market open, the portfolio manager decides to buy Megabites and submits a limit order for 1,000 shares at $19.95. The price never falls to $19.95 during the day, so the order expires unfilled. The stock closes at $20.05.
- On Friday, the order is revised to a limit of $20.06. The order is partially filled that day as 800 shares are bought at $20.06. The commission is $18. The stock closes at $20.09 and the order for the remaining 200 shares is cancelled.

**Answer:**

The market was closed at the time the decision was made to trade; therefore, the decision price is taken to be the closing price of $20.00.

The **gain or loss on paper portfolio** versus actual portfolio is the total implementation shortfall. The paper portfolio would have purchased all the shares at the decision price with no costs.

- The investment made by the paper portfolio is 1,000 × $20.00 = $20,000.
- The terminal value of the paper portfolio is 1,000 × $20.09 = $20,090. This is based on the price when the trade is completed, which in this case is when it is canceled.
- The gain on the paper portfolio is $20,090 – $20,000 = $90.

The **gain or loss on the real portfolio** is the actual ending value of the portfolio versus the actual expenditures, including costs.

- The investment made by the real portfolio is (800 × $20.06) + $18 = $16,066.
- The terminal value of the real portfolio is 800 × $20.09 = $16,072.
- The gain on the real portfolio is $16,072 – $16,066 = $6.

*Professor's Note: For sales the implementation shortfall calculation is reversed (i.e., the profit on the paper portfolio is subtracted from the profit on the real portfolio).*

The **total implementation shortfall**, or cost of the trade, is the gain on the paper portfolio minus the gain on the real portfolio as a nominal amount or as a percentage of the paper portfolio investment. The nominal cost is $84.00:

$$\text{implementation shortfall} = \frac{\text{paper portfolio gain} - \text{real portfolio gain}}{\text{paper portfolio investment}}$$

$$= \frac{\$90 - \$6}{\$20{,}000} = 0.0042 = 0.42\%$$

To decompose the implementation shortfall:

- **Explicit costs.** The commission as a percentage of the paper portfolio investment:

$$\text{explicit costs} = \frac{\text{commission}}{\text{paper portfolio investment}} = \frac{\$18}{\$20{,}000} = 0.0009 = 0.09\%$$

- **Realized profit/loss.** (In this case a loss.) The execution price minus the previous day's (Thursday's) closing price divided by the benchmark price then weighted by the *proportion filled*:

$$\text{realized loss} = \frac{\text{execution price} - \text{relevent decision price}}{\text{decision price}} \times \frac{\text{shares purchased}}{\text{shares ordered}}$$

$$= \left(\frac{\$20.06 - \$20.05}{\$20.00}\right) \times \left(\frac{800}{1{,}000}\right) = 0.0004 = 0.04\%$$

The previous day's close is used in the numerator as the relevant decision price for the realized profit/loss to reflect the manager's unreasonable limit price during the first day, which is the likely reason no shares were purchased on day one. This does not change the overall trade decision price used in the denominator.

The delay cost (in this case) measures the manager's unreasonable limit price on day one.

- **Delay costs.** The closing price the day before the order was executed minus the benchmark price divided by the benchmark price and weighted by the *proportion filled*:

$$\text{delay costs} = \frac{\text{previous day closing price} - \text{decision price}}{\text{decision price}} \times \frac{\text{shares purchased}}{\text{shares ordered}}$$

$$= \left(\frac{\$20.05 - \$20.00}{\$20.00}\right) \times \left(\frac{800}{1{,}000}\right) = 0.0020 = 0.20\%$$

- **Missed trade opportunity cost** (MTOC) only occurs if the full order is not filled. MTOC is the difference in price when the order is canceled and the benchmark price, divided by the benchmark price and weighted by the proportion of the order that was *unfilled*:

$$\text{MTOC} = \frac{\text{cancellation price} - \text{benchmark price}}{\text{benchmark price}} \times \frac{\text{shares not purchased}}{\text{shares ordered}}$$

$$= \left(\frac{\$20.09 - \$20.00}{\$20.00}\right) \times \left(\frac{200}{1{,}000}\right) = 0.0009 = 0.09\%$$

The sum of the components equals the total implementation cost calculated previously:

$$\text{total implementation cost} = 0.42\% = 0.09\% + 0.04\% + 0.20\% + 0.09\%$$

The total implementation shortfall (cost of the trade was $84.00 or 0.42%, which is 42 basis points.)

In this case, the total and each component was a positive number, meaning a cost. Commissions would always be a cost but it is possible that one or more of the other three implicit costs could be a negative number. That would mean it is a benefit or reduction in cost. It is also possible to adjust the analysis to account for the direction of market movement.

### Adjusting for Market Movements

We can use the market model to adjust for market movements, where the expected return on a stock is its alpha, $\alpha_i$, plus its beta, $\beta_i$, multiplied by the expected return on the market, $E(R_M)$:

$$E(R_i) = \alpha_i + \beta_i E(R_M)$$

Over a few days, the alpha term will be close to zero. If the market return was 0.8% over the time period of this trading and the beta was 1.2 for Megabites, the expected return for it would be 0.8% × 1.2 = 0.96%. Subtracting this from the 0.42% results in a *market-adjusted implementation shortfall* of 0.42% – 0.96% = –0.54%. With this adjustment, the trading costs are actually negative.

Negative cost means a benefit to the portfolio. Knowing that the market was rising during the period and comparing the execution prices to that rising market price indicates the purchases were done below market price, a negative cost.

## VWAP vs. Implementation Shortfall

**LOS 39.h: Contrast volume weighted average price (VWAP) and implementation shortfall as measures of transaction costs.**

*CFA® Program Curriculum, Volume 6, page 27*

As mentioned previously, VWAP has its shortcomings. Its advantages and disadvantages, as well as those for implementation shortfall, are summarized as follows:

Advantages of VWAP:

- Easily understood.
- Computationally simple.
- Can be applied quickly to enhance trading decisions.
- Most appropriate for comparing small trades in nontrending markets (where a market adjustment is not needed).

Disadvantages of VWAP:

- Not informative for trades that dominate trading volume (as described earlier).
- Can be gamed by traders (as described earlier).
- Does not evaluate delayed or unfilled orders.
- Does not account for market movements or trade volume.

Advantages of Implementation Shortfall:

- Portfolio managers can see the cost of implementing their ideas.
- Demonstrates the tradeoff between quick execution and market impact.
- Decomposes and identifies costs.
- Can be used in an optimizer to minimize trading costs and maximize performance (which will be discussed in LOS 39.i).
- Not subject to gaming.

Disadvantages of Implementation Shortfall:

- May be unfamiliar to traders.
- Requires considerable data and analysis.

## ECONOMETRIC MODELS

### LOS 39.i: Explain the use of econometric methods in pretrade analysis to estimate implicit transaction costs.

*CFA® Program Curriculum, Volume 6, page 29*

**Econometric models** can be used to forecast transaction costs. Using market microstructure theory, it has been shown that trading costs are nonlinearly related to:

- Security liquidity: trading volume, market cap, spread, price.
- Size of the trade relative to liquidity.
- Trading style: more aggressive trading results in higher costs.
- Momentum: trades that require liquidity (e.g., buying stock costs more when the market is trending upward).
- Risk.

The analyst would use these variables and a regression equation to determine the estimated cost of a trade.

The usefulness of econometric models is twofold. First, trading effectiveness can be assessed by comparing actual trading costs to forecasted trading costs from the model. Second, it can assist portfolio managers in determining the size of the trade. For example, if a trade of 100,000 shares is projected to result in round-trip trading costs of 4% and the strategy is projected to return 3%, then the trade size should be decreased to where trading costs are lower and the strategy is profitable.

## MAJOR TRADER TYPES

**LOS 39.j: Discuss the major types of traders, based on their motivation to trade, time versus price preferences, and preferred order types.**

*CFA® Program Curriculum, Volume 6, page 31*

The first type of traders we examine are **information-motivated traders**. These traders have information that is time sensitive, and if they do not trade quickly, the value of the information will expire. They therefore prefer quick trades that demand liquidity, trading in large blocks. Information traders may trade with a dealer to guarantee an execution price. They are willing to bear higher trading costs as long as the value of their information is higher than the trading costs. Information traders will often want to disguise themselves because other traders will avoid trading with them. They use market orders to execute quickly because these commonly used orders are less noticeable.

**Value-motivated traders** use investment research to uncover misvalued securities. They do not trade often and are patient, waiting for the market to come to them with security prices that accommodate their valuations. As such, they will use limit orders because price, not speed, is their main objective.

**Liquidity-motivated traders** transact to convert their securities to cash or reallocate their portfolio from cash. They are often the counterparts to information-motivated and value-motivated traders who have superior information. Liquidity-motivated traders should be cognizant of the value they provide other traders. They freely reveal their benign motivations because they believe it to be to their advantage. They utilize market orders and trades on crossing networks and electronic communication networks (ECNs). Liquidity-motivated traders prefer to execute their order within a day.

**Passive traders** trade for index funds and other passive investors, trading to allocate cash or convert to cash. They are similar to liquidity-motivated traders but are more focused on reducing costs. They can afford to be very patient. Their trades are like those of dealers in that they let other traders come to them so as to extract a favorable trade price. They favor limit orders and trades on crossing networks. This allows for low commissions, low market impact, price certainty, and possible elimination of the bid-ask spread.

A summary of the major trader types, including their motivations and order preferences, is presented in Figure 1.

**Figure 1: Summary of Trader Types and Their Motivations and Preferences**

| *Trader Types* | *Motivation* | *Time or Price Preference* | *Primary Preferred Order Types* |
|---|---|---|---|
| Information-motivated | Time-sensitive information | Time | Market |
| Value-motivated | Security misvaluations | Price | Limit |
| Liquidity-motivated | Reallocation & liquidity | Time | Market |
| Passive | Reallocation & liquidity | Price | Limit |

Other trader types include **day traders** and **dealers**. Dealers were discussed earlier and seek to earn the bid-asked spread and short-term profits. Day traders are similar in that they seek short-term profits from price movements.

## TRADING TACTICS

**LOS 39.k: Describe the suitable uses of major trading tactics, evaluate their relative costs, advantages, and weaknesses, and recommend a trading tactic when given a description of the investor's motivation to trade, the size of the trade, and key market characteristics.**

*CFA® Program Curriculum, Volume 6, page 36*

Most portfolio managers have different trading needs at different times. Few can pursue the same trading strategy all the time. In the material to follow, we discuss various trading tactics.

In a **liquidity-at-any-cost** trading focus, the trader must transact a large block of shares quickly. The typical trader in this case is an information trader but can also be a mutual fund that must liquidate its shares quickly to satisfy redemptions in its fund. Most counterparties shy away from taking the other side of an information trader's position. The liquidity-at-any-cost trader may be able to find a broker to represent him though because of the information the broker gains in the process. In any event, this trader must be ready to pay a high price for trading in the form of either market impact, commissions, or both.

In a **costs-are-not-important** trading focus, the trader believes that exchange markets will operate fairly and efficiently such that the execution price they transact at is at best execution. These orders are appropriate for a variety of trade motivations. Trading costs are not given consideration, and the trader pays average trading costs for quick execution. The trader thus uses market orders, which are also useful for disguising the trader's intentions because they are so common. The weakness of a market order is that the trader loses control over the trade's execution.

In a **need-trustworthy-agent** trading focus, the trader employs a broker to skillfully execute a large trade in a security, which may be thinly traded. The broker may need to trade over a period of time, so these orders are not appropriate for information traders. The trader cedes control to the broker and is often unaware of trade details until after

the order has executed. The weakness of this strategy is that commissions may be high and the trader may reveal his trade intentions to the broker, which may not be in the trader's best interests.

In an **advertise-to-draw-liquidity** trading focus, the trade is publicized in advance to draw counterparties to the trade. An initial public offering is an example of this trade type. The weakness of this strategy is that another trader may front run the trade, buying in advance of a buy order, for example, to then sell at a higher price.

In a **low-cost-whatever-the-liquidity** trading focus, the trader places a limit order outside of the current bid-ask quotes in order to minimize trading costs. For example, a trader may place a limit buy order at a price below the current market bid. The strength of this strategy is that commissions, spreads, and market impact costs tend to be low. Passive and value-motivated traders will often pursue this strategy. Patience is required for this strategy, and indeed its weakness is that it may not be executed at all. Additionally, if it is executed, the reason may be that negative information has been released. For example, a buy order of this type may only be executed when bad news is released about the firm.

A summary of trading tactics is presented in Figure 2. Note that the motivations for need-trustworthy-agent and advertise-to-draw-liquidity tactics are nonspecific but would exclude information-based motivations.

**Figure 2: Summary of Trading Tactics**

| *Trading Tactic* | *Strengths* | *Weaknesses* | *Usual Trade Motivation* |
|---|---|---|---|
| Liquidity-at-any-cost | Quick, certain execution | High costs & leakage of information | Information |
| Costs-are-not-important | Quick, certain execution at market price | Loss of control of trade costs | Variety of motivations |
| Need-trustworthy-agent | Broker uses skill & time to obtain lower price | Higher commission & potential leakage of trade intention | Not information |
| Advertise-to-draw-liquidity | Market-determined price | Higher administrative costs & possible front running | Not information |
| Low-cost-whatever-the-liquidity | Low trading costs | Uncertain timing of trade & possibly trading into weakness | Passive and value |

## ALGORITHMIC TRADING

### LOS 39.l: Explain the motivation for algorithmic trading and discuss the basic classes of algorithmic trading strategies.

*CFA® Program Curriculum, Volume 6, page 38*

**Algorithmic trading** is the use of automated, quantitative systems that utilize trading rules, benchmarks, and constraints. Algorithmic trading is a form of automated trading, which refers to trading not conducted manually. Automated trading accounts for about one-quarter of all trades, and algorithmic trading is projected to grow.

The **motivation for algorithmic trading** is to execute orders with minimal risk and costs. The use of algorithmic trading often involves breaking a large trade into smaller pieces to accommodate normal market flow and minimize market impact. This automated process must be monitored, however, so that the portfolio does not become over-concentrated in sectors. This might happen if certain sectors are more liquid than others.

Algorithmic trading strategies are classified into *logical participation strategies*, *opportunistic strategies*, and *specialized strategies*. Of logical participation strategies, there are two subtypes: simple logical participation strategies and implementation shortfall strategies. We examine these subtypes first.

**Simple logical participation strategies** seek to trade with market flow so as to not become overly noticeable to the market and to minimize market impact. We discuss three types of simple logical participation strategies: volume-weighted average price (VWAP) strategy, time-weighted average price strategy, and percent-of-volume strategy.

In a VWAP strategy, the order is broken up over the course of a day so as to equal or outperform the day's VWAP. At the beginning of the day, trading later in the day is uncertain, so VWAP for later periods is predicted using historical data or models.

In a time-weighted average price strategy (TWAP), trading is spread out evenly over the whole day so as to equal a TWAP benchmark. This strategy is often used for a thinly traded stock that has volatile, unpredictable intraday trading volume. Total trading volume can be forecasted using historical data or predictive models.

In the percent-of-volume strategy, the order is traded at 5–20% of normal trading volume until the order is filled.

**Implementation shortfall strategies**, or arrival price strategies, minimize trading costs as defined by the implementation shortfall measure (discussed earlier) or total execution costs. Both measures use a weighted average of opportunity costs and market impact costs. Because opportunity costs result from non-trading, this strategy trades heavier early in the day to ensure order completion. Furthermore, opportunity costs are often measured by the volatility of trade value, which increases over time. So again, opportunity costs can be reduced by trading earlier. An implementation shortfall strategy is useful when an entire portfolio must be traded.

Other algorithmic trading strategies include opportunistic participation strategies and specialized strategies. Opportunistic participation strategies trade passively over time but increase trading when liquidity is present. It is not a true participation strategy due to its opportunistic nature. Specialized strategies include passive strategies and other miscellaneous strategies.

## Choosing an Algorithmic Trading Strategy

**LOS 39.m: Discuss the factors that typically determine the selection of a specific algorithmic trading strategy, including order size, average daily trading volume, bid–ask spread, and the urgency of the order.**

*CFA® Program Curriculum, Volume 6, page 44*

The basis of simple participation strategies is to break up the trade into small pieces so that each trade is a small part of trading volume and market impact costs are minimized.

In contrast, an implementation shortfall strategy focuses on trading early to minimize opportunity costs. Furthermore, an objective function can be specified using implementation shortfall that seeks to minimize market impact costs and opportunity costs, as well as the variance of the cost of trading. The minimization of this variance also provides an incentive for the implementation shortfall strategy to trade early. Note that satisfying this objective function is similar to portfolio optimization because portfolio value is maximized.

In sum, an implementation shortfall strategy typically executes the order quickly whereas a simple participation strategy breaks the trade into small pieces and trades throughout the day. Keep this in mind for the example in Figure A below, which represents a trader's order management system.

**Example: Choosing the appropriate algorithmic strategy**

**Figure A: Order Management System**

| *Stock Ticker* | *Trade Size* | *Average Daily Volume* | *Price* | *Spread* | *Urgency* |
|---|---|---|---|---|---|
| ABCD | 20,000 | 250,000 | $24.67 | 0.06% | Low |
| LMNO | 50,000 | 125,000 | $12.18 | 0.45% | Low |
| WXYZ | 150,000 | 2,500,000 | $37.88 | 0.05% | High |

**Discuss** the appropriate trading strategy that should be used to place each order.

**Answer:**

First calculate each trade size as a percentage of average daily volume, as in Figure B.

**Figure B: Trade Sizes as a Percentage of Average Daily Volume**

| *Stock Ticker* | *Trade Size as a Percentage of Average Daily Volume* |
|---|---|
| ABCD | 20,000 / 250,000 = 8% |
| LMNO | 50,000 / 125,000 = 40% |
| WXYZ | 150,000 / 2,500,000 = 6% |

Although the trade for stock WXYZ is the largest in absolute size, it is the smallest in relative terms. The trade for stock ABCD is also relatively small, and in both cases the spreads are fairly low. The ABCD trade is of low urgency and can be traded over time. It is thus suitable for a simple participation strategy based on VWAP or another benchmark. The WXYZ trade is of high urgency, however, and should be traded more quickly using an implementation shortfall strategy.

The LMNO trade is of relatively large size and has a large spread. Because of these characteristics, it should be traded through a skilled broker or through a crossing system to minimize the spread.

## BEST EXECUTION

### LOS 39.n: Explain the meaning and criteria of best execution.

*CFA® Program Curriculum, Volume 6, page 46*

Best execution is an important concept because it impacts the client's portfolio performance. The CFA Institute has published Trade Management Guidelines for pursuing best execution.[2] The Institute compares best execution to prudence. Prudence refers to selecting the securities most appropriate for an investor, whereas best execution refers to the best means to buy or sell those securities. They are similar in that they both attempt to improve portfolio performance and meet fiduciary responsibilities.

The Institute report specifies four characteristics of best execution:

1. Best execution cannot be judged independently of the investment decision. A strategy might have high trading costs, but that alone does not mean the strategy should not be pursued as long as it generates the intended value.

2. Best execution cannot be known with certainty ex ante (before the fact); it depends on the particular circumstances of the trade. Each party to a trade determines what best execution is.

2. Available at *http://www.cfapubs.org/doi/pdf/10.2469/ccb.v2004.n3.4007*, accessed September 2012.

3. Best execution can only be assessed ex post (after the fact). While cost can be measured for any single trade, quality of execution is assessed over time. The cost of a single trade execution is very dependent on the reference or decision price used in its calculation. There can always be distortions. But over time and multiple trades, those costs can be used to indicate the quality of execution.

4. Relationships and practices are integral to best execution. Best execution is ongoing and requires diligence and dedication to the process.

## Evaluating Trading Procedures

### LOS 39.o: Evaluate a firm's investment and trading procedures, including processes, disclosures, and record keeping, with respect to best execution.

*CFA® Program Curriculum, Volume 6, page 47*

The CFA Institute's Trade Management Guidelines are split into three parts: processes, disclosures, and record keeping. These guidelines are meant to assist investment management firms in achieving best execution and maximum portfolio value for their clients.

In regard to processes, firms should have policies and procedures that have the intent of maximizing portfolio value using best execution. These policies and procedures should also help firms measure and manage best execution.

Investment management firms should also provide disclosure to their clients and potential clients regarding (1) general information on their trading techniques, markets, and brokers and (2) their conflicts of interest related to trading. This information should be provided periodically to clients to help them assess the firm's ability to provide best execution.

In regard to record keeping, investment management firms should maintain the documentation supporting (1) the firm's compliance with its policies and procedures and (2) disclosures made to its clients. In doing so, the firm also provides evidence to regulators as to how the firm pursues best execution for its clients.

### LOS 39.p: Discuss the role of ethics in trading.

*CFA® Program Curriculum, Volume 6, page 47*

Trading is based on word of honor. Buy-side and sell-side trades must honor their verbal agreements or they will quickly find that no one wants to take the opposite side of their trade. The development of complex trading techniques and the decline in explicit commissions have increased the opportunity and temptation to act unethically.

Regardless of these developments, buy-side traders should always act in the best interests of their clients. Buy-side traders and portfolio managers have a fiduciary duty to maximize the value of their client's portfolio. The buy-side trader's relationships with sell-side traders must never come before the interests of the trader's clients.

# KEY CONCEPTS

## LOS 39.a

A **market order** is an order to execute the trade immediately at the best possible price. If the order cannot be completely filled in one trade which offers the best price, it is filled by other trades at the next best possible prices. The emphasis in a market order is the speed of execution. The disadvantage of a market order is that the price it will be executed at is not known ahead of time, so it has **price uncertainty**.

A **limit order** is an order to trade at the limit price or better. For sell orders, the execution price must be higher than or equal to the limit price. For buy orders, the execution price must be lower than or equal to the limit price. If not filled on or before the specified date, limit orders expire. A limit order emphasizes the price of execution. It however may not be filled immediately and may even go unfilled or partially unfilled. A limit order thus has **execution uncertainty**.

## LOS 39.b

The effective spread is compared against the quoted spread to evaluate the cost of trading. It captures both price improvements and the costs of market impact:

$$\text{effective spread}_{\text{buy order}} = 2 \times (\text{execution price} - \text{midquote})$$
$$\text{effective spread}_{\text{sell order}} = 2 \times (\text{midquote} - \text{execution price})$$

## LOS 39.c

- Quote-driven markets: Investors trade with dealers.
- Order-driven markets: Investors trade with each other without the use of intermediaries. There are three main types:
  1. In an *electronic crossing network*, orders are batched together and crossed (matched) at fixed points in time during the day at the average of the bid and ask quotes.
  2. In *auction markets*, trader orders compete for execution.
  3. *Automated auctions* are computerized auction markets and provide price discovery.
- Brokered markets: Investors use brokers to locate the counterparty to a trade. This service is valuable when the trader has a large block to sell, when the trader wants to remain anonymous, and/or when the market for the security is small or illiquid.
- A hybrid market is a combination of the other three markets. For example, the New York Stock Exchange has features of both quote-driven and order-driven markets.

### LOS 39.d

The relationship between a **trader and the broker** is one of a *principal and agent*. The broker acts as the trader's agent and locates the necessary liquidity at the best price. The broker may even take a position in the security to facilitate the trade. Many buy-side traders prefer their anonymity so as not to tip off other traders to their actions. At the same time, the trader may be able to extract information from the broker on the depth of the market for a security and the identity of other traders. The broker may also provide record keeping, financing, cash management, and other services to the trader.

In contrast, the **trader and the dealer** often have *opposing interests*. For example, dealers want to maximize the trade spread while traders want to minimize it. In addition, when a trader has information that the dealer does not have, the trader profits at the dealer's expense. When a trader enters the market with information others do not have, the result is adverse selection risk for the dealer. It is in the trader's interest to conceal her intent, while it is in the dealer's interest to find out who the informed traders are.

### LOS 39.e

A security market should provide liquidity, transparency, and assurity of completion. A liquid market has small bid-ask spreads, market depth, and resilience. Market depth allows larger orders to trade without affecting security prices much. A market is resilient if asset prices stay close to their intrinsic values.

In a transparent market, investors can, without significant expense or delay, obtain both pre-trade information and post-trade information. If a market does not have transparency, investors lose faith in the market and decrease their trading activities. When markets have assurity of completion, investors can be confident that the counter-party will uphold their side of the trade agreement. To facilitate this, brokers and clearing bodies may provide guarantees to both sides of the trade.

### LOS 39.f

The **explicit** costs in a trade are readily discernible and include commissions, taxes, stamp duties, and fees.

**Implicit** costs sometimes cannot be measured as easily, but they are real nonetheless. They include the bid-ask spread, market or price impact costs, opportunity costs, and delay costs (a.k.a. slippage costs).

**Market impact cost** is the effect of an order on market prices. For example, suppose a large *sell* order hits the market and a portion of it gets filled at $43.00. Before the rest of it can be filled, the security price falls $0.10 to $42.90, so the rest of the order is filled at the lower bid.

**Opportunity** costs occur when an order is not filled and the security price later moves such that the trader would have profited. For example, suppose a trader places a 1-day limit buy order at $50.00 for a security when the ask price is $50.04. The price rises and the order is left unfilled. If the security closes at $50.10, then the trader has lost out on these profits. The opportunity cost is $0.06 (= $50.10 – $50.04).

### LOS 39.g

Implementation shortfall is the difference between the actual portfolio's return and a paper portfolio's return.

Implementation shortfall can be calculated as a total nominal value or as a percentage. The total can also be broken down into four elements of cost:

**Explicit costs** are commissions, taxes, fees, et cetera.

**Realized profit/loss** is the difference between the execution price (or prices if more than one trade execution is made) and the relevant decision price (usually the previous day's close).

**Delay or slippage cost** is the cost from not being able to fill the order immediately. It is the market close-to-close price movement from the day an order was entered (if not executed) until filled.

**Missed trade opportunity cost** is an opportunity loss or gain due to the inability to complete the trade. It is the difference in cancelation price of the order and decision price.

### LOS 39.h

Advantages of VWAP:

- Easily understood.
- Computationally simple.
- Can be applied quickly to enhance trading decisions.
- Most appropriate for comparing small trades in nontrending markets (where a market adjustment is not needed).

Disadvantages of VWAP:

- Not informative for trades that dominate trading volume.
- Can be gamed by traders.
- Does not evaluate delayed or unfilled orders.
- Does not account for market movements or trade volume.

Advantages of Implementation Shortfall:

- Portfolio managers can see the cost of implementing their ideas.
- Demonstrates the tradeoff between quick execution and market impact.
- Decomposes and identifies costs.
- Can be used in an optimizer to minimize trading costs and maximize performance.
- Not subject to gaming.

Disadvantages of Implementation Shortfall:

- May be unfamiliar to traders.
- Requires considerable data and analysis.

### LOS 39.i

Econometric models can be used to forecast transaction costs. Using market microstructure theory, it has been shown that trading costs are nonlinearly related to:

- Security liquidity: trading volume, market cap, spread, price.
- Size of the trade relative to liquidity.
- Trading style: more aggressive trading results in higher costs.
- Momentum: trades that require liquidity [e.g., buying (selling) when the market is trending upward (downward)].
- Risk.

The analyst uses these variables and a regression equation to forecast the estimated cost of a trade.

The usefulness of econometric models is twofold. First, trading effectiveness can be assessed by comparing actual trading costs to forecasted trading costs from the model. Second, it can assist portfolio managers in determining the size of the trade.

### LOS 39.j

Information-motivated traders trade based on time-sensitive information; thus, they prefer market orders because their trades must take place quickly. Their trades demand liquidity, and they are willing to bear higher trading costs.

Value-motivated traders use investment research to uncover misvalued securities. They will use limit orders because price, not speed, is their main objective.

Liquidity-motivated traders transact to convert their securities to cash or reallocate their portfolio from cash. They utilize market orders and trades on crossing networks and electronic communication networks (ECNs). Liquidity-motivated traders prefer to execute their order within a day.

Passive traders trade for index funds and other passive investors. They favor limit orders and trades on crossing networks. This allows for low commissions, low market impact, price certainty, and possible elimination of the bid-ask spread.

### LOS 39.k

In a liquidity-at-any-cost trading focus, the trader must transact a large block of shares quickly. The typical trader in this case is an information trader but can also be a mutual fund that must liquidate its shares quickly to satisfy redemptions in its fund. This trader must be ready to pay a high price for trading in the form of market impact, commissions, or both.

In a costs-are-not-important trading focus, the trader believes that exchange markets will operate fairly and efficiently such that the execution price they transact at is at best execution. The trader thus uses market orders.

In a need-trustworthy-agent trading focus, the trader employs a broker to skillfully execute a large trade in a security, which may be thinly traded. The weakness of this strategy is that commissions may be high and the trader may reveal his trade intentions to the broker.

In an advertise-to-draw-liquidity trading focus, the trade is publicized in advance to draw counterparties to the trade. The weakness of this strategy is that another trader may front run the trade, buying in advance of a buy order.

In a low-cost-whatever-the-liquidity trading focus, the trader places a limit order outside of the current bid-ask quotes in order to minimize trading costs. Passive and value-motivated traders will often pursue this strategy.

### LOS 39.l

Algorithmic trading is the use of automated, quantitative systems that utilize trading rules, benchmarks, and constraints to execute orders with minimal risk and costs. Algorithmic trading strategies are classified into logical participation strategies (simple logical and implementation shortfall strategies), opportunistic strategies, and specialized strategies.

Simple logical participation strategies seek to trade with market flow so as to not become overly noticeable to the market and to minimize market impact.

Implementation shortfall strategies, or arrival price strategies, minimize trading costs as defined by the implementation shortfall measure or total execution costs.

Opportunistic participation strategies trade passively over time but increase trading when liquidity is present.

Specialized strategies include passive strategies and other miscellaneous strategies.

### LOS 39.m

The basis of simple participation strategies is to break up the trade into small pieces so that each trade is a small part of trading volume and market impact costs are minimized.

In contrast, an implementation shortfall strategy focuses on trading early to minimize opportunity costs. Furthermore, an objective function can be specified using implementation shortfall that seeks to minimize market impact costs and opportunity costs, as well as the variance of the cost of trading. The minimization of this variance also provides an incentive for the implementation shortfall strategy to trade early. Note that satisfying this objective function is similar to portfolio optimization because portfolio value is maximized.

In sum, an implementation shortfall strategy typically executes the order quickly, whereas a simple participation strategy breaks the trade into small pieces and trades throughout the day.

### LOS 39.n

CFA Institute compares best execution to prudence. Prudence refers to selecting the securities most appropriate for an investor, whereas best execution refers to the best means to buy or sell those securities. They are similar in that they both attempt to improve portfolio performance and meet fiduciary responsibilities.

Four characteristics of best execution:

1. Best execution cannot be judged independently of the investment decision. Some strategies might have high trading costs but that does not mean they should not be pursued if in net they enhance portfolio value.

2. Best execution cannot be known with certainty ex ante (before the fact); it depends on the particular circumstances of the trade. Each party to a trade determines what best execution is.

3. Best execution can only be assessed ex post (after the fact). While cost can be measured for any single trade, quality of execution is assessed over time. The cost of a single trade execution is very dependent on the reference or decision price used in its calculation. There can always be distortions. But over time and multiple trades, those costs can be used to indicate the quality of execution.

4. Relationships and practices are integral to best execution. Best execution is ongoing and requires diligence and dedication to the process.

### LOS 39.o

The CFA Institute's Trade Management Guidelines are split into three parts:

1. **Processes:** Firms should have policies/procedures that have the intent of maximizing portfolio value using best execution. These should help firms determine and manage best execution.

2. **Disclosures:** Investment management firms should provide disclosure to their clients and potential clients regarding (1) general information on their trading techniques, markets, and brokers and (2) their conflicts of interest related to trading. This information should be provided periodically to clients.

3. **Record Keeping:** Investment management firms should maintain the documentation supporting (1) the firm's compliance and (2) disclosures made to its clients. In doing so, the firm also provides evidence to regulators as to how the firm pursues best execution for its clients.

### LOS 39.p

Trading is based on word of honor. Buy-side and sell-side traders must honor their verbal agreements or they will quickly find that no one wants to take the opposite side of their trade. The development of complex trading techniques and the decline in explicit commissions have increased the opportunity and temptation to act unethically.

Regardless of these developments, buy-side traders should always act in the best interests of their clients. Buy-side traders and portfolio managers have a fiduciary duty to maximize the value of their client's portfolio. The buy-side trader's relationships with sell-side traders must never come before the interests of the trader's clients.

## CONCEPT CHECKERS

1. **Discuss** why a limit order has execution uncertainty.

2. There were three sell orders placed for a stock during a day. The following are the quoted bid and ask quotes at various points in the day.

| *Time of Trade* | *Bid Price* | *Bid Size* | *Ask Price* | *Ask Size* |
|---|---|---|---|---|
| 11 a.m. | $20.00 | 400 | $20.08 | 500 |
| 12 p.m. | $20.08 | 400 | $20.18 | 500 |
| 2 p.m. | $20.12 | 400 | $20.24 | 500 |

- At 11 a.m. the trader placed an order to sell 200 shares. The execution price was $20.02.
- At 12 p.m. the trader placed an order to sell 300 shares. The execution price was $20.11.
- At 2 p.m. the trader placed an order to sell 500 shares. The average execution price was $20.09.

**Calculate** the quoted and effective spreads for these orders and the spread averages. **Comment** on any possible price improvement in each trade.

3. Suppose a trader has a large block of an emerging market stock to sell and would like to do so surreptitiously. In which type of market would be best for him to trade?

4. **Discuss** the adverse selection risk faced by a dealer.

5. An analyst is comparing two markets. Market A has higher average bid and ask sizes than Market B. **Discuss** which market has the higher quality and why.

6. Suppose there is an illiquid stock that has a limited market of buyers and sellers. In fact, the majority of trading in this firm's stock is dominated by one trader. **Discuss** the use of the volume-weighted average price (VWAP) to compare this trader to another trader.

7. Use the following information to **calculate** the implementation shortfall and its components:
   - On Wednesday, the stock price closes at $50 a share.
   - On Thursday morning before market open, the portfolio manager decides to buy Megawidgets and transfers a limit order for 1,000 shares at $49.95. The order expires unfilled. The stock closes at $50.05.
   - On Friday, the order is revised to a limit of $50.07. The order is partially filled that day as 700 shares are bought at $50.07. The commission is $23. The stock closes at $50.09 and the order is cancelled.

8. Suppose a firm was concerned that its traders were gaming its trading costs analysis. **Suggest** a measurement of trading costs that is less susceptible to gaming.

9. Are econometric models used as ex ante (before the fact) or ex post (after the fact) investment tools?

10. Why do value-motivated and passive traders prefer limit orders?

11. **Explain** why momentum markets would be problematic for a low-cost-whatever-the-liquidity trading focus.

12. A market observer notices that a particular trading firm tends to execute its trades early in the day, with volume falling off later in the day. What type of algorithmic trading system is the firm likely using?

13. What is the primary indication that a trader should not utilize algorithmic trading and instead use a broker or a crossing network?

14. John Booker is a manager at a trading firm. He is quite upset because yesterday a junior trader had excessive trading costs. **Critique** Booker's perspective.

15. **Discuss** two recent developments that could make the relationship between buy-side and sell-side traders more problematic.

# ANSWERS – CONCEPT CHECKERS

1. A limit order has execution uncertainty because it is not known when the order will be filled, if at all. If the limit price cannot be satisfied in the current market, the order will go unfilled. Because limit orders have an expiration date, the limit may go unfilled or partially unfilled if it cannot be satisfied prior to expiration.

2. The quoted spread for each order is the difference between the ask and bid prices:

| *Time of Trade* | *Ask Minus Bid Price* | *Quoted Spread* |
|---|---|---|
| 11 a.m. | \$20.08 – \$20.00 | \$0.08 |
| 12 p.m. | \$20.18 – \$20.08 | \$0.10 |
| 2 p.m. | \$20.24 – \$20.12 | \$0.12 |

The average quoted spread is a simple average of the quoted spreads: (\$0.08 + \$0.10 + \$0.12) / 3 = \$0.10.

The effective spread for a sell order is twice the midquote of the market bid and ask prices minus the execution price.

The midquote for each trade is calculated as:

| *Time of Trade* | *Midquote* |
|---|---|
| 11 a.m. | (\$20.08 + \$20.00) / 2 = \$20.04 |
| 12 p.m. | (\$20.08 + \$20.18) / 2 = \$20.13 |
| 2 p.m. | (\$20.24 + \$20.12) / 2 = \$20.18 |

The effective spread for each sell order is:

| *Time of Trade* | *2 × (Midquote – Execution Price) = Effective Spread* |
|---|---|
| 11 a.m. | 2 × (\$20.04 – \$20.02) = \$0.04 |
| 12 p.m. | 2 × (\$20.13 – \$20.11) = \$0.04 |
| 2 p.m. | 2 × (\$20.18 – \$20.09) = \$0.18 |

The average effective spread is (\$0.04 + \$0.04 + \$0.18) / 3 = \$0.0867.

The weighted-average effective spread is (200 / 1,000)\$0.04 + (300 / 1,000)\$0.04 + (500 / 1,000)\$0.18 = \$0.11.

In the first and second trade, there was price improvement because the sell orders were executed at bid prices higher than the quoted prices. Hence, the effective spread was lower than the quoted spread. In the last trade, the trade size was larger than the bid size. The effective spread in this case was higher than that quoted due to the market impact of the large order.

Overall, the simple average effective spread was lower than the average quoted spread, reflecting the price improvement in the first two trades. The weighted-average effective spread was higher than the average quoted spread, reflecting the market impact of the last trade, which was larger than either of the first two trades.

3. The market probably most suitable is a brokered market. A broker can place the order without revealing his client's identity. He can discreetly shop the stock and find the necessary liquidity. He may even take a position in the stock with his own capital.

   An electronic crossing network might be another possibility because traders usually do not know the identity of their counterparty or their trade size. The question states, however, that the stock is an emerging market stock for which brokered markets are particularly suited. Brokered markets are important in countries where public capital markets are not well developed.

4. When a trader has information that the dealer does not, the trader profits at the dealer's expense. Traders are more likely to trade when they have information that others do not. This results in adverse selection risk for the dealer. The trader's profit is the dealer's loss once the information is revealed to the market.

5. Market A is of higher quality. The larger the bid and ask sizes (the number of shares offered by a dealer or trader at a specified price), the greater the market depth and the greater the liquidity.

6. It is difficult to use VWAP to compare two traders, one of which does not dominate the markets for the securities he trades in and the other does. If a trader dominates trading in a security, VWAP will be close to the trade price. The trader will have appeared to minimize costs, even if he traded at unfavorable prices. This trader will appear better than another trader who does not dominate the trading.

7. To decompose the implementation shortfall, we calculate the following:
   - Explicit costs—the commission as a percentage of the paper portfolio investment is \$23 / \$50,000 = 0.05%.
   - Realized profit and loss is calculated using the execution price minus the decision price, which is usually measured as the previous day's closing price. This is divided by the original price and weighted by proportion of the order filled. It is (700 / 1,000) × (\$50.07 – \$50.05) / \$50.00 = 0.03%.
   - Delay costs are calculated using the difference between the closing prices on the day an order was not filled and the previous day closing price. It is weighted by the portion of the order filled. It is (700 / 1,000) × (\$50.05 – \$50.00) / \$50.00 = 0.07%.
   - Missed trade opportunity cost is calculated using the difference between the price at which the order is cancelled and the original price. It is weighted by the portion of the order that is not filled. It equals (300 / 1,000) × (\$50.09 – \$50.00) / \$50.00 = 0.05%.

   The sum of the components is the total implementation cost: 0.05% + 0.03% + 0.07% + 0.05% = 0.20%.

8. The best measurement would be the implementation shortfall measure. VWAP can be gamed by traders, who might time their trades until the VWAP makes their trading costs appear favorable. The effective spread can also be gamed. A trader can trade at favorable bids and asks by waiting for orders to be brought to the trader. In both cases, a trader might forgo profits through delay.

9. Actually, they can be used as both. Before the fact, econometric models can assist portfolio managers in determining the size of the trade. After the fact, trading effectiveness can be assessed by comparing actual trading costs to forecasted trading costs from the models.

10. Value-motivated and passive traders prefer limit orders because their primary motivation is to minimize trading costs and transact at favorable prices. They do not need the immediate execution of market orders and can afford to be patient.

11. In a low-cost-whatever-the-liquidity trading focus, the trader places a limit order outside of the current bid-ask quotes in order to minimize trading costs. Momentum markets can make their execution problematic though. If, for example, a trader has placed a buy order and the market trends upward, the order may never be filled. If the market trends downward, the trader's order may be filled, but the stock price may keep trending downward.

12. The firm is likely using an implementation shortfall strategy. These strategies trade heavier early in the day to ensure order completion, reduce opportunity costs, and minimize the volatility of trading costs.

13. When a trade is of relatively large size and has a large spread, it should be traded through a broker or a crossing system in order to minimize the spread.

14. Booker is perhaps overreacting. It is difficult to judge a trader's performance over just one day. The market conditions may have been so severe that measurement of trading costs would be flawed. Although best execution can be measured ex post over time, it cannot be legitimately measured over a short time period.

15. First, the popularity of electronic trading venues has provided more anonymity for traders. A trader who gains information from another trader can use this information against the other trader discreetly. Second, brokerage commissions have fallen dramatically. The temptation is for a trader to shift costs to those that are implicit, rather than explicit.

The following is a review of the Monitoring and Rebalancing principles designed to address the learning outcome statements set forth by CFA Institute. This topic is also covered in:

# MONITORING AND REBALANCING

Study Session 16

## EXAM FOCUS

Your focus for this topic review should be how to adjust for changes in client circumstances, capital market conditions, and values of the portfolio holdings in the periods after initial allocations have been made. There are three rebalancing strategies to learn: buy and hold, constant-mix, and constant proportion portfolio insurance (CPPI). Make sure you know how the returns to each rebalancing strategy are affected by various market patterns over time. Be able to discuss the costs of rebalancing and how to establish bands of portfolio proportions used to trigger portfolio rebalancing. Here, we build on the previous coverage of how to construct an IPS for a private wealth client and use the same principles to determine the necessary adjustments to an IPS to reflect a change in a client's risk and return objectives or constraints regarding time horizon, taxability, liquidity, legal status, or unique circumstances. In the morning session of the exam, there is typically at least one case that requires you to address the needs of a private wealth client.

### LOS 40.a: Discuss a fiduciary's responsibilities in monitoring an investment portfolio.

*CFA® Program Curriculum, Volume 6, page 64*

A portfolio manager who is in a position of trust has a fiduciary duty to monitor the portfolio to be sure it continues to meet the client's needs as client circumstances, capital markets conditions and expectations, and portfolio percentage allocations may all change over time. Changes in client circumstances may require an update of the IPS, changes in capital market conditions may lead to a change in strategic allocation, and changes in portfolio percentage allocations may require rebalancing.

### LOS 40.b: Discuss the monitoring of investor circumstances, market/ economic conditions, and portfolio holdings and explain the effects that changes in each of these areas can have on the investor's portfolio.

*CFA® Program Curriculum, Volume 6, page 65*

Over time, investor circumstances may change and portfolio managers must take account of these changes. Advisors may need to update the IPS for the investor whenever there are significant changes in the investor's risk and return objectives, time horizon, tax circumstances, liquidity needs, legal and regulatory environment, or unique circumstances. Changes in an investor's IPS will reflect changes in these objectives and constraints. Essentially, this involves constructing a new IPS that reflects these changes and perhaps the strategic asset allocation for the portfolio as well.

Even in the absence of significant changes in an investor's circumstances, changing capital market conditions may require altering the investor's asset allocation. Changes in asset class returns or returns volatility will most likely lead to revised expected returns and risk attributes requiring updating the strategic asset allocation. Changes in the phase of a market cycle, central bank policy, or the yield curve and inflation may suggest changes in tactical asset allocation to exploit opportunities for increased returns.

Finally, as asset values change within the portfolio this may require rebalancing the portfolio to a different asset allocation. We discuss rebalancing costs, benefits, and strategies later in this topic review.

## LOS 40.c: Recommend and justify revisions to an investor's investment policy statement and strategic asset allocation, given a change in investor circumstances.

*CFA® Program Curriculum, Volume 6, page 65*

The principles underlying the recommendation of changes to an investor's IPS or strategic asset allocation are exactly the same ones we covered in Study Session 4. We illustrate this with some examples.

- Marriage is a change in circumstances that could affect multiple constraints, as well as risk and return objectives, depending on the age, wealth, children, and risk tolerance of the spouse.
- Birth of a child could add an investment horizon and change the investor's liquidity needs as plans are made for the child's education.
- A desire for funds to be left as a bequest could lead to changes in the IPS as well.
- Receiving an inheritance or a new desire to make significant charitable contributions may change several elements of an investor's IPS.

*Candidates should do all the problems at the end of topic 40 in the CFA Curriculum and read the recommended answers. These problems cover several examples of changes in investor circumstances and the recommended changes to the IPS and strategic asset allocation provide additional insight into how an investor's risk and return objectives and constraints should be incorporated into the IPS and how they affect an investor's IPS.*

## LOS 40.d: Discuss the benefits and costs of rebalancing a portfolio to the investor's strategic asset allocation.

*CFA® Program Curriculum, Volume 6, page 82*

Over time as market valuations change, the percentage of a portfolio's value in each asset class will change from the initial asset allocation. If we assume that the initial asset allocation was optimal in terms of exposure to systematic risk factors and expected return, deviations from the initial asset allocation percentages will reduce the expected utility of the portfolio to the investor. Thus, we can view the benefits of portfolio

rebalancing in theory as being equal to the loss in expected utility that is avoided by rebalancing.

Consider, for simplicity, an optimal portfolio allocation of 60% to equities and 40% to fixed income securities. If equities are the riskier asset and have the greater mean return, the allocation to equities will tend to increase over time. The result is a portfolio that becomes more risky and has higher expected returns over time and no longer satisfies the investors risk and return objectives. In the absence of changes in asset class returns distributions and correlations, rebalancing the portfolio to the 60%/40% mix will restore the portfolio risk/return characteristics to their optimal levels for the investor.

From a practical view, if asset classes are sometimes overvalued and sometimes undervalued, rebalancing can increase returns as allocations to overvalued assets are reduced and allocations to undervalued assets increased. The discipline of rebalancing can help investors avoid a tendency to hold increased weights in assets that have had high returns over a period, only to see returns for those assets perform relatively poorly in subsequent periods. While rebalancing will not necessarily improve returns and reduce risk over all periods, it has had those effects on overage over longer periods.

The primary costs of rebalancing are the transactions costs incurred and the tax liability generated by selling assets that have appreciated in value. Transactions costs include the commissions paid for a trade the bid-ask spread and the market impact of the trade. The market impact of a trade is the change in price as a result of entering a trade and can be expected to be greater for larger positions. We cannot observe the price that would have prevailed had the trade not been entered, so estimating the additional transaction costs due to market impact is difficult.

While it may be difficult to estimate the true transaction cost, it is certain that costs will be incurred over time as the portfolio is rebalanced. In contrast, the benefits of rebalancing are less certain and, as we will see, depend on the subsequent market environment.

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## LOS 40.e: Contrast calendar rebalancing to percentage-of-portfolio rebalancing.

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*CFA® Program Curriculum, Volume 6, page 87*

As its name implies, **calendar rebalancing** refers to rebalancing a portfolio to its strategic allocation on a predetermined, regular basis (e.g., monthly, quarterly, or annually). The primary *benefit* to calendar rebalancing is that it provides discipline without any requirement to monitor the portfolio allocation between rebalancing dates. A *drawback* of calendar rebalancing is that the portfolio allocation could differ significantly from its optimal weights between rebalancing dates. With calendar rebalancing, asset class returns do not enter into the rebalancing decisions. We might find that deviations from optimal weights are relatively small at the rebalancing date so that the costs of rebalancing are greater than the benefit. On the other hand, if there are significant deviations from optimal weights at the rebalancing date, the market impact of the rebalancing trades may be large, which will also reduce returns.

With **percentage-of-portfolio rebalancing** (PPR), also referred to as *percent range rebalancing* or *interval rebalancing*, rebalancing is triggered by changes in relative asset values rather than simply by the passage of time. For an asset class with an optimal target allocation, *T*, and a specified maximum percentage change in that allocation, *P*, a portfolio manager can set what are called *tolerance bands* or *corridors* for that asset class:

$$\text{corridor} = T \pm (P \times T)$$

For example, assume the manager sets a 40% target allocation (*T*) for domestic equity and a 10% maximum percentage change (*P*) of 10%. The resulting corridor for domestic equity is 40% ± 0.10(40%) = 40% ± 4%; that is, a corridor of 36% to 44% for the allocation to domestic equity. With corridor rebalancing, the portfolio allocation must be monitored over time and ideally this would be done daily. The value of *P* in the corridor calculation of 10% is an ad hoc value-—we could just have easily used 5% to establish the corridor values.

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## LOS 40.f: Discuss the key determinants of the optimal corridor width of an asset class in a percentage-of-portfolio rebalancing program.

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*CFA® Program Curriculum, Volume 6, page 88*

Using the same maximum percentage change for all asset classes ignores differences in transactions costs and other relevant factors. A value of 10%, for example, may be too high for very liquid assets and too low for illiquid assets.

In establishing the band for an asset class under a percentage-of-portfolio rebalancing program, evidence suggests that a manager should consider five factors.

1. Transactions costs.

   The higher the transactions costs (the lower the liquidity) for an asset class, the greater the deviation from its target allocation must be for the benefits to outweigh the costs; therefore, higher transactions costs will increase the optimal width of the corridor for that asset class.

2. Risk tolerance.

   The higher an investor's risk tolerance, the lower the impact on the investor of deviations from target allocation weights. This implies that greater risk tolerance leads to wider optimal corridors.

3. Correlation of returns with other asset classes.

   When asset class returns tend to move together, the impact of deviations from target allocations on portfolio risk are less. Higher correlations, therefore, suggest wider optimal corridors.

4. Volatility of asset class returns.

   Greater volatility of asset class returns make deviations from target weights potentially more costly and suggest narrower optimal corridor widths.

5. Volatility of the returns on the other assets in the portfolio.

   Greater volatility of the returns on the other assets in a portfolio (viewed as a single asset for simplicity) also suggests narrower optimal corridor widths because deviations from optimal weights can lead to even greater deviations when asset returns are highly volatile.

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**LOS 40.g: Compare and contrast the benefits of rebalancing an asset class to its target portfolio weight versus rebalancing the asset class to stay within its allowed range.**

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*CFA® Program Curriculum, Volume 6, page 90*

So far we have only considered the alternative of returning the portfolio asset allocations to their target values when rebalancing is indicated. Another alternative is to only rebalance to the extent necessary to move asset class weights back within their corridor values. One rule that would accomplish this is to move the asset class weights halfway back to their target values. Under this rule, an asset class with a target allocation of 30% and a corridor of +/− 3% that has reached a weight of 35% in the portfolio would be reduced to 32.5% of the portfolio. Clearly, if asset prices were trending higher, this smaller adjustment would improve portfolio returns compared to reducing the allocation to the target weight of 30%. If asset prices were volatile but not trending, reducing the asset class weight to its target of 30% could result in higher portfolio returns compared to a smaller reduction.

Studies that have compared these two rebalancing schemes are mixed in their results so that there is no clear answer to the question of which one produces better results. As we would expect, the relative performance of different rebalancing strategies depends on whether asset values are trending upward or downward or are volatile but do not exhibit longer term trends. We will compare rebalancing strategies under different market conditions in the next section.

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**LOS 40.h: Explain the performance consequences in up, down, and nontrending markets of 1) rebalancing to a constant mix of equities and bills, 2) buying and holding equities, and 3) constant proportion portfolio insurance (CPPI).**

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*CFA® Program Curriculum, Volume 6, page 92*

We can compare rebalancing strategies by their effects on portfolio performance in various market return scenarios. For simplicity we will consider a portfolio that contains only two assets, equities and cash (or bills with a 0% return), with target weights of 60% for equities and 40% for cash.

The three strategies we consider are:

**Buy-and-hold:** Once the initial allocation is made, no rebalancing is done. If equities increase in value the weight in equities increases, and if equities decrease in value the weight in equities decreases.

**Constant mix:** This is the strategy of rebalancing the portfolio to its target weights, either on a periodic basis or when asset class weights move from the selected weights.

**Constant proportion portfolio insurance (CPPI)** Under this strategy, target weight in equities varies directly with the difference between the portfolio value and some minimum value. The difference is called the cushion. As equities increase in value, the cushion increases, and the weight of equities in the portfolio is increased as a result. A decrease in equities values decreases the cushion, and the target weight in equities decreases as a result.

Under this strategy the amount invested in equities is given as:

target equities investment = M(portfolio value – floor value) = M(cushion)

Where M is the constant proportion of the cushion invested in equities. The M selected must be greater than 1.0 and does not change once selected, in order to produce CPPI strategy.

If M is set equal to 1.0 and the initial percentage allocation to cash (or bills) and equity is set in place so that the target equities investment = portfolio value – cash value, the result will be the buy-and-hold strategy.

If M is set less than 1.0 with a floor value at zero, so that target equities investment = M(portfolio value), the result will be the constant mix strategy and M is the target proportion for equities in the portfolio.

The relative performance results of these three strategies or rules will depend on the subsequent market environment.

**Up or Down Trending Market:**

- The CPPI will outperform. If the equity market increases in value, the weight in equities and the cushion increases. The increase in cushion under CPPI results in an additional purchase of equity so that subsequent increases in equity values have a greater positive impact on portfolio value. In a downward trending market the weight in equities and cushion decrease. The decrease in cushion requires selling equities so that subsequent decreases in equity values have a smaller negative impact on portfolio values. Notice that this produces a buy winners sell losers result.
- The buy and hold strategy will underperform CPPI because no purchases or sales of equity are made and there is no amplification of subsequent gain or reduction of subsequent loss as the market continues to trend.

- The constant mix strategy will have the worst performance in a trending market. An increase in equity values will increase the percentage allocation to equity and require selling equity to restore the initial percentage allocation. This lowers the exposure to subsequent equity increases in a trending market. In a downward equity market the percentage allocation to equity will fall and constant mix will dictate purchasing equity which will increase exposure to any further decline. Notice this produces a sell winners buy losers result.

**Nontrending, Mean-Reverting Markets**

- CPPI will have the worst performance. A rise in equity values will dictate buying more equity, which increases exposure to the subsequent reversal and downturn in equity prices. A fall in equity values will dictate a sale of equities, which will limit the recovery to the subsequent reversal and upturn in equity prices. Notice CPPI now produces a buy high sell low result.
- Buy and hold will produce a better result the CPPI because no purchases or sales are made.
- The constant mix strategy will have the best performance in a trending market. An increase in equity values will increase the percentage allocation to equity and require selling equity to restore the initial percentage allocation. This lowers the exposure to subsequent equity decline when the market mean reverts. In a downward equity market, the percentage allocation to equity will fall and constant mix will dictate purchasing equity which will increase exposure to the subsequent reversal when the market mean reverts and rises. Notice constant mix now produces a sell high buy low result.

Here, we consider the math and performance of the three strategies in various scenarios to support these conclusions. In all cases the initial portfolio value is 100 and the initial percentage in equity is 60%. The constant mix (CM) and buy-and hold (BH) portfolio strategies initially both allocate 60% to equities, and for the CPPI strategy the floor value is 50 and the multiplier is 1.2.

The initial allocations to equities are all equal with BH equity value = 60, CM equity value = $0.6 \times 100 = 60$, and the CPPI equity value = $1.2\ (100 - 50) = 60$.

If in the first period equity value decreases to 50 all three portfolios have a value of 40 + 50 = 90 and the portfolio values after rebalancing are:

BH = 50 equities, 40 cash
CM = $0.6 \times 90 = 54$ equities, 36 cash
CPPI = $1.2\ (90 - 50) = 48$ equities, 42 cash

If in the second period equity values decline further by 10% the portfolio values are as follows:

BH = $40 + 50(0.9) = 85$
CM = $36 + 54(0.9) = 84.6$
CPPI = $42 + 48(0.9) = 85.2$

When equities values are trending down, CPPI performs best, and BH outperforms CM.

If, instead, equity values increase by 20% in the second period the portfolio values are as follows:

BH = 40 + 1.2(50) = 100
CM = 36 + 1.2(54) = 100.8
CPPI = 42 + 1.2(48) = 99.6

When equity value is oscillating with no trend, CM performs the best, and BH outperforms CPPI.

Finally, consider an increase in equity value from 50 to 60 in the first period so that all portfolio values increase to 110. After rebalancing, portfolio allocations are:

BH = 70 equity, 40 cash
CM = (0.6)110 = 66 equity, 44 cash
CPPI = (1.2) (110 – 50) = 72 equity, 38 cash

If equity values increase again in the second period by 10%, portfolio values are:

BH = 40 + 1.1(70) = 117
CM = 44+ 1.1 (66) = 116.6
CPPI = 38 + 1.1(72) = 117.2

When equity values are trending down, CPPI performs best, and BH outperforms CM; overall, we can say that CPPI performs best (and CM worst) in trending markets and CM performs best (and CPPI worst in oscillating (non-trending) markets.

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## LOS 40.i: Distinguish among linear, concave, and convex rebalancing strategies.

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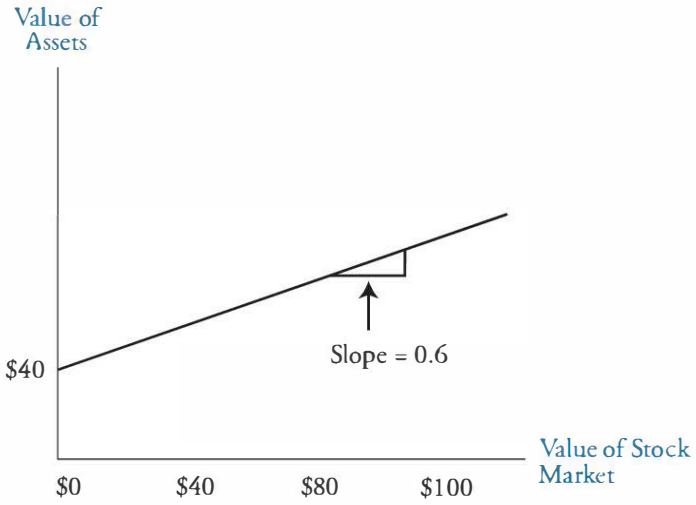
*CFA® Program Curriculum, Volume 6, page 94*

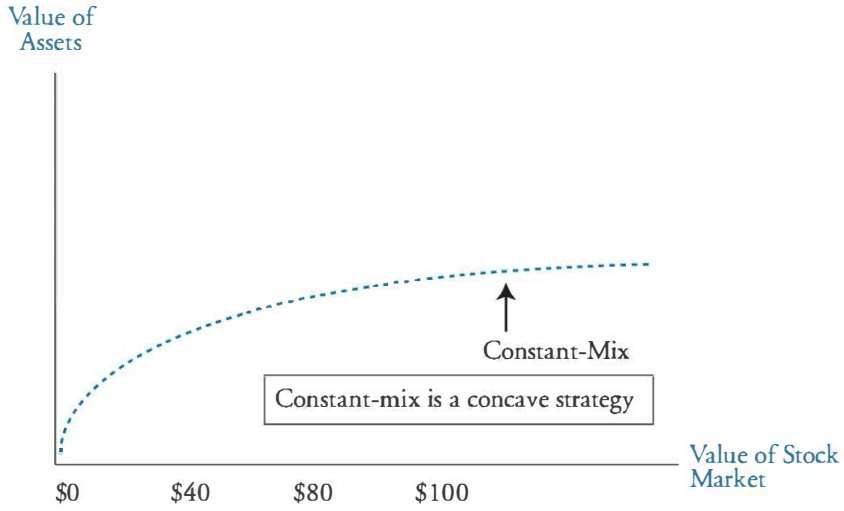
Here the terms *linear*, *concave*, and *convex* refer to the relationship between portfolio returns and equity returns. Recalling our simplifying assumption that the cash portion of the portfolio has a zero return, the buy-and-hold strategy results in portfolio returns that are linearly related to equity returns with a slope equal to the initial target equities allocation. With an equities allocation of 60%, a 5% increase in the value of equities will increase the portfolio value by 0.6 × 5% = 3% and a 10% increase in the value of equities will increase the portfolio value by 0.6 × 10% = 6%. This is a linear relationship between equities value and portfolio value with a slope of 0.6 as shown in Figure 1.

**Figure 1: Buy-and-Hold Strategy**



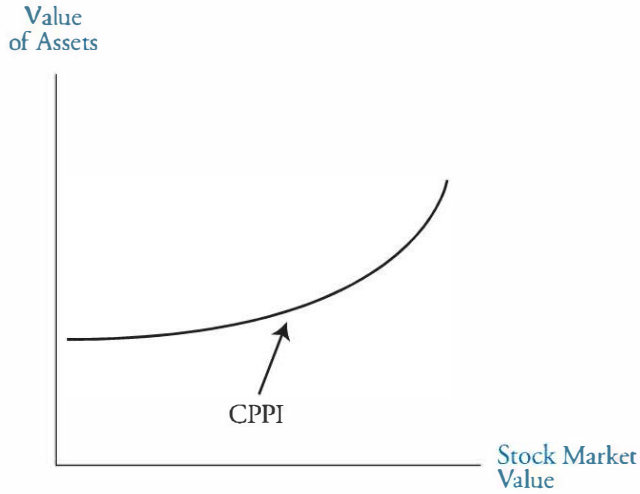

With a constant mix strategy, the reduction in the equity allocation as equity values increase reduces the increase in portfolio value compared to a buy-and-hold strategy and produces the concave relationship shown in Figure 2.

**Figure 2: Constant-Mix Strategy**




With a CPPI strategy, the equity allocation increases as equity values increase, magnifying the impact of further increases in equities values. This strategy produces the convex relationship shown in Figure 3.

Figure 3: CPPI Strategy




## LOS 40.j: Judge the appropriateness of constant mix, buy-and-hold, and CPPI rebalancing strategies when given an investor's risk tolerance and asset return expectations.

*CFA® Program Curriculum, Volume 6, page 95*

In our discussion so far we have focused on differences in returns among the strategies but not the fact that risk also varies with changes in the portfolio allocation to equities. The buy-and-hold strategy fits the preferences of an investor with a risk tolerance that increases with wealth (and equity returns). When equities increase in value, the allocation to equities increases, which then increases risk. The initial allocation to cash or bills establishes a floor for the portfolio value. If equity value goes to zero, the portfolio value is equal to the value of the cash portion of the portfolio and the allocation to equities goes to zero.

A buy-and-hold strategy will outperform a constant mix strategy when equities values are trending up or down because the percentage allocation to equities will increase when equities values are moving up and decrease when equities values are moving down. It will underperform a constant mix strategy when equities values are volatile but not trending because portfolio value will simply oscillate around the initial value, while with a constant mix strategy equities are sold when they increase in value and purchased when they decrease in value.

With a constant mix (fixed proportions) strategy, risk tolerance increases proportionately to wealth as greater *amounts* of equities are held when equities values and portfolio wealth increases. Because a constant proportion of wealth is held in equities as wealth changes, we say that it fits the preferences of an investor with constant *relative* risk aversion. There is no floor to the portfolio value because when equities values fall, more equities are purchased and the value of the cash or bills in the portfolio is reduced to accomplish this.

With a CPPI strategy the percentage portfolio allocation to equities increases when equities values increase because the cushion increases and the multiplier is greater than 1. The strategy fits the preferences of an investor who is concerned with establishing a minimum portfolio value. In contrast to a buy-and-hold strategy, the floor amount is established dynamically rather than by simply putting the floor value in cash or bills. When the cushion is large, the allocation to cash is low and it is increased if equities values fall. If equities values fall until the portfolio value equals the floor value, the allocation to equities is zero (the cushion is zero) and the entire portfolio is invested in cash or bills. In terms of risk tolerance, the CPPI strategy is consistent with the preferences of an investor who has risk tolerance that increases with wealth. Compared to a buy-and-hold strategy, a CPPI investor has greater risk tolerance for all portfolio values above the cushion or floor value. The CPPI strategy will outperform a buy and hold strategy in trending markets as the allocation to equities is reduced more rapidly when equities values fall and increased more rapidly when equities values rise. In choppy non-trending markets, the CPPI strategy will underperform a buy-and-hold strategy because more equities are purchased when equities values rise and more equities are sold when equities values fall compared to a buy-and-hold strategy.

In the following paragraphs, we summarize the key characteristics of each of the three allocation strategies.

### Buy-and-hold

The buy-and-hold strategy has a floor equal to the amount invested in cash, underperforms in trending markets, has a multiplier (M) of one and produces a linear payoff curve, and is consistent with the preferences of an investor who requires a floor portfolio value and has risk tolerance that increases with increased wealth.

### Constant mix

A constant mix strategy has no floor value, underperforms in trending markets, outperforms in choppy non-trending markets, and has risk that increases proportionally with wealth consistent with the preferences of an investor who exhibits constant relative risk aversion, has a multiplier (M) between zero and one, and produces a concave payoff curve.

### CPPI

A constant portfolio proportions insurance strategy has a floor that is dynamically achieved, and fits the preferences of an investor who is concerned about downside risk and has risk tolerance that increases more than proportionally to wealth, outperforms the other strategies in both upward and downward trending markets, has a multiplier (M) greater than one, and generates a payoff curve that is convex.

# KEY CONCEPTS

## LOS 40.a

The portfolio manager who is in a position of trust has a fiduciary duty to construct the portfolio to meet the needs of the client as specified in the IPS and the duty to monitor the portfolio to be sure it continues to meet the client's needs.

The initial construction of the portfolio is based on the client's circumstances and long-term capital market expectations at the time. The manager's duty is to continually monitor both the client's circumstances (objectives and constraints) and the market to identify changes in factors that could possibly require a change in the strategic allocation.

## LOS 40.b

**Monitoring investor circumstances:** As the investor ages, objectives and constraints are subject to change. The investor's risk tolerance declines over time as liquidity needs increase. The implications are that the portfolio manager must monitor the client's circumstances and determine when to start shifting out of equities and real estate and into bonds and other less risky assets. Remember that changes in any one of the investor's objectives and/or constraints can potentially affect all of them.

**Monitoring market/economic conditions:** Because the performance of all assets is tied to the health of the overall economy, the portfolio manager must regularly monitor and reevaluate economic forecasts. Remember that long-term capital market expectations are incorporated into asset prices as well as the client's IPS and original asset allocation.

**Monitoring the portfolio:** The manager must regularly monitor the performance of the portfolio. The different asset allocations may grow at different rates, for example, and the allocation could change significantly. Also, the returns on the various classes might not be as expected, or the client's constraints could change such that the class is no longer appropriate for the portfolio.

## LOS 40.c

- **Changes in wealth:** With an increase in wealth, the investor may become more or less tolerant of risk or experience absolutely no change in risk tolerance. The portfolio will experience an increased *ability* to tolerate risk.
- **Time horizon:** As the investor ages, financial capital increases while human capital decreases. As the investor's human capital dwindles, she may become less tolerant of risk.
- **Liquidity requirements:** As liquidity requirements increase, the ability of the portfolio to tolerate risk generally declines. If spending needs increase, the portfolio should be shifted into fixed-income securities, from both a cash flow and risk perspective.
- **Tax concerns:** The manager must always consider the tax implications of any investment and should always seek ways to minimize the tax liability.
- **Legal and regulatory:** An individual's portfolio is not subject to the legal and regulatory scrutiny of an institutional investor's portfolio. The primary concern for institutional investors is changes in laws and regulations.

### LOS 40.d

**Benefits of rebalancing:** The primary benefit is maintaining the investor's desired exposure to systematic risk factors. If the portfolio is allowed to simply drift as it will, the riskier assets in the portfolio tend to take over. Rebalancing also provides discipline. Successful performance can make the client want to react to temporary market conditions rather than follow a long-term, disciplined approach.

Costs of **rebalancing:** When equities become too large a portion of the portfolio and we sell them to rebalance, there is an associated tax liability. Of course, these transactions are not costless, so the investor faces transactions costs. Primarily for institutional investors, the costs of rebalancing also include the market conditions under which the trade is made. If the manager is selling when other managers are selling (e.g., CPPI strategy), the trade *requires liquidity* and the transaction cost can be substantial. If the trade *provides liquidity* (e.g., constant-mix strategy), the transaction costs may be minimal.

### LOS 40.e

**Calendar rebalancing:** As its name implies, calendar rebalancing is rebalancing the portfolio to its strategic allocation on a predetermined, regular basis. Generally, the frequency of rebalancing depends on the volatility of the portfolio, but sometimes rebalancing is scheduled to coincide with review dates. The primary benefit to calendar rebalancing is that it provides discipline without the requirement for constant monitoring. The drawback is that the portfolio could stray considerably between rebalancing dates.

**Percentage-of-portfolio rebalancing (PPR):** With PPR, rebalancing is triggered by changes in value rather than calendar dates. The manager sets what are called *tolerance bands* or *corridors* that are considered optimal for each asset class. By not waiting for specified rebalancing dates, PPR provides the benefit of minimizing the degree to which asset classes can violate their allocation corridors. The primary cost to PPR is associated with the need to constantly monitor the portfolio. This requires the time and expense of continually assessing the values of the asset classes and making necessary trades.

### LOS 40.f

1. Transactions costs.

The higher the transactions costs (the lower the liquidity) for an asset class, the greater the deviation from its target allocation must be for the benefits to outweigh the costs; therefore, higher transactions costs will increase the optimal width of the corridor for that asset class.

2. Risk tolerance.

The higher an investor's risk tolerance, the lower the impact on the investor of deviations from target allocation weights. This implies that greater risk tolerance leads to wider optimal corridors.

3. Correlation of returns with other asset classes.

When asset class returns tend to move together, the impact of deviations from target allocations on portfolio risk are less. Higher correlations, therefore, suggest wider optimal corridors.

4. Volatility of asset class returns.

Greater volatility of asset class returns make deviations from target weights potentially more costly and suggest narrower optimal corridor widths.

5. Volatility of the returns on the other assets in the portfolio.

Greater volatility of the returns on the other assets in a portfolio (viewed as a single asset for simplicity) also suggests narrower optimal corridor widths because deviations from optimal weights can lead to even greater deviations when asset returns are highly volatile.

## LOS 40.g

Rebalancing an allocation to its precise target weights requires more or less constant trading. With constant analysis and trading come the associated transactions costs and the inability to time trades. (Timing here refers to the ability to provide rather than require liquidity.)

Rather than set strict target allocations, managers will set allowable ranges that they consider optimal for the asset classes. Then, to provide discipline to portfolio rebalancing, managers can adopt either calendar rebalancing or percentage-of-portfolio balancing.

## LOS 40.h

The buy-and-hold strategy is a do-nothing strategy. The constant-mix strategy requires constant rebalancing of the portfolio to the specified allocations, using corridors or calendar dates. In a constant-proportion portfolio insurance (CPPI) strategy, the allocation to equities is by formula.

**Impact of Strategies on Risk and Return**

| | *Buy-and-Hold* | *Constant-Mix* | *CPPI* |
|---|---|---|---|
| Return | Outperforms a constant-mix strategy in a trending market; outperforms CPPI in a *flat* but *oscillating* market. | Outperforms a comparable buy-and-hold strategy, which, in turn, outperforms a CPPI strategy in a *flat* but *oscillating* market. | Outperforms a comparable buy-and-hold strategy, which, in turn, outperforms a constant-mix strategy in trending markets. |
| Risk | Passively assumes that risk tolerance is directly related to wealth. | Assumes that relative risk tolerance is constant because the proportion of equity in the portfolio is held constant regardless of the level of wealth. Constant-mix assumes increasing absolute risk tolerance because more equity is held as wealth increases. | Actively assumes that risk tolerance is directly related to wealth. |

### LOS 40.i

Buy-and-Hold (BH)

- Exposure diagram's slope is equal to one.
- Does not rebalance regardless of the portfolio wealth level.

Convex (CPPI) represents the purchase of portfolio insurance.

- Exposure diagram's slope is greater than one.
- Any procedure that buys when stocks rise or sells when stocks fall is a convex strategy.
- The more investors follow convex strategies, the more volatile the markets will become.

Concave (CM) represents the sale of portfolio insurance.

- Exposure diagram's slope is less than one.
- Any procedure that buys when stocks fall or sells when stocks rise is a concave strategy.
- If more investors follow concave strategies, the markets will become too stable.

### LOS 40.j

Constant-Mix (CM)

- *Absolute* risk tolerance varies directly with wealth.
- *Relative* risk tolerance remains constant regardless of wealth level.
- Investors using this strategy will hold stocks at all levels of wealth.

Buy-and-Hold (BH)

- The investor's tolerance for risk is zero if the value of the investor's assets falls below the floor value.
- Otherwise, passively, risk tolerance increases proportionately with wealth.

Constant-Proportion Portfolio Insurance (CPPI)

- Investor risk tolerance is similar to that of the BH methodology.
- Investor risk tolerance drops to zero when total assets drop below the floor value.
- However, CPPI assumes that investor risk tolerance is more dramatically affected by changes in wealth levels than BH (e.g., as stocks increase, CPPI aggressively pursues more stocks; as stocks decrease, CPPI aggressively rids the portfolio of stocks).

## CONCEPT CHECKERS

1. Suppose you initially have $100 in stock and $35 in T-bills so that total assets are $135. Suppose also that the stock market index at time 0 was 124, and at time 1, it rose to 135. At time 2, the stock market had fallen back to 130. Assume that at time 0, you are at your optimal stock-to-total-assets ratio (S/TA). Calculate the following:

   i. Your optimal S/TA ratio.
   ii. Your stock holdings at time 1 (under a buy-and-hold strategy).
   iii. Your stock holdings at time 2 (under a buy-and-hold strategy).
   iv. The amount of stock you should buy or sell at t = 1 (under a constant-mix strategy).
   v. The amount of stock you should buy or sell at t = 2 (under a constant-mix strategy).

2. **Identify** the relative investor risk tolerance characteristics of each of the following investing strategies: (1) buy-and-hold, (2) constant-mix, and (3) constant-proportion portfolio insurance (CPPI).

3. You expect the stock market to be relatively volatile over the next year. You also expect that the annual holding period return will be roughly zero. **Recommend** and **justify** a portfolio investment strategy given your forecast.

4. Jamie Gardner, CFA, makes the following statement at a conference of portfolio managers: "I believe that many managers rebalance before they should. If they were aware of the mathematics of rebalancing, they would rebalance less frequently." Assess the validity of Gardner's statement. Is she correct or incorrect? If correct, **provide** an example that supports her statement. If incorrect, **explain** why.

5. For each of the following, **state** whether the optimal corridor width should be wide or narrow and **justify** your response with one reason.

   High aversion to risk:

   Illiquid assets:

   High volatility:

6. **List** and **describe** four factors that would result in a portfolio manager for an individual investor to reassess their client's portfolio.

7. Based upon a recent analysis of his objectives and constraints in conjunction with capital market expectations, Brian Amallater's portfolio has the following strategic allocation:

| *Class* | *Currently* |
|---|---|
| Cash and equivalents | 5% |
| LT Treasury bonds | 5% |
| Domestic corporate bonds | 5% |
| Domestic equities | 50% |
| International equities | 20% |
| Real estate (raw land) | 15% |

Using only the current allocation, **estimate** Brian's age, wealth, and tolerance for risk and **discuss** factors that you considered.

8. While employed as a factory worker for 30 years, Millie D'Marco, who has never been married and has no dependents, accumulated a retirement portfolio that has grown to $55,000 and is currently invested in cash ($10,000 savings and checking) and bank CDs. Since retiring ten years ago, Millie has been receiving a $24,000 per year retirement annuity from her employer's defined benefit pension plan. She lives with her two dogs, Gregory and Douglas, and her cat, Timothy.

With no hobbies, few expenses, and no real cares in the world, Millie buys a $1 lottery ticket each week and has just won $1,000,000 (lump sum after taxes). Immediately upon hearing the news, Millie called her half-sister (Molly), who implored Millie to set aside funds to provide college educations for Molly's three grandchildren (currently 8, 9, and 11 years old). Millie states that she has no real need for the money and her pension meets all her current living expenses, so she plans to "travel until they plant me in the ground." She's not sure whether she will provide any money for Molly's grandchildren but states that "they can have what's left when I die."

**Discuss** each of the usual objectives and constraints associated with Millie's IPS. (Note: No calculations are necessary.)

# ANSWERS – CONCEPT CHECKERS

1. i. 100 / 135 = 0.7407, or 74.1%

   ii. percent increase in market = (135 – 124) / 124 = 0.0887 or 8.87%

   s = \$100 × 1.088 = \$108.87

   iii. percent decrease in market = (130 – 135) / 135 = –0.037, or –3.7%

   s = \$108.87 × (1 – 0.037) = \$104.84

   iv. s = \$108.87 and TA = \$143.87 (\$108.87 + \$35), so solve the following equation for *x*:

   (\$108.87 + \$x) / 143.87 = 0.741 → x = –\$2.26

   v. s = \$108.87 – 2.26 = \$106.61 at the end of time 1

   The drop in the market was –3.7%, so s = (\$106.61) × (1 – 0.037) = \$102.66, and TA = 143.87 – (106.61 – 102.66) = 139.92.

   Solving the following equation for *x*:

   (\$102.66 + x) / 139.92 = 0.741 → x = \$1.02

2. 1) *Buy-and-hold.* The investor's tolerance for risk is zero if the value of the investor's assets falls below the floor value (zero equity allocation) but increases as stocks increase in value.

   2) *Constant-mix.* Investors' relative risk tolerance remains constant regardless of their wealth level. They will hold stocks at all levels of wealth.

   3) *CPPI.* Investor risk tolerance is similar to that of the buy-and-hold methodology. Investor risk tolerance drops to zero when total assets drop below the floor value.

3. The constant-mix strategy will perform the best. Although the constant-mix strategy will underperform in steady bull or bear markets, constant-mix outperforms in an oscillating environment because you are always buying more shares whenever the market falls. Hence, each up movement will have a slightly higher level of capital gains.

4. Gardner is correct. An increase in the value of an individual asset class will result in an increase in the value of the total portfolio. For example, consider a \$1,000 portfolio that consists of 50% equity and 50% debt, and the manager wants a 10% corridor. A 10% corridor would imply that equity and debt must stay within 50 ± 5%. If either debt or equity increased \$30 (a 6% increase), its new allocation would be \$530 / 1,030 = 51.5%, not 56%, so no rebalancing would be required. If assets are positively correlated, rebalancing is even less frequent, as stocks and bonds will grow together and proportions will be relatively stable.

   You might have argued that Gardner is incorrect if you assumed that the debt and equity portions of the portfolio are highly negatively correlated. In that case, the asset values would move opposite each other, increasing the need to rebalance.

5. High aversion to risk: narrow corridor width—investors have a high level of risk aversion meaning they have below-average risk tolerance and are averse to changes in the portfolio allocation and thus require more frequent rebalancing.

   Illiquid assets: wide corridor width—illiquid assets imply high transactions costs to buy and sell the assets; therefore, to minimize transaction costs, the corridor should be set wider, resulting in less rebalancing and reducing transaction costs.

   High volatility: narrow corridor width—assets that exhibit a lot of volatility should have a narrow corridor width to be able to detect when the asset is out of range and to quickly rebalance before the asset allocation gets farther out of the desired range.

6. Client circumstances may change for any one or more of the following reasons and force the client to rebalance her portfolio:
   - *Change in wealth*. A change in wealth may cause an increase, decrease, or no change in the investor's willingness to tolerate risk. The manager must reevaluate the portfolio allocation, incorporating any changes in the investor's objectives or constraints. The manager must also be prepared for irrational behavior associated with newfound wealth.
   - *Changing time horizons*. Usually, as the time horizon shortens, the investment mix becomes more conservative.
   - *Changing liquidity requirements*. An increase in liquidity needs means higher allocations to cash and safer investments.
   - *Tax circumstances*. An increase in wealth brings an increasing need for tax planning. Tax-exempt and tax-sheltered investments become relatively more attractive. Generally, during high-income years, the investor's portfolio should be allocated to low-income-generating investments, and in low-income years, to high-income-generating investments.
   - *Laws and regulations*. Changes in laws and regulations are more of a concern for institutional investors than for individuals. Regulatory concerns become an issue if the individual wants to establish a trust, for example.
   - *Unique circumstances/preferences*. A client's unique needs must be assessed on a continual basis, and appropriate changes must be made whenever these preferences change over time.

7. 70% is allocated to equities, including 20% to international equities.
   - 15% is allocated to raw land, which is considered both risky and illiquid.
   - Only 5% is held in cash and 10% in LT bonds.

   Interpretation: The allocation of 85% of the portfolio to risky *financial capital* would imply the investor's *human capital* is rather high and the investor doesn't need liquidity in the portfolio. Remember that human capital can be thought of as *bond-like*, so the portfolio can be heavily (nearly 100%) allocated to equities and other risky assets with returns coming mostly in the form of capital gains.

   Brian is probably a young professional with a high-income potential, little need for current income, a long time horizon, the need to avoid taxable gains, and fairly low current wealth. Assuming Brian is a young professional, his tolerance for risk (both willingness and ability) is above average.

8. The facts of the mini-case are deliberately vague. For example, Millie has stated nothing about her willingness to tolerate risk, and we have no idea how much money she will spend annually on traveling. There are probably several scenarios you can think of that would require different portfolio allocations.

Before discussing the objectives and constraints, we should mention a few things about this case. First, the financial adviser must be prepared for just about anything (i.e., the concept of investing a lot of money is new to Millie, so the financial adviser must be prepared for irrational statements or spending desires). Millie doesn't seem to have any investing experience other than with the local bank.

Millie seems very "casual" and doesn't seem to plan for the future with regard to accumulating wealth (i.e., Millie seems to live for the day). This would probably indicate the need to educate Millie in all aspects of disciplined, rational investing with well-defined objectives and constraints.

**Liquidity**

A specific spending requirement is (the possibility of) providing for the children's educations, which will start in about ten years. In addition, because Millie has a modest retirement income, she will probably have to meet her travel expenses from the portfolio.

**Legal and Regulatory**

Millie might decide to establish trust funds for Molly's grandchildren. If she does, she should seek legal counsel. As compared to institutional investors, individuals don't typically have many legal or regulatory concerns.

**Taxes**

Millie, as a typical individual investor, is subject to taxes. We don't know the relevant tax rates, but the financial manager should always strive to optimize the tax treatment of portfolio income with respect to the client's needs.

**Time Horizon**

Because Millie retired ten years ago, she probably has a single-stage time horizon of about 10 to 15 years, which could be considered fairly long term. When she dies, her portfolio will continue, but that is more or less irrelevant for Millie's IPS, especially because she has no stated amount she wishes to leave to Molly's grandchildren.

**Unique Circumstances**

Unique needs are spending requirements outside the ordinary (e.g., large donations) or factors that affect the way the portfolio is to be allocated. Unique needs can be a problem for financial advisers because they frequently pertain to disallowed investments, without regard for the potential portfolio benefits. For example, the individual may prohibit investments in companies doing business with certain countries or instruct the manager to avoid certain classes of investments. Millie has stated nothing out of the ordinary, so we wouldn't list any unique circumstances. However, the portfolio manager must always honor the client's unique needs.

**Risk**

*Willingness*: Because all her money is in bank deposits and CDs, one interpretation is that Millie has no idea of the risks associated with investing in capital markets. Alternatively, she may have made a conscious decision to stay out of securities markets because she perceives them as too risky. We really don't know which. If she had made specific statements regarding risk, we would have been able to asses her willingness to tolerate risk.

Relevant statements might be obvious, such as, "I can't stand the thought of losing money." They might also be vague: "I'm not real sure about investing in the stock market." In either case, however, the investor would probably be perceived as having below-average willingness to tolerate risk.

In Millie's case, we will assume below-average willingness due to her highly concentrated investments in cash. Playing the lottery, due to the very small amount gambled, does not by itself imply she has above-average or even average willingness.

*Ability*: Because her pension meets her living expenses and the travel expenses might be construed as a desired rather than required spending need, the portfolio can probably tolerate above-average risk.

*Overall*: You should never indicate an overall tolerance for risk that exceeds the investor's willingness. You can sometimes recommend more risk than desired if the investor has well-above-average ability to tolerate risk due to significant wealth and low spending needs.

*Recommendation*: Below-average risk tolerance.

**Return**

Once we determine the future, after-tax amount necessary to provide for the grandchildren's educations in "today's" dollars and the after-tax nominal annual travel expenses, we can solve for the after-tax required return using a financial calculator:

FV = – college expenses (fixed, after-tax amount in "today's" dollars)
PMT = – travel expenses (assumed constant nominal, after-tax)
PV = $1,000,000
N = 10
CPT → I/Y = after-tax real return in "today's" dollars

We then add inflation to arrive at the after-tax, nominal required return. Expenses are already expressed in nominal terms, so we do not have to adjust them for inflation. The inflation adjustment is necessary to protect the real value of the portfolio.

The following is a review of the Performance Evaluation and Attribution principles designed to address the learning outcome statements set forth by CFA Institute. This topic is also covered in:

# EVALUATING PORTFOLIO PERFORMANCE[1]

Study Session 17

## EXAM FOCUS

Performance evaluation has been an important topic on the Level III exam. It is covered here and in the next topic review. The calculations in this material can be very long, involved, repetitive, and use extensive subscript notation; begin by understanding the intent of the calculations and then practice making them. There is an equal chance the questions will focus on understanding the output of performance evaluation as on making calculations. Plan to spend some time on these two readings. Also be aware there are differences of opinion on the best way to perform some of the calculations. The CFA material is presenting some of the possible approaches. For the exam, do it the way it is presented in the material.

## PERFORMANCE EVALUATION

### LOS 41.a: Demonstrate the importance of performance evaluation from the perspective of fund sponsors and the perspective of investment managers.

*CFA® Program Curriculum, Volume 6, page 119*

*Professor's Note: In a large portfolio with multiple mangers there are typically decisions made by the fund sponsor as well as decisions made by the individual managers within the fund that affect portfolio performance. Performance evaluation can deconstruct return to show which decisions made by whom add or subtract value in the fund. The fund sponsor perspective will capture all value added or lost while the manager perspective will focus only on what a particular manager did to add or lose value for the fund. This material presupposes a fund sponsor is an entity like a pension fund, endowment, or foundations using several investment managers.*

**Fund sponsor's perspective.** Performance evaluation improves the effectiveness of a fund's investment policy by acting as a feedback and control mechanism. It does the following:

1. Shows where the policy and allocation is effective and where it isn't.
2. Directs management to areas of value added and lost.
3. Quantifies the results of active management and other policy decisions.

1. The terminology used throughout this topic review is industry convention as presented in Reading 41 of the 2013 CFA Level III exam curriculum.

4. Indicates where other, additional strategies can be successfully applied.

5. Provides feedback on the consistent application of the policies set forth in the IPS.

The increased complexity of institutional investment management has led to a greater need for sophisticated performance evaluation from the fund sponsor's perspective.

**Investment manager's perspective.** As with the fund sponsor's perspective, performance evaluation can serve as a feedback and control mechanism. Some investment managers may simply compare their reported investment returns to a designated benchmark. Others will want to investigate the effectiveness of each component of their investment process.



## Components of Performance Evaluation

**LOS 41.b: Explain the following components of portfolio evaluation (performance measurement, performance attribution, and performance appraisal).**

*CFA® Program Curriculum, Volume 6, page 120*

Performance evaluation will involve:

1. *Performance measurement* to calculate rates of return based on changes in the account's value over specified time periods.

2. *Performance attribution* to determine the sources of the account's performance.

3. *Performance appraisal* to draw conclusions regarding whether the performance was affected primarily by investment decisions, by the overall market, or by chance.

## Return Calculations With External Cash Flows

*Professor's Note: External cash flows are funds the client adds or withdraws from the portfolio. They must be removed from the change in market value of the portfolio to determine the remaining change in value that is due to investment performance. They must also be considered to determine how much money was available for use. Several approaches will be covered to deal with this issue in the course of this and the next reading. The approaches differ in details but are conceptually related; the percentage return is the investment gain or loss divided by the weighted average of the funds available to use.*

The rate of return on an account is the percentage change in the account's market value over a defined time period (known as the measurement or evaluation period). An account's rate of return needs to factor in external cash flows. External cash flows refer to contributions and withdrawals made to and/or from an account, as opposed to internal cash flows, such as interest or dividends.

If there is an external cash flow at the *beginning* of the evaluation period, the account's return is calculated as follows:

$$r_t = \frac{MV_1 - (MV_0 + CF)}{MV_0 + CF}$$

If there is an external cash flow at the *end* of the evaluation period, it should be subtracted from (if a withdrawal, added to) the account's ending value, as it has no impact on the investment-related value of the account:

$$r_t = \frac{(MV_1 - CF) - MV_0}{MV_0}$$

**Example: Rate of return calculation**

The Keane account was valued at $12,000,000 at start of the month (before any contributions). At the month end, its value was $12,260,000. During the month, the account received a contribution of $40,000.

**Calculate** the rate of return if the contribution was received (1) on the first day of the month and (2) on the last day of the month.

**Answer:**

If the contribution was received on the *first day of the month*, the rate of return for the month would be:

$$r_t = \frac{\$12,260,000 - (\$12,000,000 + \$40,000)}{(\$12,000,000 + \$40,000)} = 0.018272 = 1.8272\%$$

If the $40,000 contribution was received on the *last day of the month*, the rate of return would be:

$$r_t = \frac{(\$12,260,000 - \$40,000) - \$12,000,000}{\$12,000,000} = 0.018333 = 1.8333\%$$

Note: A contribution on the last day of the month has no impact on the investment-related value of the account. This is because the contribution is deducted before calculating the return.

When the external cash flows do not occur at the beginning or end of the period, other approaches are required.

## CALCULATING TIME- AND MONEY-WEIGHTED RETURNS

**LOS 41.c: Calculate, interpret, and contrast time-weighted and money-weighted rates of return and discuss how each is affected by cash contributions and withdrawals.**

*CFA® Program Curriculum, Volume 6, page 124*

**For the Exam:** The fact that these return calculations also appear in Study Session 18 (GIPS®) tells me you should be ready to perform them on the exam.

### Time-Weighted Rate of Return

The time-weighted rate of return (TWRR) calculates the compounded rate of growth over a stated evaluation period of one unit of money initially invested in the account. It requires a set of subperiod returns to be calculated covering each period that has an external cash flow. This approach requires a fund market value on the date of each external cash flow. The subperiod results are then compounded together. The resulting TWRR is unaffected by the external cash flows.

**Example: Time-weighted rate of return**

The Rooney account was $2,500,000 at the start of the month and $2,700,000 at the end. During the month, there was a cash inflow of $45,000 on day 7 and $25,000 on day 19. The values of the Rooney account are $2,555,000 and $2,575,000 (inclusive of the cash flows for the day) on day 7 and day 19, respectively. Calculate the time-weighted rate of return (assuming 30 days in the month).

**Answer:**

First, calculate three subperiod returns using the rate of return calculation when external cash flows occur at the end of the evaluation period:

Subperiod 1 (days 1–7)

$$r_{t,1} = \frac{[(\$2{,}555{,}000 - \$45{,}000) - \$2{,}500{,}000]}{\$2{,}500{,}000} = 0.004 = 0.4\%$$

Subperiod 2 (days 8–19)

$$r_{t,2} = \frac{[(\$2{,}575{,}000 - \$25{,}000) - \$2{,}555{,}000]}{\$2{,}555{,}000} = -0.002 = -0.2\%$$

Subperiod 3 (days 20–30)

$$r_{t,3} = \frac{(\$2{,}700{,}000 - \$2{,}575{,}000)}{\$2{,}575{,}000} = 0.049 = 4.9\%$$

Second, compound the returns together (chain-link) to calculate an overall time-weighted rate of return:

$$TWRR = (1 + 0.004)(1 - 0.002)(1 + 0.049) - 1 = 0.051 = 5.1\%$$

## Money-Weighted Rate of Return

The money-weighted rate of return (MWRR) is an internal rate of return (IRR) on all funds invested during the evaluation period, including the beginning value of the portfolio. In equation form, the periodic MWRR is the rate, *R*, that solves:

$$MV_1 = MV_0(1+R)^m + \sum_{i=1}^{n} CF_i(1+R)^{L(i)}$$

where:

$MV_1$ = ending value of the portfolio
$MV_0$ = beginning value of the portfolio
M = number of time units in the evaluation period (e.g., number of days in the month)
$CF_i$ = cash flow *i*
L(i) = number of time units (days, etc.) cash info *i* is in the portfolio or cash outflow *i* is absent from the portfolio

**For the Exam:** Solving any IRR equation (including MWRR) is a trial and error process of guessing a return and solving for ending value until a return is guessed that produces a result equal to the actual ending value of the portfolio. The text states that solving MWRR is better suited to spreadsheet software. In the unlikely event the subperiods between cash flows are of equal length, the IRR functions of a calculator can be used to find the periodic IRR.

**Example: Using equal subperiods**

The Owen account is valued at $900,000 at the start of the month. On day 15, a contribution of $50,000 is made. At the end of the month, the account is worth $1,466,553. **Calculate** the MWRR (assuming 30 days in a month).

**Answer:**

The 15-day periodic MWRR is:

$$MV_1 = MV_0(1+R)^2 + CF_1(1+R)$$
$$\$1,466,553 = \$900,000(1+R)^2 + \$50,000(1+R)$$
$$R = 24.9\% \text{ (15-day return)}$$

Keystrokes on the TI BAII Plus® are as follows:

| | | |
|---|---|---|
| CF | 2nd | CLR WORK |
| | 900,000 | ENTER ↓ |
| | 50,000 | ENTER ↓ ↓ |
| | –1,466,553 | ENTER |
| IRR | CPT → | 24.904 |

This compounds to a monthly return of:

$$1.24904^2 - 1 = 0.5601 = 56.01\%$$

I don't know about you, but I sure wish I had known ahead of time to invest with this manager.

## TWRR vs. MWRR

MWRR is an average growth rate of all funds in the account. It is affected by both the returns generated on the assets and the timing of external cash flows. For example, if the assets first appreciate significantly and then depreciate significantly and a large external cash flow is made, the timing of the external cash flow will significantly affect the MWRR. If a large external cash flow is received at the very beginning of the period it is exposed to the increase and decrease in asset values. If it occurs after the appreciation period but before the decline, the MWRR will be lower because relatively more funds were exposed to the decline than to the increase. In contrast, TWRR is only a linking of subperiod returns and is not affected by external cash flows.

- Generally, TWRR is used for manager evaluation and GIPS® reporting because it reflects only the return of the assets and not client decisions to add or subtract funds.
- A special case can exist if the manager controls the timing of fund additions and withdrawals. This can happen with some portfolios, such as hedge funds and other limited partnership investments. If the manager controls the timing of cash flows, MWRR is appropriate for performance reporting and GIPS®.
- TWRR reflects what would have happened to the beginning value if no external cash flows had occurred.
- TWRR calculations can be data intensive and expensive to perform because they require a portfolio market value on the date of all external cash flows.
- MWRR only requires a beginning and end of period market value.

A Bank Administration Institute (BAI)[2] study recommends that TWRR can be approximated by calculating the MWRR over frequent time intervals and then chain-linking those returns over the evaluation period. The BAI study concluded that only if there are large (> 10% of the account's value) external cash flows or volatile performance swings will this linked internal rate of return (LIRR) fail to provide a close approximation to the true TWRR.

*Professor's Note: To comply with the GIPS® standards, for periods beginning January 1, 2010, firms are required to value portfolios on the date of all large external cash flows. GIPS® does not define what constitutes a large external cash flow. Any flow that produces a significant difference in MWRR and TWRR should be considered large.*

## The Effect of External Contributions and Withdrawals

If the external cash flows are large relative to the account's value, and the account's performance is quite volatile, there can be a significant difference between the TWRR and MWRR.

**Example: TWRR vs. MWRR**

The Neville account is valued at $400,000 at the beginning of the month. On day 8, it is valued at $1,300,000 after receiving a $900,000 contribution on that day. At the end of the month, the account is valued at $2,695,398. The TWRR is:

Subperiod 1 (days 1–8)

$$r_{t,1} = \frac{[(\$1{,}300{,}000 - \$900{,}000) - \$400{,}000]}{\$400{,}000} = 0.0 = 0\%$$

Subperiod 2 (days 9–30)

$$r_{t,2} = \frac{[\$2{,}695{,}398 - \$1{,}300{,}000]}{\$1{,}300{,}000} = 1.0734 = 107.34\%$$

Compounding the returns produces a time-weighted rate of return:

$$TWRR = (1 + 0)(1 + 1.0734) - 1 = 2.0734 - 1 = 1.0734 = 107.34\%$$

The MWR is:

$$\$2{,}695{,}398 = \$400{,}000(1 + R)^{30} + \$900{,}000(1 + R)^{22}$$

2. See *http://www.bai.org/research/* for more on BAI research. Accessed September 2012.

By trial and error, R = 0.03. Converting to a monthly basis:

$$MWRR = 1.030^{30} - 1 = 1.427 = 142.7\%$$

**Explain** why based on the specific circumstances in the Neville account, the MWRR is much higher than the TWRR.

**Answer:**

The first subperiod had a 0.0% return and the second subperiod had a 107.34% return. The client added funds right before the second subperiod so more funds where in the account during the subperiod of high return. MWRR weights returns by the amount of funds invested; more funds in the high return subperiod produce a higher MWRR than TWRR. TWRR is unaffected by external cash flows.

## DATA QUALITY

### LOS 41.d: Identify and explain potential data quality issues as they relate to calculating rates of return.

*CFA® Program Curriculum, Volume 6, page 129*

The phrase "garbage in, garbage out" is quite appropriate for return calculations. That is, the calculated return is only as accurate as the inputs. The following are potential problems relating to data quality:

- When accounts contain illiquid (infrequently priced) assets, estimates or educated guesses must sometimes be used to calculate returns.
- For many thinly-traded fixed-income securities, current market prices may not be available. Estimated prices may be derived from dealer quoted prices on securities with similar attributes. This is known as **matrix pricing**.
- Highly illiquid securities may be carried at cost or the price of the last trade, thus, not reflecting the current price.
- Account valuations should include trade date accounting, including accrued interest and dividends.

## PORTFOLIO RETURN COMPONENTS

**LOS 41.e: Demonstrate the decomposition of portfolio returns into components attributable to the market, to style, and to active management.**

*CFA® Program Curriculum, Volume 6, page 131*

*Professor's Note: The three components of return (market, style, and active management) are the foundation for portfolio performance attribution. This approach decomposes portfolio return into overall market return, the style of the manager, and active management decisions the manager makes. These building blocks of attribution analysis are important and are a prime illustration of the use of benchmarks.*

A portfolio return can be broken up into three components: market, style, and active management.

$$P = M + S + A$$

where:

P = investment manager's portfolio return
M = return on the market index
S = B – M = excess return to style; difference between the manager's style index (benchmark) return and the market return. S can be positive or negative.
A = P – B = active return; difference between the manager's overall portfolio return and the style benchmark return.

This relationship recognizes first that the manager's style benchmark can earn more or less than the market. Had the manager taken a passive position in a broad market index, the return on that index, *M*, would be an appropriate benchmark, and S = 0. Because the manager might specialize in a particular style, however, we add (if B > M, S > 0) or subtract (if B < M, S < 0) the difference between the benchmark and market returns. Finally, the return to active management, *A*, is the difference between the manager's portfolio return and the benchmark return and is attributed to active management.

**Example: Portfolio return components**

The Pallister account has a total monthly return of 5.04%. During the same period, the portfolio benchmark returned 5.32% and the market index returned 3.92%. **Calculate** the amount of the portfolio return attributable to the manager's active management and style.

**Answer:**

The return to active management is the difference between the portfolio return, *P*, and the manager's style benchmark, *B*:

$$A = P - B = 5.04\% - 5.32\% = -0.28\%$$

The return to style is the difference between the manager's style benchmark, *B*, and the market, *M*:

$$S = B - M = 5.32\% - 3.92\% = 1.4\%$$

## BENCHMARK PROPERTIES

**LOS 41.f: Discuss the properties of a valid benchmark and explain the advantages and disadvantages of alternative types of performance benchmarks.**

*CFA® Program Curriculum, Volume 6, page 133*

To effectively evaluate performance, a valid benchmark should possess the following seven characteristics, which should align the benchmark's style and risk with that of the manager and provide the manager with an appropriate management objective:

1. *Specified in advance.* The benchmark is known to both the investment manager and the fund sponsor. It is specified at the start of an evaluation period.

2. *Appropriate.* The benchmark is consistent with the manager's investment approach and style.

3. *Measurable.* Its value and return can be determined on a reasonably frequent basis.

4. *Unambiguous.* Clearly defined identities and weights of securities constituting the benchmark.

5. *Reflective of the manager's current investment opinions.* The manager has current knowledge and expertise of the securities within the benchmark.

6. *Accountable.* The manager(s) should accept the applicability of the benchmark and agree to accept differences in performance between the portfolio and benchmark as caused only by his active management.

7. *Investable.* It is possible to replicate the benchmark and forgo active management.

*Professor's Note: To help you remember the necessary properties of a valid benchmark, notice the first letters of the properties combine to spell "SAMURAI." Benchmarks are very important in the Level III material. I would know the list and pay close attention to all discussions of benchmarks.*

## Advantages and Disadvantages of Benchmarks

The seven primary types of benchmarks in use are:

1. **Absolute.** An absolute benchmark is a return objective (i.e., aims to exceed a minimum target return).

   Advantage:

   - Simple and straightforward benchmark.

   Disadvantage:

   - An absolute return objective is not an investable alternative.

2. **Manager universes.** The median manager or fund from a broad universe of managers or funds is used as the benchmark. The *median manager* is the fund that falls at the middle when funds are ranked from highest to lowest by performance.

   Advantage:

   - It is measurable.

   Disadvantages:

   - Manager universes are subject to "survivor bias," as underperforming managers often to go out of business and their performance results are then removed from the universe history.
   - Fund sponsors who choose to employ manager universes have to rely on the compiler's representations that the universe has been accurately compiled.
   - Cannot be identified or specified in advance so it is not investable.

3. **Broad market indices.** There are several well-known broad market indices that are used as benchmarks [e.g., the S&P 500 for U.S. common stocks, the Morgan Stanley Capital International (MSCI) and Europe, Australasia and Far East (EAFE) for non-U.S. developed market common stocks, and so on.].

   Advantages:

   - Well recognized, easy to understand, and widely available.
   - Unambiguous, generally investable, measurable, and may be specified in advance.
   - It is appropriate to use if it reflects the approach of the manager.

Disadvantage:

- The manager's style may deviate from the style reflected in the index. For example, it is not appropriate to use the S&P 500 for a small-capitalization U.S. growth stock manager.

4. **Style indices**. Investment style indices represent specific portions of an asset category. Four well-known U.S. common stock style indices are (1) large-capitalization growth, (2) large-capitalization value, (3) small-capitalization growth, and (4) small-capitalization value.

   Advantage:

   - Widely available, widely understood, and widely accepted.
   - If the index reflects the manager's style and it is investable, it is an appropriate benchmark.

   Disadvantages:

   - Some style indices can contain weightings in certain securities and sectors that may be larger than considered prudent.
   - Differing definitions of investment style can produce quite different benchmark returns.
   - In these cases they are not appropriate benchmarks.

5. **Factor-model-based**. Factor models involve relating a specified set of factor exposures to the returns on an account. A well-known 1-factor model is the market model where the return on a portfolio is expressed as a linear function of the return on a market index. A generalized factor model equation would be:

$$R_P = a_p + b_1F_1 + b_2F_2 + ... + b_KF_K + \varepsilon$$

   where:
   $R_P$ = periodic return on an account
   $a_p$ = "zero factor" term, representing the expected value of $R_P$ if all factor values were zero
   $F_i$ = factors that have a systematic effect on the portfolio's performance, i = 1 to K
   $b_i$ = sensitivity of the returns on the account to the returns generated from factor *i*
   $\varepsilon$ = error term; portfolio return not explained by the factor model

   Some examples of factors are the market index, industry, growth characteristics, a company's size, and financial strength.

   The benchmark portfolio (i.e., the *normal portfolio*) is the portfolio with exposures to the systematic risk factors that are typical for the investment manager. The manager's past portfolios are used as a guide.

Advantage:

- Useful in performance evaluation.
- Provides managers and sponsors with insight into the manager's style by capturing factor exposures that affect an account's performance.

Disadvantages:

- Focusing on factor exposures is not intuitive to all managers or sponsors.
- The data and modeling are not always available and may be expensive.
- It may be ambiguous because different factor models can produce different output.

6. **Returns-based**. Returns-based benchmarks are constructed using (1) the managed account returns over specified periods and (2) corresponding returns on several *style indices* for the same periods.

   These return series are submitted to an allocation algorithm that solves for the combination of investment style indices that most closely tracks the account's returns.

   Advantages:

   - Generally easy to use and intuitive.
   - Meets the criteria of a valid benchmark.
   - Useful where the only information available is account returns.

   Disadvantages:

   - The style indices may not reflect what the manager owns or what the manager or client would be willing to own.
   - A sufficient number of monthly returns would be needed to establish a statistically reliable pattern of style exposures.
   - Will not work when applied to managers who change style.

7. **Custom security-based**. Custom security-based benchmarks are designed to reflect the manager's security allocations and investment process. (See the following LOS for further discussion.)

   Advantages:

   - Meets all of the required benchmark properties and all of the benchmark validity criteria.
   - Allows continual monitoring of investment processes.
   - Allows fund sponsors to effectively allocate risk across investment management teams.

   Disadvantages:

   - Can be expensive to construct and maintain.
   - A lack of transparency by the manager (e.g., hedge funds) can make it impossible to construct such a benchmark.

## Constructing Custom Security-Based Benchmarks

### LOS 41.g: Explain the steps involved in constructing a custom security-based benchmark.

*CFA® Program Curriculum, Volume 6, page 137*

The construction of a custom security-based benchmark entails the following steps:

*Step 1:* Identify the important elements of the manager's investment process.
*Step 2:* Select securities that are consistent with that process.
*Step 3:* Weight the securities (including cash) to reflect the manager's process.
*Step 4:* Review and adjust as needed to replicate the manager's process and results.
*Step 5:* Rebalance the custom benchmark on a predetermined schedule.

## Validity of Using Manager Universes as Benchmarks

### LOS 41.h: Discuss the validity of using manager universes as benchmarks.

*CFA® Program Curriculum, Volume 6, page 137*

Fund sponsors often use the median account in a particular "universe" of account returns as a benchmark. However, even though finishing in the top half of all managers with the same style might be a good performance objective, this form of benchmark has a number of drawbacks:

1. Apart from being measurable, it fails the other properties of a valid benchmark:
   - It is not possible to identify the median manager in *advance*.
   - Because the median manager cannot be determined ahead of time, the measure also fails the *unambiguous* property.
   - The benchmark is not *investable*, as the median account will differ from one evaluation period to another.
   - It is impossible to verify the benchmark's *appropriateness* due to the ambiguity of the median manager.

2. Fund sponsors who choose to employ manager universes have to rely on the compiler's representations that the accounts within the universe have been appropriately screened, input data validated, and calculation methodology approved.

3. As fund sponsors will terminate underperforming managers, universes will be subject to "survivor bias." As consistently underperforming accounts will not survive, the median will be biased upwards. Without a valid reference point, evaluating manager performance using this benchmark becomes suspect.

## TESTS OF BENCHMARK QUALITY

### LOS 41.i: Evaluate benchmark quality by applying tests of quality to a variety of possible benchmarks.

*CFA® Program Curriculum, Volume 6, page 139*

An important part of performance evaluation and risk management, it is essential to distinguish good benchmarks from bad ones. Some issues to consider in benchmark evaluation are:

- **Systematic bias.** There should be minimal systematic bias in the benchmark relative to the account. To assess the relationship between returns on the benchmark and the account, the manager can calculate the *historical beta* of the account relative to the benchmark (i.e., regress the portfolio returns on the benchmark returns). A beta near 1.0 would indicate that the benchmark and portfolio tend to move together (i.e., they are sensitive to the same systematic factors). If the beta differs significantly from 1.0, the benchmark may be responding to different factors and thus have a different set of risk factor exposures.

  Another method to identify systematic bias is looking at *correlations*. Consider the relationships seen earlier:

  $$A = P - B$$

  $$S = B - M$$

  where:
  A = excess return attributable to the management's active management decisions
  P = investment manager's portfolio return
  B = benchmark return
  S = excess return attributable to the manager's investment style

  Returns to the manager's active decision making (*A*) should be *uncorrelated* with the manager's investment style (*S*). That is, whether the style benchmark performs well should have no effect on the manager's ability to generate active return, *A*.

  An interesting multiple correlation is that between the style benchmark return (*B*), the return on the market (*M*), and the return on the portfolio (*P*). Specifically, if the style benchmark outperforms the market (i.e., B > M), we would expect to see the manager's portfolio outperform the market (i.e., P > M). Accordingly, there should be a strong positive relationship between (B – M) and (P – M).

- **Tracking error.** Tracking error is defined as the volatility (standard deviation) of *A*, the excess return earned due to active management (i.e., P – B). If the appropriate benchmark has been selected, the standard deviation of the difference between the returns on the portfolio and the benchmark (the tracking error) will be smaller than that of the difference between the portfolio and a market index. This would indicate that the benchmark is capturing important elements of the manager's investment

style. Further differences between the portfolio and benchmark returns can be attributed primarily to active management.

- **Risk characteristics.** An account's exposure to systematic sources of risk should be very similar to those of the benchmark; that is, the systematic risk may be higher or lower during individual periods but should average that of the benchmark over time. If the account tends to consistently exhibit more or less risk than the benchmark, this would indicate a systematic bias.
- **Coverage.** Benchmark coverage is defined as the percentage of a portfolio that is made up of securities that are also in the benchmark. The *coverage ratio* is the market value of the securities that are in both the portfolio and the benchmark as a percentage of the total market value of the portfolio. The higher the coverage ratio, the more closely the manager is replicating the benchmark (i.e., the more the benchmark reflects the manager's universe).
- **Turnover.** Benchmark turnover is the proportion of the benchmark's total market value that is bought or sold (i.e., turned over) during periodic rebalancing. Passively managed portfolios should utilize benchmarks with low turnover.
- **Positive active positions.** An active position is the difference between the weight of a security or sector in the managed portfolio versus the benchmark. For example, if the account has 5% in Vodafone and the benchmark has 3%, the active position is 5% – 3% = 2%.

  If the benchmark includes many securities for which the manager has no opinions and does not own, the number of negative active positions will be large. If the portion of negative positions is large, it may indicate the benchmark does not reflect the manager's process and is not appropriate for the manager.

## HEDGE FUND BENCHMARKS

**LOS 41.j: Discuss the issues that arise when assigning benchmarks to hedge funds.**

*CFA® Program Curriculum, Volume 6, page 141*

*Professor's Note: This section is qualitative in nature even when presenting formulas. No calculations are shown or covered. The issue is the difficulty of identifying suitable benchmarks.*

The diversity and lack of transparency of hedge funds makes benchmark identification difficult or impossible.

1. The difficulties start with calculating the return of a hedge fund. Most hedge funds hold long and short positions and some hedge funds have minimal or theoretically zero capital in relation to the total of long and short positions. Trying to apply the basic accounting rate of return calculation when $V_0$ is very small or theoretically zero can produce results that are difficult to interpret.

$$r = \frac{V_1 - V_0}{V_0}$$

2. One approach is to evaluate performance in terms of value-added return:

   $R_V = R_P - R_B$

   where:
   $R_V$ = value-added return
   $R_P$ = portfolio return
   $R_B$ = benchmark return

   To replicate a zero net asset hedge fund, $R_V$ is the value-added return on a long-short portfolio. Although the weights can sum to zero, a return can be calculated by summing up the returns on all the individual security positions, long and short. Even this seemingly simple process is complicated, however, as active managers trade frequently, resulting in changing asset positions.

   The calculations associated with determining the manager's value-added return (not required by the LOS) must distinguish between the return earned by simply holding an asset and the value-added return due to over- (under-) weighting the asset relative to the benchmark. Recall that, for a long-only manager, overweighting a security relative to the benchmark results in a positive *active weight.* For hedge fund managers, determining a value-added return is, of course, complicated by the manager's ability to sell short. In addition, the extremely wide range of funds that fall under the hedge fund classification makes it difficult, if not impossible, to define a benchmark that is applicable to all hedge funds.

3. Some hedge funds target an absolute return target and argue comparison benchmarks are irrelevant.

4. Other funds may have clearly defined styles (such as long-short equity) and it may be possible to compare results of the manager to other managers of the same style. But other funds have no definable style on which to base a comparison.

5. The difficulty of defining benchmarks has led others to use the Sharpe ratio as the basis of comparing hedge fund managers. The same difficulties in identifying comparable managers with which to compare still arise. In addition, the use of standard deviation is questionable when many hedge funds show skewed returns.

## Macro and Micro Performance Attribution

**LOS 41.k: Distinguish between macro and micro performance attribution and discuss the inputs typically required for each.**

*CFA® Program Curriculum, Volume 6, page 145*

**LOS 41.l: Demonstrate, justify, and contrast the use of macro and micro performance attribution methodologies to evaluate the drivers of investment performance.**

*CFA® Program Curriculum, Volume 6, page 151*

The second phase of performance evaluation is performance attribution. The basic concept is to identify and quantify the sources of returns that are different from the designated benchmark. There are two basic forms of performance attribution: micro and macro attribution. **Macro performance attribution** is done at the fund sponsor level. The approach can be carried out in percentage terms (i.e., rate-of-return) and/or in monetary terms (i.e., dollar values). **Micro performance attribution** is done at the investment manager level.

*Professor's Note: Essentially, the goal of macro attribution is to gain insight into the decisions made by the sponsor and measure the affect of those decisions on the portfolio. One of those sponsor decisions is which managers to hire and how those managers perform. The goal of micro attribution is to analyze an individual manager's decisions and determine how that manager added or lost value for the sponsor. The CFA text focuses on the concept and use of macro analysis. For micro attribution the attention is more evenly divided between concept, use, and calculations. All of this is prime test material.*

### Macro Performance Attribution

There are three main inputs into the **macro attribution** approach: (1) policy allocations; (2) benchmark portfolio returns; and (3) fund returns, valuations, and external cash flows.

1. **Policy allocations.** It is up to the sponsor to determine asset categories and weights as well as allocate the total fund among asset managers. As in any IPS development, allocations will be determined by the sponsor's risk tolerance, long-term expectations, and the liabilities (spending needs) the fund must meet.

2. **Benchmark portfolio returns.** A fund sponsor may use broad market indices as the benchmarks for asset categories and use narrowly focused indices for managers' investment styles.

3. Fund **returns**, valuations, and **external cash flows**. When using percentage terms, returns are calculated at the individual manager level. This enables the fund sponsor to make decisions regarding manager selection.

   If also using monetary terms, account valuation and external cash flow data are needed to compute the value impacts of the fund sponsor's investment policy decision making.

## Conducting a Macro Attribution Analysis

Macro attribution starts with the fund's beginning market value and ends with its ending market value. In between are six levels of analysis that attribute the change in market value to sources of increase or decrease in market value. The levels are:

1. Net contributions.
2. Risk-free asset.
3. Asset categories.
4. Benchmarks.
5. Investment managers.
6. Allocation effects.

Level 1, **net contributions**, is the net sum of external cash flows made by the client into or withdrawn from the portfolio. Net contributions increase or decrease ending market value but are not investment value added or lost.

Level 2, **risk-free investment**, simulates what the fund's ending value would have been if the beginning value and external cash flows had earned the risk-free return.

Level 3, **asset categories**, recognizes that most sponsors will consider risk-free investments as too conservative. It simulates the ending value of beginning value and external cash flows if funds had been invested in asset category benchmarks weighted in accord with the fund's strategic policy (in other words, passively replicating the strategic asset allocation with index funds).

The incremental return to the asset category level is the weighted average of the categories' returns over the risk-free asset. Level 3's incremental return could be calculated as:

$$R_{AC} = \sum_{i=1}^{A}(w_i)(R_i - R_F)$$

where:

$R_{AC}$ = incremental return (above the risk-free rate) for the asset category strategy
$(R_i - R_F)$ = excess return (above the risk-free rate) for asset category *i*
$w_i$ = weight of asset category *i*
A = number of asset categories

Up to this point, all results could have been achieved by passively implementing the fund's strategic asset allocation.

Level 4, the **benchmark level**, allows the sponsor to select and assign managers a benchmark different from the policy benchmark. This is tactical asset allocation by the sponsor. For example, 60% in the S&P 500 might fit the fund's strategic objective but the sponsor may expect value stocks to outperform the S&P. The sponsor could direct the manager to use the S&P value index as that manager's target or *manager benchmark*. Level 4 simulates the return of the beginning market value and external cash flows if invested in manager benchmarks. The Level 4 result can also be passively achieved but reflects active decision making by the sponsor to deviate from strategic benchmarks. The level 4 incremental return could be calculated as:

$$R_B = \sum_{i=1}^{A}\sum_{j=1}^{M}(w_i)(w_{i,j})(R_{B,i,j} - R_i)$$

where:

$R_B$ = incremental return for the benchmark strategy
$w_i$ = policy weight of asset category *i*
$w_{i,j}$ = weight assigned to manager *j* in asset category *i*
$R_{B,i,j}$ = return for manager *j*'s benchmark in category *i*
$R_i$ = return on asset category *i*
A = number of asset categories
M = number of managers in asset category *i*

The formula allows for more than one portfolio manager in each asset category. If we assumed only one manager per category, the formula would simplify to:

$$R_B = \sum_{i=1}^{A}(w_i)(R_{B,i} - R_i)$$

Level 5, **investment managers** or **active management**, simulates the results of investing the fund's beginning value and external cash flows and earning the returns actually produced by the managers. The simulation assumes the sponsor has actually allocated

funds in accord with the policy allocations, an assumption that is usually not perfectly implemented. The level 5 incremental return could be calculated as:

$$R_{IM} = \sum_{i=1}^{A}\sum_{j=1}^{M}(w_i)\left(w_{i,j}\right)\left(R_{A,i,j} - R_{B,i,j}\right)$$

where:

$R_{IM}$ = incremental return for the investment manager level
$w_i$ = policy weight of asset category $i$
$w_{i,}$ = weight assigned to manager $j$ in asset category $i$
$R_{A,i,j}$ = return for manager $j$'s portfolio in category $i$
$R_{B,i,j}$ = return for $j$th manager's benchmark for asset category $i$
A = number of asset categories
M = number of managers in asset category $i$

Level 6, **allocation effects**, is simply a residual plug to sum to the portfolio ending value. If all policies were perfectly implemented, the allocation effect would be zero.

*Professor's Note: You will find many attribution models include a residual "plug." It should not be surprising that complex calculations designed to analyze events will not always add up perfectly. As a rough analogy you could think of residual error in quantitative modeling. You will find that one of the reasons that multiple approaches to attribution are discussed is that a given approach may be more suited to a given situation. In general, if an approach to a specific situation has a large residual plug, it would be wise to consider if another approach yields better results or if the calculations are just wrong.*

**Figure 1: Macro Attribution Analysis, Brice Pension Fund, September 2012**

| *Decision-Making Level* | *Fund Value* | *Incremental % Return Contribution* | *Incremental Value Contribution* |
|---|---|---|---|
| Beginning value | $447,406,572 | – | – |
| Net contributions | 449,686,572 | 0.00% | $2,280,000 |
| Risk-free asset | 451,067,710 | 0.30% | 1,381,138 |
| Asset category | 466,122,089 | 3.33% | 15,054,379 |
| Benchmarks | 467,329,262 | 0.28% | 1,207,173 |
| Investment managers | 467,390,654 | 0.02% | 61,392 |
| Allocation effects | 467,559,838 | 0.03% | 169,184 |
| Ending value | $467,559,838 | 3.96% | $20,153,266 |

1. **Net contributions.**

   *Net contributions* during September 2012 were a positive $2,280,000. Net contributions added to the starting value equals a value of $449,686,572.

2. **Risk-free asset.**

   If the fund's starting value and its net external cash inflows are invested at the risk-free rate the fund value would have increased by 0.30%, an incremental increase of $1,381,138 above the value from the net contributions level, giving a total fund value of $451,067,710.

*Professor's Note: The increment of $1,381,138 cannot be replicated by multiplying $449,686,572 by 0.30%, as the net $2,280,000 contribution was not a single start of the month cash flow. The composition of the net contribution is also unknown. There could have been a large contribution on day 1 and an almost equally large withdrawal just before month end.*

*The formulas from the previous pages are used to calculate the asset, benchmark, and manager effects.*

3. **Asset category.**

   This asset category level assumes that the fund's net contributions value is invested based on the fund sponsor's policy allocations to the specified asset category benchmarks. This is a pure index fund approach reflecting SAA. The policy allocations lead to a 3.33% increase above the risk-free rate, increasing the value of the fund by $15,054,379.

4. **Benchmarks.**

   The benchmarks level assumes that the beginning value and external cash flows of the fund are passively invested in the aggregate of the managers' respective benchmarks. This is also a pure index fund approach but reflecting the sponsor's TAA decisions. The aggregate manager benchmark return was 0.28%, producing an incremental gain of $1,207,173. The difference between the manager benchmarks and the asset category benchmarks (aggregated) is also known as the "misfit return" or "style bias." For the Brice fund, the misfit return was 0.28%.

5. **Investment managers (value of active management).**

   The investment managers level assumes that the beginning value and external cash flows of the fund invested are the actual results of the managers. This is not an index approach but still reflects sponsor decision making as the sponsor selects the managers. This incremental return reflects the value added by the managers. The aggregate actual return of the managers (using policy weights) exceeded the return on the aggregate manager investment style benchmark by 0.02%. In monetary terms, it has added $61,392.

6. **Allocation effects.**

   This is a balancing "plug" figure. It is the difference between the fund's ending value and the value from the investment managers level. This is created if fund sponsors

deviate slightly from their policy allocations. It was an incremental increase of $169,184 or +0.03%.

## MICRO PERFORMANCE ATTRIBUTION

Micro performance attribution analyzes individual portfolios relative to designated benchmarks. The value-added return (portfolio return minus benchmark return) can be broken into three components: (1) pure sector allocation, (2) allocation/selection interaction, and (3) within-sector selection.

$$R_V = \underbrace{\sum_{j=1}^{S}\left(w_{P,j} - w_{B,j}\right)\left(R_{B,j} - R_B\right)}_{\text{pure sector allocation}} + \underbrace{\sum_{j=1}^{S}\left(w_{P,j} - w_{B,j}\right)\left(R_{P,j} - R_{B,j}\right)}_{\text{allocation/selection interaction}}$$
$$+ \underbrace{\sum_{j=1}^{S} w_{B,j}\left(R_{P,j} - R_{B,j}\right)}_{\text{within-sector selection}}$$

where:
$R_V$ = value-added return
$w_{P,j}$ = portfolio weight of sector $j$
$w_{B,j}$ = benchmark weight of sector $j$
$R_{P,j}$ = portfolio return of sector $j$
$R_{B,j}$ = benchmark return of sector $j$
$R_B$ = return on the portfolio's benchmark
$S$ = number of sectors

**For the Exam:** Spend the time to understand the micro attribution calculations and get past the notation; the concepts of the calculations are rather intuitive. The CFA text spends considerable time on both concept and calculation for micro attribution. Be ready for both conceptual, interpretation, and calculation questions.

Pure sector allocation looks at whether the manager over- or underweighted a market sector that over- or underperformed the total return of the benchmark. It ignores the return of the stocks the manager selected so it purely captures the ability of the manager to emphasize outperforming sectors and avoid underperforming sectors.

Within-sector selection does the opposite. It uses benchmark weights, so it ignores the manager's sector weighting decisions and only focuses on the manager's performance within a sector versus that of the benchmark within that sector. Essentially it measures the manager's stock picking skill.

Adding the previous two components will not total to the portfolio incremental return in most situations. A joint allocation/selection interaction is needed that sums over-/underweighting and stock selection.

Joint effects are common in many models that break down return. They are mathematically necessary. Candidates are often confused because there will not be an allocation/selection interaction component in global attribution. The global model will be complicated by the need to break out currency effects. The global model will use portfolio weighs rather than benchmark weights for within-selector effects. As a result, there is no joint allocation/selection interaction. To further complicate your task, the naming of the calculations will be different, as will the notations used. Take this one step at a time. Rushing through attribution calculations does not work.

1. **Pure sector allocation.**

   Pure sector allocation assumes the manager holds the same sectors as in the benchmark and that within each sector the same securities are held in the same proportion as in the benchmark. The performance is attributed to the manager's decisions to hold each sector in a different weight in his portfolio relative to the weight of that sector in the benchmark.

**Example: Pure sector allocation**

One of the investment managers of the Giggs fund has the following results of a micro attribution analysis:

Figure 2: Sector Weighting/Stock Selection Micro Attribution

| *Economic Sectors* | *Portfolio Sector Weight (%)* | *Benchmark Sector Weight (%)* | *Portfolio Sector Return (%)* | *Benchmark Sector Return (%)* |
|---|---|---|---|---|
| | 6.77 | 6.45 | –0.82 | –0.73 |
| Capital goods | 8.52 | 8.99 | –3.28 | –4.34 |
| Consumer durables | 36.22 | 37.36 | 1.96 | 1.98 |
| Energy | 5.24 | 4.65 | 0.44 | 0.24 |
| Financial | 18.53 | 16.56 | 2.98 | 2.22 |
| Technology | 14.46 | 18.87 | 2.32 | –0.48 |
| Utilities | 9.22 | 7.12 | 0.54 | –0.42 |
| Cash and equivalents | 1.04 | 0.00 | 0.17 | — |
| Portfolio + cash | 100.00 | 100.00 | 1.34 | 0.56 |

Using data from Figure 2, **calculate** the performance impact due to the financial sector allocation.

**Answer:**

$$\begin{aligned} R_{FS\ Allocation} &= \left(w_{P,FS} - w_{B,FS}\right)\left(R_{B,FS} - R_B\right) \\ &= (0.1853 - 0.1656)(0.0222 - 0.0056) \\ &= (0.0197)(0.0166) = 0.000327 = 0.0327\% \end{aligned}$$

This example shows that the decision to overweight a sector that outperformed the overall benchmark resulted in a positive contribution to portfolio performance. Note that *underweighting* the sector would have produced a negative contribution.

The manager's goal should be for the two terms in the equation to have the same signs, either both positive or both negative:

- Overweight (+) an outperforming (+) sector → positive impact.
- Underweight (–) an underperforming (–) sector → positive impact.
- Underweight (–) an outperforming (+) sector → negative impact.
- Overweight (+) an underperforming (–) sector → negative impact.

2. **Within-sector selection return.**

This calculates the impact on performance attributed only to security selection decisions. The within-sector selection return is assuming that the manager weights each sector in the portfolio in the same proportion as in the overall benchmark.

**Example: Within-sector selection return**

Using Figure 2 from the previous example, **calculate** the utilities within-sector allocation return.

**Answer:**

$$\text{utilities within-sector allocation return} = w_{B,\text{utilities}}(R_{P,\text{utilities}} - R_{B,\text{utilities}})$$
$$= 0.0712 \times [0.54\% - (-0.42\%)]$$
$$= +0.068\%$$

The positive contribution shows that the portfolio held utilities stocks that performed better than the utilities stocks contained in the sector benchmark.

3. **Allocation/selection interaction return.**

This return involves the joint effect of assigning weights to both sectors and individual securities. A decision to increase the allocation of a particular security will also increase the weighting of the sector to which the security belongs.

**Example: Allocation/selection interaction return**

Using Figure 1 from the pure sector allocation example, **calculate** the allocation/selection interaction return for consumer durables.

**Answer:**

consumer durables allocation/selection interaction return

$= (w_{P,durables} - w_{B,durables})(R_{P,durables} - R_{B,durables})$

$= [(0.3622 - 0.3736)(0.0196 - 0.0198)]$

$= (-0.0114)(-0.0002)$

$= 0.00000228 = 0.000228\%$

Generally speaking, the allocation/selection interaction impact tends to be relatively small if the benchmark is appropriate. Thus, some analysts group the impact with the within-sector selection impact.

## FUNDAMENTAL FACTOR MODEL MICRO ATTRIBUTION

### LOS 41.m: Discuss the use of fundamental factor models in micro performance attribution.

*CFA® Program Curriculum, Volume 6, page 157*

It should be possible to construct multifactor models to conduct micro attribution. This involves combining economic sector factors with other fundamental factors (e.g., a company's size, its growth characteristics, its financial strength, etc.).

Constructing a suitable factor model involves the following:

- Identify the fundamental factors that will generate systematic returns.
- Determine the exposures of the portfolio and the benchmark to the fundamental factors at the start of the evaluation period. The benchmark could be the risk exposures of a style or custom index or a set of *normal* factor exposures that are typical of the manager's portfolio.
- Determine the manager's *active exposure* to each factor. The manager's active exposures are the difference between his *normal* exposures as demonstrated in the benchmark and his actual exposures.
- Determine the *active impact*. This is the added return due to the manager's active exposures.

The results of the fundamental factor micro attribution will indicate the source of portfolio returns, based on actual factor exposures versus the manager's normal factor exposures (e.g., sector rotation), the manager's ability to time the market (e.g., adjust the portfolio beta and/or duration in response to market expectations), and so on.

The results will look very similar to a *returns-based style analysis*, where the returns to the portfolio are regressed against the returns to several different indices to determine factor exposures. The primary difference between them is the use of other fundamental factors (e.g., management's use of leverage, market timing, sector rotation, and the size of the firm,) that would not ordinarily be used in a returns-based style analysis.

The strengths and limitations of the micro and fundamental factor model attributions are summarized in Figure 3.

**Figure 3: Strengths and Limitations of Micro Attribution and Fundamental Factor Model Attribution**

| | *Micro Attribution* | *Fundamental Factor Model Attribution* |
|---|---|---|
| Strengths | Disaggregates performance effects of managers' decisions between sectors and securities. Relatively easy to calculate. | Identifies factors other than just security selection or sector allocation. |
| Limitations | The need to identify an appropriate benchmark with specified securities and weights at the start of the evaluation period. Security selection decisions will affect sector weighting (allocation/selection interaction). | Exposures to the factors need to be determined at the start of the evaluation period. Can prove to be quite complex, leading to potential spurious correlations. |

## FIXED-INCOME ATTRIBUTION: INTEREST RATE EFFECTS AND MANAGEMENT EFFECTS

**LOS 41.n: Evaluate the effect of the external interest rate environment and the effect of active management on fixed-income portfolio returns.**

*CFA® Program Curriculum, Volume 6, page 158*

**LOS 41.o: Explain the management factors that contribute to a fixed-income portfolio's total return and interpret the results of a fixed-income performance attribution analysis.**

*CFA® Program Curriculum, Volume 6, page 161*

**For the Exam:** LOS 41.n and LOS 41.o refer to evaluate, explain, and interpret. Past test questions on fixed income attribution models have followed the LOS and CFA text. Computers are used to simulate returns for the portfolio and break out components of return. The simulation mathematics are not covered. Focus on a conceptual understanding of each component and realize that these must sum up to the actual portfolio return as you will see in the example below. Questions may come down to nothing more than solving for the missing number, explaining one of the return components, or interpreting the relative performance of two or more fixed-income managers.

Attribution analysis of a fixed-income portfolio is different than that of equity. Duration and interest rates are typically the dominant factor in return. Therefore, the attribution focuses on simulations of what the *external interest rate environment* would have been expected to produce and the *manager's contribution*.

Changes in the external interest rate environment, consisting of shifts and twists in the Treasury yield curve, are beyond the individual manager's control and should neither penalize nor benefit the manager's evaluation. Therefore, the attribution begins with simulating what the portfolio would have done based on these external changes. The external interest rate effect is based on a term structure analysis of default-free securities (Treasury securities in the United States). The external interest rate effect can be subdivided into two components:

- First, a simulation of what the manager's benchmark would have returned if interest rates had moved in the manner of the forward curve. For example, if part of the benchmark is invested in 5 year securities yielding 4% and the 1-month forward rate for 4 year and 11 month securities is 4.1%, the expected return is calculated assuming rates do move to 4.1%. This must be done for all securities in the benchmark and aggregated. It is the **expected interest rate effect**. Notice it does not consider any actions of the manager or what actually happened to rates.

- Second, the benchmark return is simulated based on what actually happened to interest rates. The difference in simulated benchmark returns is due to changes in forward rates (i.e., change not in accord with starting forward rates). It is the **unexpected interest rate effect**. It still does not consider any actions of the manager.

The sum of these two effects is the **external interest rate effect** and is the return of a default-free benchmark return. The portfolio could have passively earned this return.

The next four simulations capture value added or lost versus the index by the actions of the manager.

- **Interest rate management effect** measures the manager's ability to anticipate changes in interest rates and adjust the portfolio duration and convexity accordingly. Each portfolio asset is priced as if it were a default-free bond (i.e., price each using Treasury forward rates). This is compared to another simulation, still using Treasury interest rates but including changes the manager made to duration and positioning on the yield curve. The difference is the interest rate management effect because it captures the consequences of the manager's changes to duration and curve positioning if only Treasury securities were used. It can be further subdivided into duration, convexity, and yield-curve shape effects if desired.
- **Sector/quality management effect** considers what happened to the yield spreads on the actual sectors and quality of assets held in the portfolio. For example, if the manager holds corporate bonds and corporate spreads narrow, the portfolio will outperform the previous Treasury-only simulation. These increments of value added or lost versus the previous Treasury-only simulation are aggregated for all non-Treasury sectors the manager holds to produce the sector/quality management effect. This effect does not look at the actual securities the manager used.
- **Security-selection effect** examines the actual securities selected by the manager. For example, if corporate bond spreads narrowed 20 basis points and the corporate bonds held by the manager narrowed more, the manager's selection effect is positive for corporate bonds. It is calculated as the total return of each security less all the previous components. It is analogous to security selection in equity attribution. The aggregate of all the individual security selection effects is the manager's security selection effect.
- **Trading effect** is a plug figure. The trading effect assumes any additional unexplained component of the portfolio return is due to the manager's trading activities. It is calculated as the total portfolio return less the other effects: the external interest rate effect, the interest rate management effect, the sector/quality management effect, and the security selection effect.

**Example: Management factors**

The table below outlines the performance attribution analysis for two fixed-income managers of the Helix fund for the year ended December 31, 2012:

**Performance Attribution Analysis**

| | *Alpha Asset Management* | *Alpha Asset Management* | *Bond Portfolio Benchmark* |
|---|---|---|---|
| 1. Interest rate effect | | | |
| i. Expected | 0.56 | 0.56 | 0.56 |
| ii. Unexpected | 0.66 | 0.66 | 0.66 |
| Subtotal | 1.22 | 1.22 | 1.22 |
| 2. Interest rate management effect | | | |
| iii. Duration | 0.18 | −0.17 | 0.00 |
| iv. Convexity | −0.07 | −0.07 | 0.00 |
| v. Yield-curve change | 0.10 | 0.18 | 0.00 |
| Subtotal | 0.21 | −0.06 | 0.00 |
| 3. Other management effects | | | |
| vi. Sector | −0.08 | 1.17 | 0.00 |
| vii. Bond selection | 0.16 | −0.13 | 0.00 |
| viii. Transaction costs | 0.00 | 0.00 | 0.00 |
| Subtotal | 0.08 | 1.04 | 0.00 |
| 4. Trading activity return | 0.09 | 0.10 | 0.00 |
| 5. Total return | 1.60 | 2.30 | 1.22 |

Alpha Asset Management states that its investment strategy is to outperform the index through active interest rate management and bond selection.

Beta Asset Management states its investment strategy is to immunize against interest rate exposure and to yield positive contribution through bond selection.

Assess whether both managers' positive performances were primarily through their stated objectives.

**Answer:**

Alpha's active management process yielded 38 basis points overall (subtotals of 2, 3, and 4). Twenty-one basis points were due to Alpha's interest rate management process (subtotal 2). Sixteen basis points were due to bond selection (category vii).

Thus, a substantial proportion of Alpha's positive contribution of 38 basis points came from its stated strategies of interest rate management and bond selection.

Although Beta has remained fairly neutral to interest rate exposure (–6 basis points), its main positive contribution has come from identifying undervalued sectors (117 basis points from category vi) rather than bond selection (–13 basis points from category vii).

Thus, the analysis seems to contradict Beta's stated aim of enhancing portfolio returns through bond selection.

## Risk-Adjusted Performance Measures

### LOS 41.p: Calculate, interpret, and contrast alternative risk-adjusted performance measures, including (in their ex post forms) alpha, information ratio, Treynor measure, Sharpe ratio, and $M^2$.

*CFA® Program Curriculum, Volume 6, page 164*

The final stage of the performance evaluation process is performance *appraisal*. Performance appraisal is designed to assess whether the investment results are more likely due to skill or luck. Should we hire or fire the manager? Risk-adjusted performance measures are one set of tools to use in answering such questions. Each of the following is **ex post**, meaning the actual return of the portfolio or manager is used to assess how well the manager did on a risk-adjusted basis. Five commonly used measures are:

1. Alpha (also known as Jensen's ex post alpha or ex post alpha).
2. The information ratio (IR).
3. The Treynor measure.
4. The Sharpe ratio.
5. $M^2$ (Modigliani and Modigliani).

1. **Ex post alpha.**

   Alpha is the difference between the actual return and the return required to compensate for systematic risk. Alpha uses the ex post security market line (SML) as a benchmark to appraise performance. Positive alpha suggests superior performance but the sponsor may also be concerned with the variability of alpha over time.

On an ex ante basis, the SML and CAPM project return to be:

$$\hat{R}_A = R_F + \beta_A\left(\hat{R}_M - R_F\right)$$

where:
$\hat{R}_A$ = expected return on the account (portfolio)
$R_F$ = risk-free rate of return
$\hat{R}_M$ = expected return on the market
$\beta_A$ = account's beta (systematic risk)

Using data on *actual returns* (i.e., historical rather than expected returns), a simple linear regression is used to calculate ex post alpha:

$$\alpha_A = R_{At} - \hat{R}_A$$

where:
$\alpha_A$ = ex post alpha on the account
$R_{At}$ = actual return on the account in period $t$
$\hat{R}_A = R_F + \beta_A\left(\hat{R}_M - R_F\right)$ = predicted account return

*Professor's Note: This may look mysterious but a Level III candidate will have done this a dozen times in the course of Level I and II. Calculate the expected return of a portfolio given its beta, the market return, and the risk-free rate over a past period. Subtract the result from the actual return of the portfolio. The difference is alpha. Also remember that graphically, positive alpha means the portfolio plots above the SML and negative alpha plots below.*

2. **The Treynor measure.**

The Treynor measure is related to alpha by using beta, a systematic measure of risk. Visually, a portfolio or manager with positive alpha will plot above the SML. If a line is drawn from the risk-free return on the vertical axis through the portfolio, Treynor is the slope of that line. That means a portfolio with positive alpha will have a Treynor measure that is greater than the Treynor of the market. A portfolio with negative alpha will have a Treynor that is less than the Treynor of the market.

$$T_A = \frac{\bar{R}_A - \bar{R}_F}{\beta_A}$$

where:
$\bar{R}_A$ = average account return
$\bar{R}_F$ = average risk-free return
$\beta_A$ = account beta

3. **The Sharpe ratio.**

   While the previous two ratios only consider systematic risk, Sharpe uses total risk (standard deviation). Sharpe would be plotted against the CML, which also assesses risk as standard deviation. The Sharp ratio of the market is the slope of the CML. For any portfolio the line between the risk-free rate and the intersection of that portfolio's return and standard deviation is its CAL and the slope of that portfolio's CAL is its Sharpe ratio. A superior manager will have a higher Sharpe than the market and a steeper CAL than the CML.

   Sharpe is similar to the Treynor measure in using excess return but the Sharpe ratio uses standard deviation for risk and Treynor uses beta.

$$S_A = \frac{\bar{R}_A - \bar{R}_F}{\sigma_A}$$

   where:
   $\bar{R}_A$ = average account return
   $\bar{R}_F$ = average risk-free return
   $\sigma_A$ = standard deviation of account returns

4. **The $M^2$ measure** (from Modigliani and Modigliani).

   $M^2$ also uses standard deviation as risk in the denominator and excess return in the numerator, which makes it very similar to Sharpe. $M^2$ measures the value added or lost relative to the market if the portfolio had the same risk (standard deviation) as the market. It measures the result of a hypothetical portfolio that uses leverage to increase risk and return if the portfolio has less risk than the market or lends at the risk-free rate to lower risk and return if the portfolio has more risk than the market:

$$M_P^2 = \bar{R}_F + \left(\frac{\bar{R}_P - \bar{R}_F}{\sigma_P}\right)\sigma_M$$

   where:
   $\bar{R}_P$ = average portfolio (account) return
   $\bar{R}_F$ = average risk-free return
   $\sigma_P$ = standard deviation of portfolio (account) returns
   $\sigma_M$ = standard deviation of the market index

5. **The information ratio.**

   The **information ratio** (IR) is quite similar to the Sharpe ratio in that excess return is measured against variability. For the IR, the excess return is the portfolio return less the return of an appropriate benchmark (rather than the risk-free rate). This

excess return is also called **active return**. The denominator of the IR is the standard deviation of the excess return in the numerator (also called **active risk**).

$$IR_A = \frac{\text{active return}}{\text{active risk}} = \frac{\bar{R}_A - \bar{R}_B}{\sigma_{A-B}}$$

where:
$\bar{R}_A$ = average account return
$\bar{R}_B$ = average benchmark return
$\sigma_{A-B}$ = standard deviation of excess returns measured as the difference between account and benchmark returns

*Professor's Note: The Sharpe ratio and the IR are even more similar than they appear. Both use a form of excess return for the numerator which is apparent from the formulas. Less obvious is that both use the standard deviation of their numerator for their denominator.*

*The Sharpe ratio uses the standard deviation of the portfolio in the denominator. However because the standard deviation of the risk-free asset in a single period is zero with a zero correlation to the portfolio return, the standard deviation of the portfolio is equal to the standard deviation of excess return used in the numerator of the Sharpe ratio.*

**Example: Risk-adjusted performance appraisal measures**

The data in the table below has been collected to appraise the performance of four asset management firms:

**Performance Appraisal Data**

| | *Fund 1* | *Fund 2* | *Fund 3* | *Fund 4* | *Market Index* |
|---|---|---|---|---|---|
| Return | 6.45% | 8.96% | 9.44% | 5.82% | 7.60% |
| Beta | 0.88 | 1.02 | 1.36 | 0.80 | 1.00 |
| Standard deviation | 2.74% | 4.54% | 3.72% | 2.64% | 2.80% |

The risk-free rate of return for the relevant period was 3%. **Calculate** and **rank** the funds using ex post alpha, Treynor measure, Sharpe ratio, and $M^2$.

**Answer:**

| *Evaluation Tool* | *Fund 1* | *Fund 2* | *Fund 3* | *Fund 4* |
|---|---|---|---|---|
| Alpha | 6.45 – 7.05 = –0.60% | 8.96 – 7.69 = 1.27 | 9.44 – 9.26 = 0.18 | 5.82 – 6.68 = –0.86 |
| Rank | 3 | 1 | 2 | 4 |
| Treynor | (6.45 – 3) / 0.88 = 3.92 | (8.96 – 3) / 1.02 = 5.84 | (9.44 – 3) / 1.36 = 4.74 | (5.82 – 3) / 0.80 = 3.53 |
| Rank | 3 | 1 | 2 | 4 |
| Sharpe | (6.45 – 3) / 2.74 = 1.26 | (8.96 – 3) / 4.54 = 1.31 | (9.44 – 3) / 3.72 = 1.73 | (5.82 – 3) / 2.64 = 1.07 |
| Rank | 3 | 2 | 1 | 4 |
| $M^2$ | 3 + (1.26 × 2.8) = 6.53% | 3 + (1.31 × 2.8) = 6.67% | 3 + (1.73 × 2.8) = 7.84% | 3 + (1.07 × 2.8) = 6.00% |
| Rank | 3 | 2 | 1 | 4 |

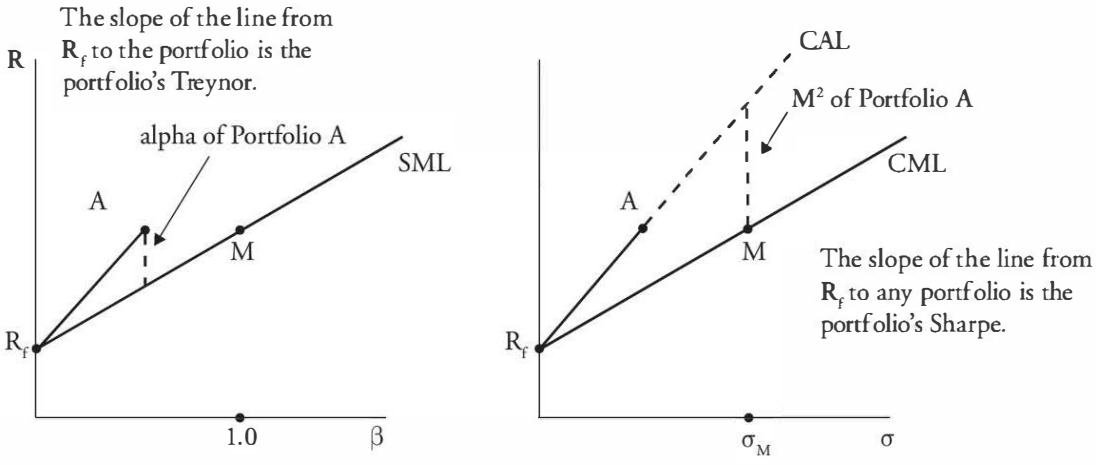
Note that the alpha and Treynor measures give the same rankings, and the Sharpe and $M^2$ measures give the same rankings. However, when comparing the alpha/Treynor rankings to the Sharpe/$M^2$ measures, funds 2 and 3 trade places.

Fund 2 has a much higher total risk (standard deviation) than Fund 3 but has a much lower beta. Relatively speaking, for Fund 2's total risk, a smaller proportion relates to systematic risk that is reflected in the low beta. Compared to Fund 3, it must have a bigger proportion of risk relating to non-systematic risk factors.

Hence, Fund 2 does better in the alpha and Treynor measures, as they only look at systematic risk (beta). It fairs less well when it comes to the Sharpe and $M^2$ measures that consider total risk.

## Summary Points

Figure 4: **Risk-Adjusted Measures**



- Alpha and Treynor both measure risk as systematic risk (beta). They will agree in that a manager with positive alpha will have a Treynor in excess of the market Treynor. They may not always agree in relative ranking. A manager with the highest alpha may not have the highest Treynor.
- Superior (inferior) Sharpe will mean superior (inferior) $M^2$. Both measure risk as total risk (standard deviation).
- Both Alpha and Treynor are criticized because they depend on beta and assumptions of the CAPM. The criticisms include (1) the assumption of a single priced risk rather than some form of multifactor risk pricing and (2) the use of a market proxy, such as the S&P 500, to stand for the market. Roll's critique shows that small changes in what is assumed to be the market can significantly change the alpha and Treynor calculations and even reverse the conclusions of superior or inferior performance and rankings.
- Measures like $M^2$ that use a benchmark are also subject to the criticism the benchmark used may not be precisely replicable. As a related issue, transaction cost to replicate the market or a custom benchmark are not considered.
- Any ex post calculation is a sample of true results and actual results can be different in the future. Even if results do reflect true manager skill, the manager can change approach or style in the future.
- Alpha, Treynor, and Sharpe are the more widely used measures.
- Also remember from Levels I and II that the highest relative return measure does not necessarily mean the highest return. For example, a very low risk portfolio with low beta or standard deviation could have a higher alpha and Sharpe but a very risky portfolio with lower alpha and Sharpe can still have the higher absolute return.

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**LOS 41.q: Explain how a portfolio's alpha and beta are incorporated into the information ratio, Treynor measure, and Sharpe ratio.**

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*CFA® Program Curriculum, Volume 6, page165*

*Professor's Note: This is an odd LOS. You will find no direct section of material to cover it in the CFA text. Reading between the lines of what is covered:*

- *Positive (negative) alpha will directly correlate to a portfolio Sharpe ratio that is higher than (below) the market Sharpe ratio.*
- *Beta is directly used in the Treynor measure as the measure of risk and indirectly used in the IR because the IR uses a benchmark in calculating excess return. The benchmark is selected as appropriate to the account's long-term objectives and the benchmark will reflect the appropriate systematic risk (one of which is beta) for the portfolio.*

## QUALITY CONTROL CHARTS

### LOS 41.r: Demonstrate the use of performance quality control charts in performance appraisal.

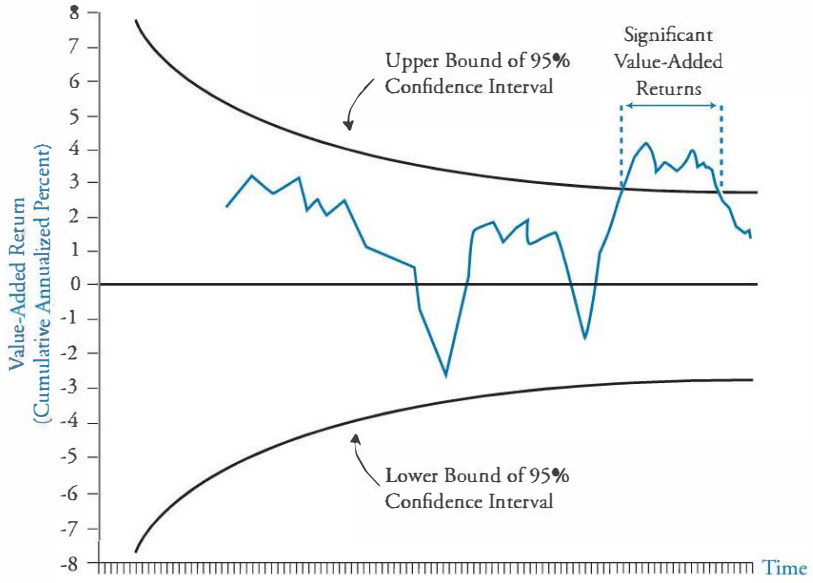
*CFA® Program Curriculum, Volume 6, page 168*

One way of evaluating performance results is through quality control charts. To construct a chart, three important assumptions are made about the distribution of the manager's value-added returns (i.e., the difference between the portfolio and benchmark returns):

1. The null hypothesis states the expected value-added return is zero.
2. Value-added returns are independent and normally distributed.
3. The investment process is consistent, producing more or less constant variability of the value-added returns (i.e., the distribution of the value-added returns about their mean is constant).

You will notice that these are assumptions we make in regression analysis. From these assumptions, a quality control chart is constructed, as in Figure 5.

**Figure 5: Example Quality Control Chart**




The manager's cumulative value-added return is plotted on the vertical axis, and time is plotted on the horizontal axis. You will notice that the center of the vertical axis is at zero, the event where the portfolio and benchmark returns are equal, so the value-added return is zero. The solid, horizontal line originating at zero can be thought of as the benchmark return, and any portfolio returns plotting off the horizontal line would represent those occasions when the portfolio and benchmark returns are not equal.

Management can plot the manager's cumulative value-added returns on the chart to determine whether they are randomly generated (happen by chance) or are derived through superior management. If deviations from the benchmark return are purely random, they should be distributed more or less randomly around the solid horizontal line (i.e., there will be no tendency for them to be positive or negative). If they tend to be consistently above or below the line, however, superior or inferior performance, respectively, could be indicated.

To this point, we have considered only the nominal value-added returns relative to the benchmark. We know from regression analysis, however, that we must also derive a measure of statistical significance (confidence). To do this, we calculate a *confidence interval* around the horizontal (zero value-added return) line. If the value-added return falls outside the confidence interval, we conclude that it is statistically different from zero.

The solid, cone-shaped-like lines surrounding the horizontal line in Figure 5 represent the *confidence interval.* The confidence interval is generated using the standard deviation of value-added returns and the empirical rule. For example, approximately 95% of all returns will fall within two standard deviations of the mean (zero in this case). When a value-added return falls outside the 95% confidence interval (see Figure 5), the null hypothesis is rejected. In other words, we say that the value-added return is statistically different from zero and, therefore, not the result of a random event.

## MANAGER CONTINUATION POLICY

**LOS 41.s: Discuss the issues involved in manager continuation policy decisions, including the costs of hiring and firing investment managers.**

*CFA® Program Curriculum, Volume 6, page 174*

The costs of hiring and firing investment managers can be considerable because the fired manager's portfolios will have to be moved to the new manager(s). This can be quite expensive, both in time and money:

1. A proportion of the existing manager's portfolio may have to be liquidated if the new manager's style is significantly different.

2. Replacing managers involves a significant amount of time and effort for the fund sponsor.

As a result, some fund sponsors have a formalized, written manager continuation policy (MCP) which will include the goals and guidelines associated with the management review process:

- Replace managers only when justified (i.e., minimize unnecessary manager turnover).
  - Short periods of underperformance should not necessarily mean automatic replacement.
- Develop formal policies and apply them consistently to all managers.

- Use portfolio performance and other information in evaluating managers:
  - Appropriate and consistent investment strategies (i.e., the manager doesn't continually change strategies based upon near-term performance).
  - Relevant benchmark (style) selections.
  - Personnel turnover.
  - Growth of the account.

Implementing the MCP process usually involves:

1. Continual manager monitoring.

2. Regular, periodic manager review.

The manager review should be handled much as the original hiring interview, which should have included the manager's key personnel. Then, before replacing a manager, management must determine that the move will generate value for the firm (like a positive NPV project). That is, the value gained from hiring a new manager will outweigh the costs associated with the process.

## Type I Errors and Type II Errors

### LOS 41.t: Contrast Type I and Type II errors in manager continuation decisions.

*CFA® Program Curriculum, Volume 6, page 177*

Type I and Type II errors refer to incorrectly rejecting or failing to reject the null hypothesis, respectively. Stating the null hypothesis as the manager generates no value-added and the alternative hypothesis as the manager adds value, there are two potential statistical errors:

$H_0$: The manager adds no value.

$H_A$: The manager adds positive value.

**Type I error**—Rejecting the null hypothesis when it is true. That is, keeping managers who are not adding value.

**Type II error**—Failing to reject the null when it is false. That is, firing good managers who are adding value.

**For the Exam:** To keep Type I and II errors straight, remember the phrase "Type I horn." That is, a Type I error is when you incorrectly reject the null hypothesis, H0. Putting "ho" with the first letters of reject null, you get the word "horn."

# KEY CONCEPTS

## LOS 41.a

**Fund sponsor's perspective:** Performance evaluation improves the effectiveness of a fund's investment policy by acting as a feedback and control mechanism. It:

- Shows where the policy is effective and where it isn't.
- Directs management to areas of underperformance.
- Indicates the results of active management and other policy decisions.
- Indicates where other, additional strategies can be successfully applied.
- Provides feedback on the consistent application of the policies set forth in the IPS.

**Investment manager's perspective:** As with the fund sponsor's perspective, performance evaluation can serve as a feedback and control mechanism. Some investment managers may simply compare their reported investment returns to a designated benchmark. Others will want to investigate the effectiveness of each component of their investment process.

## LOS 41.b

The three primary concerns to address when assessing the performance of an account are:

1. **The return performance of the account over the period.** This is addressed through performance measurement, which involves calculating rates of return based on changes in the account's value over specified time periods.

2. **How the manager(s) attained the observed performance.** This is addressed by performance attribution. This looks into the sources of the account's performance (e.g., sector or security selection) and the importance of those sources.

3. **Whether the performance was due to investment decisions.** This is addressed by performance appraisal. The objective is to draw conclusions regarding whether the performance was affected primarily by investment decisions, by the overall market, or by chance.

## LOS 41.c

The **time-weighted rate of return** (TWRR) calculates the compounded rate of growth over a stated evaluation period of one unit of money initially invested in the account. It requires a set of subperiod returns to be calculated covering each period that has an external cash flow. The subperiod results are then compounded together:

$$R_P = (1 + R_{s1})(1 + R_{s2})(1 + R_{s3})(1 + R_{s4})...(1 + R_{sk}) - 1$$

The **money-weighted rate of return** (MWRR) is the internal rate of return (IRR) on all funds invested during the evaluation period, including the beginning value of the portfolio:

$$MV_1 = MV_0(1+R)^m + \sum_{i=1}^{n} CF_i(1+R)^{L(i)}$$

The MWRR, unlike the TWRR, is heavily influenced by the size and timing of cash flows. The TWRR is the preferred method unless the manager has control over the size and timing of the cash flows. The MWRR will be higher (lower) than the TWRR if funds are added prior to a period of strong (weak) performance.

## LOS 41.d

The phrase "garbage in, garbage out" is quite appropriate for return calculations. That is, the calculated return is only as good (i.e., accurate) as the inputs. The following are potential problems relating to data quality:

- When accounts contain illiquid (infrequently priced) assets, estimates or educated guesses must sometimes be used to calculate returns.
- For many thinly-traded fixed-income securities, current market prices may not be available. Estimated prices may be derived from dealer quoted prices on securities with similar attributes. This is known as **matrix pricing**.
- Highly illiquid securities may be carried at cost or the price of the last trade, thus not reflecting the current price.
- Account valuations should include trade date accounting, including accrued interest and dividends.

## LOS 41.e

Portfolio return, *P*, can be broken into returns due to market, style, and active management:

$$P = M + S + A$$

where:
P = portfolio return
M = market index return
S = return to style
A = return due to active management
S = B – M
B = portfolio benchmark return
A = P – B

## LOS 41.f

A valid benchmark should meet the following criteria:

1. **Specified in advance**: The benchmark is known to both the investment manager and the fund sponsor. It is specified at the start of an evaluation period.

2. **Appropriate**: The benchmark is consistent with the manager's investment approach and style.

3. **Measurable**: Its value can be determined on a reasonably frequent basis.

4. **Unambiguous**: Clearly-defined identities and weights of securities constitute the benchmark.

5. **Reflective of current investment opinions**: The manager has current knowledge and expertise of the securities within the benchmark.

6. **Accountable**: The manager(s) should accept the applicability of the benchmark and be accountable for deviations in construction due to active management.

7. **Investable**: It is possible to replicate the benchmark and forgo active management.

There are seven primary types of benchmarks in use:

1. **Absolute**: An absolute benchmark is a return objective (e.g., aims to exceed a minimum return target).

2. **Manager universes**: The median manager or fund from a broad universe of managers or funds is used as the benchmark.

3. **Broad market indices**: There are several well-known broad market indices that are used as benchmarks (e.g., the S&P 500 for U.S. common stocks).

4. **Style indices**: Investment style indices represent specific portions of an asset category.

5. **Factor-model-based**: Factor models involve relating a specified set of factor exposures to the returns on an account.

6. **Returns-based**: Returns-based benchmarks are constructed using (1) the managed account returns over specified periods and (2) corresponding returns on several style indices for the same periods.

7. **Custom security-based**: A custom security-based benchmark reflects the manager's investment universe, weighted to reflect a particular approach.

### LOS 41.g

The construction of a custom security-based benchmark entails the following steps:

*Step 1:* Identify the important elements of the manager's investment process.
*Step 2:* Select securities that are consistent with that process.
*Step 3:* Weight the securities (including cash) to reflect the manager's process.
*Step 4:* Review and adjust as needed to replicate the manager's process and results.
*Step 5:* Rebalance the custom benchmark on a predetermined schedule.

### LOS 41.h

Using the median account as a benchmark has a number of drawbacks:

1. It fails several properties of a valid benchmark:
   - It is impossible to identify the median manager in advance.
   - It is ambiguous, as the median manager is unknown.
   - The benchmark is not investable.
   - It is impossible to verify the benchmark's appropriateness due to the ambiguity of the median manager.

2. Fund sponsors who choose to employ manager universes have to rely on the compiler's representations that the accounts within the universe have been screened, input data validated, and calculation methodology approved.

3. As fund sponsors will terminate underperforming managers, universes will be subject to "survivor bias." As consistently underperforming accounts will not survive, the median will be biased upwards. Without a valid reference point, evaluating manager performance using this benchmark becomes suspect.

## LOS 41.i

**Systematic bias:** There should be minimal systematic bias in the benchmark relative to the account.

**Tracking error:** Tracking error is defined as the volatility of the excess return earned due to active management.

**Risk characteristics:** An account's exposure to systematic sources of risk should be similar to those of the benchmark over time.

**Coverage:** The coverage ratio is the market value of the securities that are in both the portfolio and the benchmark as a percentage of the total market value of the portfolio.

**Turnover:** Passively managed portfolios should utilize benchmarks with low turnover.

**Positive active positions:** An active position is the difference between the weight of a security or sector in the managed portfolio versus the benchmark.

## LOS 41.j

The diversity of hedge funds has led to problems when designating a suitable benchmark. In most cases, hedge funds hold both short and long investment positions. This leads to performance measurement issues as well as administrative and compliance issues. Given these complications, other performance methods that may be more appropriate are:

1. **Value-added return**: One approach is to evaluate in terms of performance impact. A return can be calculated by summing up the performance impacts of the individual security positions, both long and short.

2. **Separate long/short benchmarks**: It may be possible to construct separate long and short benchmarks. These could then be combined in their relevant proportions to create an overall benchmark.

3. **The Sharpe ratio**: The confusion over exactly what constitutes a hedge fund, as well as the myriad strategies employed by hedge fund managers, has led to the popular use of the Sharpe ratio, which compares portfolio returns to a risk-free return rather than a benchmark.

## LOS 41.k

The basic concept of performance attribution is to identify and quantify the sources of returns that are different from the designated benchmark. There are two basic forms of performance attribution:

1. Macro performance attribution is done at the fund sponsor level. The approach can be carried out in percentage terms (a rate-of-return metric) and/or in monetary terms (a value metric).

2. Micro performance attribution is used by both fund managers (to analyze the performance of the individual portfolio managers they use) and the portfolio managers themselves (to determine sources of excess returns). Note the distinction does not relate to who is carrying out the performance attribution, but rather to the variables being used.

There are three main inputs into the macro attribution approach:

1. **Policy allocations**: It is up to the sponsor to determine the asset categories and weights as well as to allocate the total fund among asset managers. As in any IPS development, allocations will be determined by the sponsor's risk tolerance, long-term expectations, and the liabilities (spending needs) the fund must meet.

2. **Benchmark portfolio returns**: A fund sponsor may use broad market indices as the benchmarks for asset categories and narrowly-focused indices for managers' investment styles.

3. **Fund returns, valuations, and external cash flows**: When using percentage terms, returns will need to be calculated at the individual manager level. This enables the fund sponsor to make decisions regarding manager selection.

If also using monetary values, account valuation and external cash flow data are needed to compute the value impacts of the fund sponsor's investment policy decision making.

## LOS 41.l

### Macro Attribution Analysis

There are six levels of investment policy decision-making, by which the fund's performance can be analyzed:

1. Net contributions.

2. Risk-free asset.

3. Asset categories.

4. Benchmarks.

5. Investment managers.

6. Allocation effects.

The levels represent investment strategies management can utilize to add value to the fund; these levels increase in risk, expected return, and tracking error as one progresses down the list.

### Micro Attribution Analysis

Micro performance attribution consists of analyzing individual portfolios relative to designated benchmarks. The value-added return (portfolio return minus benchmark

return) can be broken into three components: (1) pure sector allocation, (2) allocation/selection interaction, and (3) within-sector selection.

$$R_V = \underbrace{\sum_{j=1}^{S}\left(w_{P,j} - w_{B,j}\right)\left(R_{B,j} - R_B\right)}_{\text{pure sector allocation}} + \underbrace{\sum_{j=1}^{S}\left(w_{P,j} - w_{B,j}\right)\left(R_{P,j} - R_{B,j}\right)}_{\text{allocation/selection interaction}} + \underbrace{\sum_{j=1}^{S} w_{B,j}\left(R_{P,j} - R_{B,j}\right)}_{\text{within-sector selection}}$$

## LOS 41.m

It should be possible to construct multifactor models to conduct micro attribution. This involves combining economic sector factors with other fundamental factors. Constructing a suitable factor model would involve the following:

- Identify the fundamental factors that will generate systematic returns.
- Determine the exposures of the portfolio and the benchmark to the fundamental factors at the start of the evaluation period.
- Determine the manager's active exposure to each factor.
- Determine the active impact. This is the added return due to the manager's active exposures.

The results of the fundamental factor micro attribution will indicate the source of portfolio returns, based upon actual factor exposures versus the manager's normal factor exposures (e.g., sector rotation), the manager's ability to time the market (e.g., adjust the portfolio beta and/or duration in response to market expectations), and so on.

## LOS 41.n

Attribution analysis of a fixed-income portfolio amounts to comparing the return on the active manager's portfolio to the return on a passively managed, risk-free portfolio. The difference between the two can be attributed to the effects of the external interest rate environment and the manager's contribution.

1. Effect of the external interest environment:
   - Return on the default-free benchmark assuming no change in the forward rates.
   - Return due to the actual changes in interest rates.

2. Contribution of the management process:
   - Return from interest rate management.
   - Return from sector/quality management.
   - Return from the selection of specific securities.
   - Return from trading activity.

## LOS 41.o

The manager's contribution to the portfolio return (i.e., the return to active management) can be divided into four components:

1. **Interest rate management effect**: The ability of the manager to predict changes in relevant interest rates.

2. **Sector/quality effect**: The ability of the manager to select and overweight (underweight) outperforming (underperforming) sectors and qualities.

3. **Security selection effect**: The ability of the manager to select superior securities to represent sectors.

4. **Trading activity**: The residual effect; assumed to measure the return to active trading (buying and selling) over the period.

### LOS 41.p

The final stage of the performance evaluation process, performance appraisal, measures compare returns on a risk-adjusted basis. The following are five methods of performance appraisal in their ex post (historical) forms:

1. **Ex post alpha (Jensen's alpha)**: Alpha is the difference between the account return and the return required to compensate for systematic risk. Alpha uses the ex post SML as a benchmark to appraise performance.

2. **Information ratio**: Excess return is measured against variability.

3. **The Treynor measure**: The Treynor measure calculates the account's excess return above the risk-free rate, relative to the account's beta (i.e., systematic risk).

4. **The Sharpe ratio**: Unlike the previous two methods, the Sharpe ratio calculates excess returns above the risk-free rate, relative to total risk measured by standard deviation.

5. $M^2$: Using the CML, $M^2$ compares the account's return to the market return if the two had equal risk.

### LOS 41.q

Positive (negative) alpha will directly correlate to a portfolio Sharpe ratio that is higher than (below) the market Sharpe ratio.

Beta is directly used in Treynor as the measure of risk and indirectly used in the IR because IR uses a benchmark in calculating excess return. The benchmark is selected as appropriate to the accounts long-term objectives, and the benchmark will reflect the appropriate systematic risk (one of which is beta) for the portfolio.

### LOS 41.r

Quality control charts plot managers' performance relative to a benchmark, with a statistical confidence interval.

The manager's value-added return is plotted on the vertical axis, and time is plotted on the horizontal axis. The center of the vertical axis is where the portfolio and benchmark returns are equal, so the value-added return is zero. The solid, horizontal line originating at zero can be thought of as the benchmark return, and any portfolio returns plotting off the horizontal line would represent those occasions when the portfolio and benchmark returns are not equal.

Management can plot the manager's value-added returns on the chart to determine whether they are randomly generated or are derived through superior management.

If they tend to be consistently above or below the line, this could indicate superior or inferior performance, respectively.

### LOS 41.s

Some fund sponsors have a formalized, written manager continuation policy (MCP) which includes the goals and guidelines associated with the management review process:

- Replace managers only when justified (i.e., minimize unnecessary manager turnover).
  - Short periods of underperformance should not necessarily mean automatic replacement.
- Develop formal policies and apply them consistently to all managers.
- Use portfolio performance and other information in evaluating managers:
  - Appropriate and consistent investment strategies (i.e., the manager doesn't continually change strategies based upon near term performance).
  - Relevant benchmark (style) selections.
  - Personnel turnover.
  - Growth of the account.

### LOS 41.t

Type I and Type II errors refer to incorrectly rejecting or failing to reject the null hypothesis, respectively. Stating the null hypothesis as the manager generates no value-added and the alternative hypothesis as the manager adds value, there are two potential statistical errors:

$H_0$: The manager adds no value.

$H_A$: The manager adds positive value.

**Type I error**—Rejecting the null hypothesis when it is true. That is, keeping managers who are returning no value-added.

**Type II error**—Failing to reject the null when it is false. That is, firing good managers who are adding value.

## CONCEPT CHECKERS

1. The Helix account was valued at $6,000,000 at start of the month. At the month-end, its value is $6,380,000. The account received a contribution of $80,000.

   **Calculate** the rate of return for the month under the following conditions:
   (a) The contribution was received at the start of the month.
   (b) The contribution was received at the end of the month.

2. The Genesis account is valued at $1,000,000 at the start of the month and $1,200,000 at the end. During the month, there was a cash inflow of $30,000 on day 11 and $20,000 on day 17. The values of the account are $1,050,000 and $1,150,000 on days 11 and 17, respectively. **Calculate** the time-weighted rate of return (assuming 30 days in the month).

3. The Pygmalion account is valued at $750,000 at the start of the month. On day 22, a contribution of $20,000 is made. At the end of the month, the account is worth $1,266,513. Assuming 30 days in a month, the daily MWRR is *closest* to:
   A. 1.5%.
   B. 1.7%.
   C. 1.9%.

4. Answer the following questions relating to rate of return calculations:
   (a) **Outline** the advantages and disadvantages of the time-weighted rate of return and the money-weighted rate of return.

   (b) If daily valuations are unavailable, **describe** a method that is an approximate estimate to the time-weighted rate of return.

   (c) **Discuss** circumstances where there could be significant differences between the time-weighted and money-weighted rates of return.

5. Rhombus Asset Management runs a U.S. small-cap equity portfolio. The portfolio generated an 8.9% return during 2005. Rhombus uses the Russell 2000® Index as the most appropriate benchmark. The Russell 2000® Index yielded 9.1% over the same evaluation period. The Wilshire 5000, a broad U.S. equity market index, yielded 8.5% over the same evaluation period.

   **Calculate** Rhombus Asset Management's return due to style and due to active management. Assess Rhombus's performance compared to the benchmark and to the market.

6. **List** and discuss the seven characteristics for a benchmark to effectively evaluate management performance.

7. Hexagon PLC is an investment management company based in London. It manages portfolios consisting of European equities only. It states that its benchmark is to beat the median manager. **Discuss** the validity of the median manager benchmark approach.

8. **Discuss** the problems associated with applying traditional performance measurement and evaluation techniques to a long-short hedge fund and **suggest** alternative measures that may be more appropriate.

9. **Distinguish** between macro and micro attribution, including their inputs.

10. The following is an extract from a micro attribution analysis of one of the investment managers of the Hiatus fund:

| *Economic Sectors* | *Portfolio Weight (%)* | *Sector Benchmark Weight (%)* | *Portfolio Return (%)* | *Sector Benchmark Return (%)* |
|---|---|---|---|---|
| Energy | 8.38 | 7.72 | 3.55 | 3.32 |
| Financial | 15.48 | 13.42 | 1.66 | 1.10 |
| Technology | 17.89 | 22.01 | 3.21 | 3.18 |

*The overall benchmark return was 2.32%.

Using the above table, **calculate** and **evaluate**:

(i) The pure sector allocation return for the energy sector.

(ii) The within-sector selection return for the financial sector.

(iii) The allocation/selection interaction return for the technology sector.

11. (i) **Explain** management factors contributing to a fixed-income portfolio's total return.

(ii) Delta Asset Management states that its investment strategy is to outperform the index through active interest rate management and identifying undervalued sectors. Kappa Asset Management states its investment strategy is to immunize against interest rate exposure and to yield positive contribution through bond selection. Using the data in the table, assess whether both managers' positive performance was primarily through their stated objectives.

| | *Delta Asset Management* | *Kappa Asset Management* | *Bond Portfolio Benchmark* |
|---|---|---|---|
| 1. Interest rate effect | | | |
| i. Expected | 0.49 | 0.49 | 0.49 |
| ii. Unexpected | 0.59 | 0.59 | 0.59 |
| **Subtotal** | 1.08 | 1.08 | 1.08 |
| 2. Interest rate management effect | | | |
| iii. Duration | −0.12 | 0.23 | 0.00 |
| iv. Convexity | −0.02 | −0.03 | 0.00 |
| v. Yield-curve change | 0.10 | 0.16 | 0.00 |
| **Subtotal** | −0.04 | 0.36 | 0.00 |
| 3. Other management effects | | | |
| vi. Sector | 1.02 | 0.04 | 0.00 |
| vii. Bond selection | 0.08 | 0.23 | 0.00 |
| viii. Transaction costs | 0.00 | 0.00 | 0.00 |
| **Subtotal** | 1.10 | 0.27 | 0.00 |
| 4. Trading activity return | 0.05 | 0.07 | 0.00 |
| 5. Total return | 2.19 | 1.78 | 1.08 |

12. The following data has been collected to appraise the following four funds:

| | *Fund A* | *Fund B* | *Fund C* | *Fund D* | *Market Index* |
|---|---|---|---|---|---|
| Return | 8.25% | 7.21% | 9.44% | 10.12% | 8.60% |
| Beta | 0.91 | 0.84 | 1.02 | 1.34 | 1.00 |
| Standard deviation | 3.24% | 3.88% | 3.66% | 3.28% | 3.55% |
| Tracking error* | 0.43% | 0.62% | 0.33% | 1.09% | |

* Tracking error is the standard deviation of the difference between the Fund Return and the Market Index Return.

The risk-free rate of return for the relevant period was 4%. **Calculate** and rank the funds using the following methods:

(i) Jensen's alpha

(ii) Treynor measure

(iii) Sharpe ratio

(iv) $M^2$

(v) Information ratio

**Compare** and **contrast** the methods and **explain** why the ranking differs between methods.

13. The Solus fund is in the process of implementing a Manager Continuation Policy in order to avoid excessive manager turnover yet remove inferior managers as required. At the moment, Solus believes it is being a bit too conservative and retaining managers even though they are producing weak performance. **State** and **explain** the type of statistical error Solus is currently making. Briefly **explain** the other kind of error Solus could make.

14. For a given portfolio over a particular time period, an analyst is given beginning market value, ending market value, and a specified cash flow. All of the given values are positive with a positive return for the year. The analyst represents the return for the period calculated as if the one cash flow came at the beginning of the period with the symbol $R_B$ and represents the return calculated as if the cash flow came at the end of the period with the symbol $R_E$. Based only on the given information:
    A. $R_B > R_E$.
    B. $R_B = R_E$.
    C. $R_B < R_E$.

15. For a passively-managed portfolio, with respect to managing the portfolio and choosing the best benchmark, a manager would want a:
    A. low coverage ratio of the chosen benchmark, which has a low turnover ratio.
    B. low coverage ratio of the chosen benchmark, which has a high turnover ratio.
    C. high coverage ratio of the chosen benchmark, which has a low turnover ratio.

16. **Specify** one way each for how fundamental factor model micro attribution is similar to and different from a returns-based style analysis.

17. In calculating the Treynor and Sharpe measures for a given portfolio, other things constant, lowering unsystematic risk will *most likely*:
A. increase both the Treynor measure and Sharpe measures.
B. increase the Treynor measure but not the Sharpe measure.
C. increase the Sharpe measure but not the Treynor measure.

18. A standard deviation measure appears in:
A. the Sharpe measure but not the information ratio.
B. the information ratio but not the Sharpe measure.
C. both the information ratio and the Sharpe measure.

19. An analyst examines a quality control chart that depicts a manager's value-added return. The manager's value-added return is plotted on the vertical axis over time, which is on the horizontal axis. Above and below the horizontal axis are two confidence interval bounds. The analyst will say that the manager has *added* significant value when the plot of the manager's performance is:
A. above zero only.
B. below zero and below the lower bound of the 95% confidence interval.
C. above zero and above the upper bound of the 95% confidence interval.

## ANSWERS – CONCEPT CHECKERS

1. If the contribution of $80,000 had been at the start of the month:

$$r_t = \frac{\$6{,}380{,}000 - (\$6{,}000{,}000 + \$80{,}000)}{\$6{,}000{,}000 + \$80{,}000} \times 100 = 4.93\%$$

If the $80,000 contribution had occurred at the month end:

$$r_t = \frac{(\$6{,}380{,}000 - \$80{,}000) - \$6{,}000{,}000}{\$6{,}000{,}000} \times 100 = 5.00\%$$

2. Calculating rates of return for each subperiod:

Subperiod 1 (days 1–11)

$r_{t,1}$ = [($1,050,000 – $30,000) – $1,000,000] / $1,000,000 = 0.02

Subperiod 2 (days 12–17)

$r_{t,2}$ = [($1,150,000 – $20,000) – $1,050,000] / $1,050,000 = 0.0762

Subperiod 3 (days 18–30)

$r_{t,3}$ = ($1,200,000 – $1,150,000) / $1,150,000 = 0.0435

Compounding the returns together to calculate an overall time-weighted rate of return:

TWRR = (1 + 0.02)(1 + 0.0762)(1 + 0.0435) – 1 = 0.1455 = 14.55%

3. B For the daily MWRR, the following equation needs to be solved:

$$\$1{,}266{,}513 = \$750{,}000(1 + R)^{30} + \$20{,}000(1 + R)^{8}$$

Using a trial and error process, the closest rate of return that equates the above formula is R = 0.017. (Note: Most calculators are unable to solve for an IRR when the time intervals between cash flows are unequal. If you are asked to perform a MWRR calculation on the exam, the time intervals will be equal.)

$$\$750{,}000(1.017)^{30} + \$20{,}000(1.017)^{8} = \$1{,}266{,}513$$

4. **TWRR**

(a) The following outlines advantages and disadvantages of the TWRR and the MWRR:

**Advantages**

(i) The TWRR is not influenced by external cash flow activity. Therefore, it reflects what return an investor would achieve if he had placed the funds in the account at the start of the evaluation period.

(ii) As most investment managers have very little control over external cash activity, the TWRR would be an appropriate measure.

**Disadvantages**

(i) Account valuations are needed for every date an external cash flow takes place.

(ii) Administration costs may be higher as, potentially, daily valuations are required.

**MWRR**

Advantages

(i) The MWRR would be more appropriate if the investment manager retains control over external cash flows.

(ii) Only valuations at the start and end of the evaluation period are required.

**Disadvantages**

(i) The MWRR is sensitive to the size and timing of external cash flows.

(ii) If an investment manager has little or no control over the size or timing of external cash flows, the TWRR would be more appropriate.

(b) The TWRR can be approximated by calculating the MWRR over frequent time intervals and then chain-link those returns over the evaluation period. This process is known as the linked internal rate of return (LIRR).

(c) If the external cash flows are relatively large compared to the account's value, and the account's performance is varying considerably, there can be a significant difference between the TWRR and MWRR.

If funds are invested into an account prior to a period of strong (weak) performance, then the MWRR will be higher (lower) than the TWRR as the contribution is being invested just prior to the subperiod earning a high (low) growth rate.

5. Style return = B – M = 9.1% – 8.5% = +0.6%

Active management return = P – B = 8.9% – 9.1% = –0.2%

The positive style return tells us small-cap stocks outperformed the market as a whole.

However, the negative active management return tells us Rhombus has underperformed its benchmark for the evaluation period in question. Consistently underperforming the benchmark would bring Rhombus's investment management skills under question.

6. The following criteria are required from a benchmark to effectively evaluate performance:
   - *Specified in advance.* The benchmark is known and specified at the start of an evaluation period.
   - *Appropriate.* The benchmark is consistent with the manager's investment style.
   - *Measurable.* It can be calculated on a reasonably frequent basis.
   - *Unambiguous.* The identities and weights of securities constituting the benchmark are clearly defined.
   - *Reflective of current investment opinions.* The manager has current knowledge of the securities within the benchmark.
   - *Accountable.* The investment manager should be aware of and accept accountability of the constituents and performance of the benchmark (i.e., the manager exhibits ownership).
   - *Investable.* It is possible to replicate the benchmark and forgo active management.

7. To assess the validity of a benchmark, use the letters from the word "SAMURAI." The benchmark should be:

   *Specified in advance:* The median manager cannot be specified in advance.

   *Appropriate:* It is not possible to verify if the benchmark as the median manager is unknown.

   *Measurable:* The median manager's return can be calculated on a frequent basis.

   *Unambiguous:* The median manager is unknown and therefore ambiguous.

   *Reflective of current investment opinions:* Again, as the median manager is unknown, it is impossible to verify this.

   *Accountable:* It is also impossible to verify the benchmark's *appropriateness* due to the ambiguity of the median manager.

   *Investable:* The benchmark is not *investable,* as the median account will differ from one evaluation period to another.

8. Problems with using traditional techniques to assess long-short hedge funds include:
   - It is possible for $MV_0$ to be zero for a long-short portfolio, making the return calculation nonsensical.
   - Many hedge funds use an "absolute return" approach, which makes relative performance comparisons with a traditional benchmark less useful.

   Alternative performance methods that can be used instead:

   A. **Value-added return.**

      This method evaluates in terms of performance impact:

      value-added return = portfolio return – benchmark return

      To replicate a zero net asset hedge fund, the value-added return on a long-short portfolio will be where the active weights sum to zero. Although the active weights sum to zero, a return can be calculated by summing up the performance impacts of the individual security positions, both long and short.

   B. **Creating separate long/short benchmarks.**

      It may be possible to use either a returns-based or security-based benchmark approach to construct separate long and short benchmarks. The benchmarks could then be combined in their relevant proportions to create an appropriate overall benchmark.

   C. **The Sharpe ratio.**

      The Sharpe ratio measures the excess return over a risk-free rate of return, relative to volatility (risk) of returns. A hedge fund's Sharpe ratio can be compared to that of a universe of other similar hedge funds.

9. (i) Macro attribution is performance attribution carried out at the fund sponsor level. Micro attribution is performance attribution carried out at the investment manager level (i.e., to attribute the performance of an individual manager). The distinction relates to the decision variables being used, not who is carrying out the attribution analysis, as micro attribution is often employed by fund managers and portfolio managers.

(ii) Macro attribution analysis uses a value metric that uses account valuation and external cash flow data to calculate rates of return and dollar impacts. Micro performance attribution analysis uses a rate of return metric that calculates percentage returns at the level of the individual manager account.

(iii) There are three inputs into both approaches:

Macro attribution:
1. Policy allocations.
2. Benchmark portfolio returns.
3. Fund returns, valuations, and external cash flows.

Micro attribution:
1. Pure sector allocation.
2. Allocation selection.
3. Within-sector selection.

10. (i) Pure energy sector allocation = $[(0.0838 - 0.0772) \times (3.32\% - 2.32\%)] = 0.0066\%$

This shows that the decision to overweight a sector that performed better than the overall benchmark resulted in a positive contribution to portfolio performance.

(ii) Financial sector within-sector allocation return = $0.1342 \times (1.66\% - 1.10\%) = +0.0752\%$

The positive contribution shows that the Hiatus portfolio held financial stocks that performed better than the financial stocks contained in the sector benchmark.

(iii) Technology sector allocation/selection interaction return = $[(0.1789 - 0.2201) \times (3.21\% - 3.18\%)] = -0.0012\%$

Underweighting the portfolio in the technology sector when the fund performed better than the sector benchmark has led to a negative contribution.

11. (i) There are four management factors contributing to a fixed-income portfolio's return:

1. Interest rate management effect—this indicates how well the manager predicts interest rate changes.

2. Sector/quality effect—this effect measures the manager's ability to select the best issuing sectors and quality groups.

3. Security selection effect—this measures how the return of a specific security within its sector relates to the average performance of the sector.

4. Trading activity—this encompasses the effect of sales and purchases of bonds over a given period.

(ii) **Delta**

Delta has yielded an overall positive contribution of 111 basis points through active management (subtotals 2, 3, and 4). Most of this positive contribution has come from sector management (102 basis points). Delta actually made a negative contribution of –4 basis points from active interest rate management.

Thus, the statement that Delta's strategy is to outperform the index through active interest rate management (incorrect) and identifying undervalued sectors (correct) appears to be only partially correct.

**Kappa**

Kappa has yielded 70 basis points overall through active management. This has primarily come from active interest rate management (36 basis points) and bond selection (23 basis points).

Thus, the statement that Kappa's strategy is to immunize against interest rate exposure (incorrect) and to yield positive contribution through bond selection (correct) is also partially correct.

12. Jensen's alpha and the Treynor measure will give the same ranking:

| | *Fund A* | *Fund B* | *Fund C* | *Fund D* |
|---|---|---|---|---|
| Alpha | 8.25% – 8.19% = +0.06% | 7.21% – 7.86% = –0.65% | 9.44% – 8.69% = +0.75% | 10.12% – 10.16% = –0.04% |
| Ranking | 2 | 4 | 1 | 3 |
| Treynor | (8.25 – 4) / 0.91 = 4.67 | (7.21 – 4) / 0.84 = 3.82 | (9.44 – 4) / 1.02 = 5.33 | (10.12 – 4) / 1.34 = 4.57 |
| Ranking | 2 | 4 | 1 | 3 |

The Sharpe ratio and $M^2$ will give the same ranking:

| | *Fund A* | *Fund B* | *Fund C* | *Fund D* |
|---|---|---|---|---|
| Sharpe | (8.25 – 4) / 3.24 = 1.31 | (7.21 – 4) / 3.88 = 0.83 | (9.44 – 4) / 3.66 = 1.49 | (10.12 – 4) / 3.28 = 1.87 |
| Ranking | 3 | 4 | 2 | 1 |
| $M^2$ | 4 + [(8.25 – 4) / 3.24] 3.55 = 8.65% | 4 + [(7.21 – 4) / 3.88] 3.55 = 6.95% | 4 + [(9.44 – 4) / 3.66] 3.55 = 9.29% | 4 + [(10.12 – 4) / 3.28] 3.55 = 10.64% |
| Ranking | 3 | 4 | 2 | 1 |

The notable change in ranking between Alpha/Treynor and Sharpe/$M^2$ is Fund D. Fund D has a relatively low total risk (standard deviation of 3.28%) but a relatively high beta (1.34). This implies that Fund D has a high proportion of systematic risk but very little non-systematic risk.

| | *Fund A* | *Fund B* | *Fund C* | *Fund D* |
|---|---|---|---|---|
| IR | (8.25% – 8.60%) / 0.43% = –0.81 | (7.21% – 8.60%) / 0.62% = –2.24 | (9.44% – 8.60%) / 0.33% = 2.55 | (10.12% – 8.60%) / 1.09% = 1.39 |
| Ranking | 3 | 4 | 1 | 2 |

The ranks based upon the information ratio are similar to that of the Sharpe and $M^2$ measures. This is because the measure of risk in the denominator is related to other measures of dispersion, and the information ratio uses the average return in the numerator, as do the other measures.

13. Solus is currently making a **Type I error**. A Type I error is incorrectly rejecting the null hypothesis. In management assessment, the null hypothesis is, "The manager contributes no value-added returns," or, "The manager's value-added returns are zero." Rejecting the null would imply that the manager generates positive value-added returns. The error is that inferior managers are kept when they should be removed.

    The other type of error Solus could make is a **Type II error**, which is failing to reject the null hypothesis when it is false. This is when good managers are removed when they should have been kept.

14. **C** The cash flow is subtracted out of the numerator in both cases. If the cash flow comes at the beginning of the period, it is added to the denominator and decreases the measure of return even more.

15. **C** The coverage ratio is the market value of the securities that are in both the portfolio and the benchmark, specified as a percentage of the total market value of the portfolio. The higher the coverage ratio, the more closely the manager is replicating the benchmark. Benchmark turnover is the proportion of the benchmark's total market value that is bought or sold (turned over) during periodic rebalancing. Passively-managed portfolios should utilize benchmarks with low turnover.

16. The methods are *similar* in that they both use the following initial steps in constructing a suitable factor model:
    - Identify the fundamental factors that will generate systematic returns.
    - Determine the exposures of the portfolio and the benchmark to the fundamental factors.
    - Determine the performance of each of the factors.

    In this way, the fundamental factor model micro attribution results will look very similar to a returns-based style analysis and can be determined the same way (e.g., the returns to the portfolio are regressed against the returns to several different indices to determine the factor exposures).

    The primary *difference* between them is the use of other fundamental factors (e.g., management's use of leverage, market timing, sector rotation, the size of the firm, and so on) that would not ordinarily be used in a returns-based style analysis.

17. **C** The Treynor measure uses only systematic risk (i.e., beta) in the denominator, so lowering the unsystematic risk of the asset in question will have no affect on the Treynor measure. The Sharpe ratio uses standard deviation, which includes both unsystematic and systematic risk. Lowering unsystematic risk, therefore, will lower the denominator and increase the Sharpe ratio.

18. **C** The Sharpe measure uses the standard deviation of the returns in the denominator, and the information ratio uses the standard deviation of the excess return. Although they measure standard deviation differently, they both incorporate a standard deviation measure.

19. **C** A quality control chart combines the average value added and its standard deviation to generate a confidence interval that can be used to determine statistical significance. The upper and lower confidence interval bounds are indicated with lines on the quality control chart. When the value added is above the upper bound of the confidence interval (i.e., outside the confidence interval), it means that we can reject the null hypothesis that the value was achieved by chance. We can conclude that the manager added value to the portfolio with her trading strategies.

The following is a review of the Performance Evaluation principles designed to address the learning outcome statements set forth by CFA Institute. This topic is also covered in:

# GLOBAL PERFORMANCE EVALUATION

Study Session 17

## EXAM FOCUS

Understand and be able to perform a global performance attribution. You should also understand risk measurement in a global context and the concept of risk budgeting. The likelihood of performance evaluation being tested on the exam is high.

## CURRENCY MOVEMENTS AND PORTFOLIO RETURNS

### LOS 42.a: Evaluate the effect of currency movements on the portfolio rate of return, calculated in the investor's base currency.

*CFA® Program Curriculum, Volume 6, page 199*

*Professor's Note: Throughout the Level III curriculum, the currency in which the investment is denominated is referred to as the local currency and the investor's home currency as the domestic currency. In this LOS, the investor's currency is referred to as the base currency. Accordingly, throughout this review, I refer to the investor's currency as the domestic and/or base currency and the currency of the foreign investment as the local or foreign currency.*

A foreign currency-denominated investment represents an investment in the underlying asset and the local currency. Therefore, the return on a foreign investment must be converted to return in the domestic (base) currency. A high return in a foreign currency asset can be more than offset by a decline in the value of the currency.

For a purely domestic portfolio, the return on the portfolio can be broken down into capital gains (price change) and cash flow yield (dividends or coupons):

$$R_j = CG_j + CF_j$$

where:
$R_j$ = return on asset $j$
$CG_j$ = capital gain/loss on asset $j$
$CF_j$ = cash flow yield (dividend or coupon yield) for asset $j$

For a global portfolio, the equation must be modified to capture the effects of currency value fluctuations:

$$R_{j,d} = CG_j + CF_j + C_j$$

where:
$R_{j,d}$ = return on asset *j* in the domestic (base) currency
$C_j$ = return due to currency movements = $e_j(1 + CG_j + CF_j)$
$e_j$ = percentage change in the value of currency *j*

*Professor's Note: The percentage change in the value of currency j, denoted $e_j$, is multiplied by $(1 + CG_j + CF_j)$ because the change in the value of the currency must be reflected in the original principal invested, the capital gain, and the cash flow.*

**Example: Global portfolio currency component**

XYZ Fund invested $100 million in the UK-based FT index on January 1, 2005. By December 31, 2005, the index had appreciated by 10%, and the pound had depreciated 3% against the U.S. dollar. Assuming no dividend yield, what is the return of the fund in U.S. dollars?

**Answer:**

*Note: The domestic (base) currency is the U.S. dollar, and the local (foreign) currency is the British pound.*

$CG_j = 0.10$; $CF_j = 0$; $e_j = -0.03$

$C_j = e_j(1 + CG_j + CF_j) = -0.03(1 + 0.10 + 0) = -0.033$

$R_{j,d} = CG_j + CF_j + C_j = 0.10 + 0 - 0.033 = 0.067$ or 6.70%

Alternatively, the return in USD can be found by compounding the local capital gains return, $CG_j$, by the currency effect, $e_j$:

$$R_{j,d} = (1 + CG_j)(1 + e_j) - 1 = (1 + 0.10)(1 - 0.03) - 1 = 0.067$$

In the local (foreign) currency, the fund earned a return of 10%, but due to currency depreciation, the fund only earned 6.70% in the domestic (base) currency.

*Professor's Note: Because the investment earned 10.0% and the currency depreciated 3.0%, you might be tempted to say the domestic return is 7.0%. However, the currency effect is –3.3%, not –3.0%. This is due to depreciation of the initial investment and the pound-denominated return, both of which must be converted back into dollars. That is, the initial investment depreciated 3% and the return (10%) also depreciated 3%, which contributed (0.03)(0.10) = 0.003 = 0.3% to the overall decline in value upon conversion to U.S. dollars.*

**For the Exam:** The LOS asks you to evaluate the effect of currency movements on the portfolio return. Thus, be prepared to calculate the $C_j$ terms when provided with the other input data. In other words, given the total return in the local currency (or its components) and the change in the currency, be able to perform the middle calculation in the example.

## GLOBAL RETURN DECOMPOSITION AND ATTRIBUTION

**LOS 42.b: Explain how portfolio return can be decomposed into yield, capital gains in local currency, and currency contribution.**

*CFA® Program Curriculum, Volume 6, page 200*

**LOS 42.c: Explain the purpose of global performance attribution and calculate the contributions to portfolio performance from market allocation, currency allocation, and security selection.**

*CFA® Program Curriculum, Volume 6, page 202*

**For the Exam:** LOS 42.c asks you specifically to calculate the three components of global portfolio performance attribution. For the exam, I recommend that you memorize the formulas and be able to calculate each when provided with necessary inputs.

We start our global performance attribution by decomposing the domestic return on the global portfolio into the local capital gain, local income yield, and currency effect for all the markets in the portfolio. Note that the capital gains and income components are calculated in the local (foreign) currencies because changes in values of the currencies are captured by the last term: (Note: All returns throughout this discussion are expressed as percentages.)

$$R_{p,d} = \sum_j w_{j,p} CG_{j,l} + \sum_j w_{j,p} I_{j,l} + \sum_j w_{j,p} C_j$$

where:
$R_{p,d}$ = domestic return on the portfolio
$w_{j,p}$ = weight of market $j$ in the portfolio
$CG_{j,l}$ = capital gain for market $j$ in the local currency
$I_{j,l}$ = income yield for market $j$ in the local currency
$C_j$ = currency effect for market $j$

The **capital gains component** is the total percentage change in value for the market (i.e., the change in the value of the investment in the market) as measured in the local (foreign) currency.

The income yield is the percentage cash flow (e.g., dividends, coupons), also measured in the local currency.

The currency effect for each market is the difference between the local and domestic returns caused by translating back into the domestic currency. For each market *j*, the currency effect is calculated as the percentage change in the local currency relative to the domestic currency ($e_j$) multiplied by the total ending value of the market in its local currency. The total value of the market in its local currency includes the original principal invested plus any capital gains/losses and cash flows, so the currency effect for market *j* is calculated as:

$$C_j = e_j\left(1 + CG_j + I_j\right)$$

where:
$C_j$ = currency effect for market *j*
$e_j$ = percentage change in the foreign currency *j* relative to the domestic currency
$CG_j$ = capital gain for market *j* in the local currency
$I_j$ = income yield for market *j* in the local currency

## Market Return and Security Selection

To this point, we have worked with the basic expression for defining the return on any international investment. It breaks down the portfolio return into its basic components: capital gains and cash flows. By simply measuring capital gains and cash flows, however, it gives us nothing that helps explain how the values (e.g., $CG_j$) were generated. To determine whether the manager was able to effectively allocate the portfolio among and within the markets, we start by breaking out the market return and security selection components.

The market return component for each market is calculated as if the manager had invested in the index for each market rather than individual securities. By calculating the total market return in local currencies (i.e., the local index returns), we separate out the portion of the total portfolio return attributable to the returns of the markets.

Defining $R_{j,l}$ as the *local* return for market *j*, the total market return for the portfolio in local currencies is calculated as:

$$R_{p,l} = \sum_j w_{j,p} R_{j,l}$$

where:
$R_{p,l}$ = total return for the portfolio in local currencies
$w_{j,p}$ = weight of market *j* in the portfolio
$R_{j,l}$ = local return on market index *j*

(This is the **market return** component requested in a global attribution question on a previous Level III exam, not the market allocation contribution you will see in the following.)

Next, we want to determine the portion of the total portfolio return attributable to the manager's ability to select superior (i.e., outperforming) securities to represent each market. This is accomplished for each market by measuring the return for the market in the portfolio and subtracting the index return for the market. To determine the overall portfolio security selection effect, we sum all the individual market security selection effects. In those markets where the manager was (not) able to identify outperformers, the security selection effect is positive (zero or negative):

$$R_{SecSel,p} = \sum_{j} w_{j,p} R_{SecSel,j}$$

where:
$R_{SecSel,p}$ = portion of the total portfolio return attributable to security selection
$w_{j,p}$ = weight of market $j$ in the portfolio
$R_{SecSel,j}$ = return attributable to security selection in market $j$
$= R_{j,l} - R_{j,b}$
= local return for market $j$ in the portfolio minus the local return for market $j$ in the benchmark

(This is the **security selection** component requested in the same exam question, which shows up again in the following.)

The security selection effect compares the return for each market in the portfolio to the return for the same market in the index (in local currencies). By doing this we implicitly assume that the systematic risk of the market in the portfolio is the same as that of the market index. That is, we assume the difference in returns is due solely to security selection rather than different levels of systematic risk.

Let's return to our original equation for determining the domestic return to a global portfolio. We originally defined the domestic return as:

$$R_{p,d} = \sum_{j} w_j CG_{j,l} + \sum_{j} w_j I_{j,l} + \sum_{j} w_j C_j$$

Now that we have broken down the capital gains component of the portfolio (i.e., $CG_{j,l}$) into market return and security selection, we can redefine the equation to include those components:

$$\begin{aligned} R_{p,d} &= \sum_{j} w_j CG_{j,l} + \sum_{j} w_j I_{j,l} + \sum_{j} w_j C_j \\ &= \sum_{j} w_j R_{j,l} + \sum_{j} w_j R_{SecSel,j} + \sum_{j} w_j I_{j,l} + \sum_{j} w_j C_j \end{aligned}$$

When we further define the security selection contribution, we arrive at the global return decomposition tested on the previous exam:

$$R_{p,d} = \sum_j w_j R_{j,l} + \sum_j w_j R_{SecSel,j} + \sum_j w_j I_{j,l} + \sum_j w_j C_j$$
$$= \sum_j w_j R_{j,l} + \sum_j w_j \left(R_{j,p,l} - R_{j,b,l}\right) + \sum_j w_j I_{j,l} + \sum_j w_j C_j$$

where:

$\sum_j w_j R_{j,l}$ = portfolio market return in the local currencies

$\sum_j w_j \left(R_{j,p,l} - R_{j,b,l}\right)$ = portfolio security selection effect in the local currencies

$\sum_j w_j I_{j,l}$ = portfolio yield in local currencies

$\sum_j w_j C_j$ = portfolio currency effect

**For the Exam:** To this point, the only comparison we have made is between the market returns in the portfolio and the benchmark to determine whether the manager was successful in selecting superior securities. We decomposed the total portfolio domestic return into its components: market return, security selection, yield, and currency effect. In other words, we did not compare the manager's performance against a global benchmark. To determine on the exam whether you are being asked to perform a return decomposition or attribution, look for data on a benchmark. If no benchmark data are provided, you are being asked to perform a return decomposition as we have done to this point. If you are provided with benchmark data, you will probably have to perform the attribution analysis that follows.

## Allocation Effects

Thus far, we have only compared the manager's performance to a passive investment in market indices. We assumed the manager selected various markets and then either invested passively in market indices or selected individual securities to represent the markets. We took the manager's selection of markets as given and broke down the portfolio return. The analysis did not indicate the manager's ability to select superior markets, and we did not measure the manager's performance relative to a global benchmark.

We decomposed the manager's total global return into a capital gains component, a yield component, and a currency effect. We then further decomposed the capital gains component into market return and security selection to determine whether the manager was successful in selecting superior securities to represent the markets or should have simply invested passively in the market indices. In doing so, you will notice that we considered only the weights of the markets in the manager's portfolio (i.e., the manager's *absolute asset allocation*).

Instead of selecting global markets and then deciding whether to passively invest in indices or actively invest by selecting securities, we could have assumed the manager's performance will be measured against a global index. In that case, the manager has the choice of passively investing in the global index (i.e., construct and weight each market in the portfolio as it is in the global index) or attempting to outperform the index by altering the portfolio allocation relative to the index. The manager now has the opportunity to weight markets differently from the index as well as select outperforming securities within each market. By studying the manager's *relative asset allocation*, we introduce **allocation effects.**

To analyze (i.e., attribute) the global portfolio manager's portfolio return, we will break it up into its component returns: the domestic return on the global index (i.e., the benchmark), the return to market allocation, the security selection component, the return to currency allocation, and the yield component.

**Benchmark domestic return.** The manager should be able to at least replicate the domestic (i.e., translated) return on the benchmark. (This is the return on the global index in the manager's currency.) We will describe the benchmark domestic return as:

$$R_{b,d} = \sum_{j} \left(w_{j,b}\right)\left(R_{j,b,d}\right)$$

where:
$R_{b,d}$ = total domestic (translated) return on the benchmark
$w_{j,b}$ = weight of market $j$ in the benchmark
$R_{j,b,d}$ = return on market $j$ in the benchmark in the domestic currency

To passively index the portfolio to a global benchmark, the manager would weight each market and security in the portfolio as it is in the index. The domestic return on the global index accounts for translating the foreign currencies back into the manager's domestic currency. Thus, the first component of the global portfolio manager's domestic return is that attributable to the global index. This, by the way, should serve as the minimum return the manager should earn on the global investment. If the global portfolio manager cannot generate at least the return on a passive investment in the global index, he should not attempt active management through market/currency allocation or security selection.

**Market allocation contribution.** In an attempt to generate extra return relative to the benchmark, the manager can choose to alter the weights of the global markets relative to their weights in the index. Specifically, the manager seeks to overweight outperforming markets and underweight underperformers. We indicate the difference in weights as $w_{j,p} - w_{j,b}$, the weight of the market in the portfolio minus the weight of the market in the benchmark.

To calculate the manager's total market allocation contribution, we multiply the difference in weights for each market by the local return for the market and then sum across all markets. If the manager underweights (overweights) a market, the sign of the

first term is negative (positive). Notice that the benchmark returns used in the market allocation contribution are measured in the *local currency*:

$$\text{market allocation contribution} = \sum_{j}\left(w_{j,p} - w_{j,b}\right)R_{j,b,l}$$

where:

$w_{j,p}$ = weight of market $j$ in the portfolio

$w_{j,b}$ = weight of market $j$ in the benchmark

$\left(w_{j,p} - w_{j,b}\right)$ = amount by which the manager chose to over- or underweight market $j$ relative to the benchmark

$R_{j,b,l}$ = return for market $j$ in the benchmark in its local currency

**For the Exam:** On the exam, you might see the words *market* and *sector* used interchangeably in a global framework. For example, the euro market could be referred to as the euro sector. In a domestic framework, sectors are usually defined by industry, such as transportation sector, financial sector, et cetera.

**Currency allocation contribution.** Briefly defined, the currency contribution for any global investment is the percentage increase or decrease in the value of the investment due solely to translating it back into the investor's domestic currency. It is the percentage change in the return due only to relative currency movements.

Measurement of the currency contribution for an individual investment is quite straightforward; you subtract the return for the investment in the local currency from the return for the investment in the domestic currency. For example, if the local return for the investment is 10% and the domestic (translated) return is 9%, the currency contribution is –1%. The manager's obvious goal is allocating more heavily to currencies expected to appreciate against the domestic currency, so that the currency effect is positive.

To measure the manager's currency allocation contribution, we compare the local and domestic returns for each market in the global portfolio and the benchmark. We

then sum these individual market currency contributions to arrive at the effect of the manager's overall currency allocation on the portfolio return:

$$\text{currency allocation contribution} = \sum_{j}(w_{j,p}C_{j,p} - w_{j,b}C_{j,b})$$

where:

$w_{j,p}$ = weight of market $j$ in the portfolio

$w_{j,b}$ = weight of market $j$ in the benchmark

$C_{j,p}$ = currency effect for market $j$ in the portfolio

$= \left(R_{j,p,d} - R_{j,p,l}\right)$ = domestic return for market $j$ in the portfolio minus the local return for market $j$ in the portfolio

$C_{j,b}$ = currency effect for market $j$ in the benchmark

$= \left(R_{j,b,d} - R_{j,b,l}\right)$ = domestic return for market $j$ in the benchmark minus the local return for market $j$ in the benchmark

**For the Exam:** Unless specifically told otherwise in the exam question, you can assume each country is a separate market and each has its own currency. Be on the lookout, however, for the situation where different countries use the same currency. In this case, you would probably be given a table containing a list of local and domestic returns by country and the currency utilized in each country.

To determine the weights to use in calculating the *currency allocation contribution,* you should combine the investments in all countries that use the same currency. For example, assume the euro is one of the currencies in the portfolio, and several countries in the portfolio utilize the euro. You would add the values of the investments in those countries in determining the weights to use in calculating the currency allocation contribution. However, to calculate the *market allocation contribution,* you will use the returns from the individual countries and their individual weights.

This would be an unusual structure for an exam question, even though it is not beyond the realm of possibility. For example, you are more likely to be given European stocks as a market rather than individual European countries. If you should see an attribution question where countries and currencies are not the same, the key will be reading the question carefully for instructions on how to treat the markets. If no instructions are provided, do what I have suggested here.

Combining these components with the yield and security selection components discussed earlier, we arrive at our final decomposition of the portfolio return when the manager is assessed relative to a global benchmark:

$$R_p = \text{benchmark domestic return} + \text{market allocation contribution} + \text{currency allocation contribution} + \text{security selection contribution} + \text{yield component}$$

$$= \sum_j \left(w_{j,b}\right)\left(R_{j,b,d}\right) + \sum_j \left(w_{j,p} - w_{j,b}\right)R_{j,b,l} +$$

$$\sum_j (w_{j,p}C_{j,p} - w_{j,b}C_{j,b}) + \sum_j w_{j,p}\left(R_{j,p,l} - R_{j,b,l}\right) + \sum_j w_{j,p}I_{j,l}$$

*Professor's Note: The yield and security selection components are calculated as we did earlier when we assumed the manager was not being compared to a benchmark. In that case, we used only portfolio weights.*

**For the Exam:** Here is a brief summary of the components:

Remember the weights:

- For the benchmark domestic return (#1), use benchmark weights only.
- For the two allocation contributions (#2 and #3), which assume comparison to a benchmark, use both portfolio and benchmark weights.
- For the security selection contribution and yield component (#4 and #5), use portfolio weights only.

1. **Benchmark domestic return.** The domestic return the manager could earn by passively investing in a global index. To calculate, multiply the domestic return for the market by its weight in the benchmark and sum across all markets:

$$\text{benchmark domestic return} = \sum_j \left(w_{j,b}\right)\left(R_{j,b,d}\right)$$

2. **Market allocation contribution.** The return component generated by the manager weighting markets in the portfolio differently from their weights in the benchmark. To calculate, multiply the market's local return by the difference between the weight for the market in the portfolio and in the benchmark and sum across all markets:

$$\text{market allocation contribution} = \sum_j \left(w_{j,p} - w_{j,b}\right)R_{j,b,l}$$

3. **Currency allocation contribution**. The return component generated when the manager overweights currencies expected to outperform and underweights currencies expected to underperform. First, calculate for an individual market by subtracting its weighted currency effect in the benchmark from its weighted currency effect in the portfolio and then sum across all markets. Each currency effect is calculated as the domestic return minus the respective local return:

$$\text{currency allocation contribution} = \sum_{j}(w_{j,p}C_{j,p} - w_{j,b}C_{j,b})$$

4. **Security selection contribution**. The return component generated by the manager's ability to select superior securities to represent markets. To calculate, multiply the weight of the market in the portfolio by the difference between the local returns for the market in the portfolio and in the benchmark and sum across all markets:

$$\text{security selection contribution} = \sum_{j} w_{j,p}\left(R_{j,p,l} - R_{j,b,l}\right)$$

5. **Yield component**. The cash flow component of the portfolio return. To calculate, multiply the percentage yield for the market by its weight in the portfolio and sum across all markets:

$$\text{yield component} = \sum_{j} w_{j,p}I_{j,l}$$

**Example: Return decomposition**

The following figure shows the performance of BC Fund, a U.S.-based fund, and its benchmark for calendar year 2010. BC invested only in Canadian and Mexican stocks. During 2010, the Canadian dollar and the Mexican peso depreciated by 2% and 10%, respectively, against the U.S. dollar. Assume that no dividends were paid. **Determine** the benchmark domestic return in addition to the fund's currency allocation, market allocation, security selection, and yield component effects.

**Performance of the BC Fund and Its Benchmark**

| | *Weight* | | *Local Return* | | *U.S. $ Return* | |
|---|---|---|---|---|---|---|
| *Sector* | *BC* | *Benchmark* | *BC* | *Benchmark* | *BC* | *Benchmark* |
| Canada | 50% | 80% | 13.50% | 15.00% | 11.23% | 12.70% |
| Mexico | 50% | 20% | 22.00% | 18.00% | 9.80% | 6.20% |

**Answer:**

The following indicates the global performance attribution:

| | |
|---|---|
| Benchmark domestic return | 11.40% |
| Currency allocation | –3.03% |
| Market allocation | 0.90% |
| Security allocation | 1.25% |
| Yield return | 0.00% |
| Portfolio return | 10.52% |

- The portfolio underperformed the benchmark (in base currency) by 10.52 – 11.40 = –0.88%.
- –3.03% is attributable to currency allocation. This is because the portfolio manager overweighted the underperforming currency (peso) as compared to the benchmark.
- 0.90% is attributable to market allocation. This is because the manager overweighted the better-performing market in local currency (Mexico).
- 1.25% is due to security selection, mainly due to superior return in Mexico (as compared to the benchmark).
- Because no dividends were paid, the yield is zero.

The following information summarizes the calculations.

**Benchmark Domestic Return**

The benchmark domestic return is the weight of each sector in the benchmark multiplied by the return of that sector in the domestic currency: (0.8)(12.70%) + (0.2)(6.20%) = 11.4%.

**Portfolio Domestic Return**

The portfolio domestic return is the weight of each sector in the portfolio multiplied by the return of that sector in the domestic currency: (0.5)(11.23%) + (0.5)(9.8%) = 10.52%.

**Excess Return Attribution for the Currency Allocation, Market Allocation, and Security Selection Effects**

| (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|
| *Sector* | $C_{j,p}$ | $C_{j,b}$ | *Currency Effect* | *Market Allocation* | *Security Selection* |
| Canada | –2.27% | –2.30% | 0.71% | –4.50% | –0.75% |
| Mexico | –12.20% | –11.80% | –3.74% | 5.40% | 2.00% |
| Total | | | –3.03% | 0.90% | 1.25% |

**Currency Allocation Effect**

Column 2 shows the currency effect for each sector in the portfolio (i.e., portfolio return$_{domestic}$ – portfolio return$_{local}$):

$C_{j,p}$ for Canada = $(R_{j,p,d} - R_{j,p,l})$ = 11.23% – 13.50% = –2.27%

$C_{j,p}$ for Mexico = $(R_{j,p,d} - R_{j,p,l})$ = 9.80% – 22.00% = –12.20%

Column 3 shows the currency effect for each sector in the benchmark (i.e., benchmark return$_{domestic}$ – benchmark return$_{local}$):

$C_{j,b}$ for Canada = $(R_{j,b,d} - R_{j,b,l})$ = 12.70% – 15.00% = –2.30%

$C_{j,b}$ for Mexico = $(R_{j,b,d} - R_{j,b,l})$ = 6.20% – 18.00% = –11.80%

Column 4 shows the currency allocation effect of each sector in the portfolio and benchmark:

currency allocation effect for Canada = $(w_{j,p}C_{j,p} - w_{j,b}C_{j,b})$
= 0.5(–2.27%) – 0.8(–2.30%) = 0.71%

currency allocation effect for Mexico = $(w_{j,p}C_{j,p} - w_{j,b}C_{j,b})$
= 0.5(–12.20%) – 0.2(–11.80%)
= –3.74%

total currency allocation effect = 0.71% = (–3.74%) = –3.03%

**Market Allocation Effect**

Column 5 shows the market allocation effect (difference in weights × local return):

market allocation effect for Canada = $(w_{j,p} - w_{j,b})R_{j,b,l}$
= (0.5 – 0.8)(15%) = –4.50%

market allocation effect for Mexico = $(w_{j,p} - w_{j,b})R_{j,b,l}$
= (0.5 – 0.2)(18%) = 5.40%

total market allocation effect = –4.50% + 5.40% = +0.90%

**Security Allocation Effect**

Column 6 shows the security allocation (selection) effect (portfolio weight × difference in returns):

$$\text{security selection for Canada} = w_{j,p}(R_{j,p,l} - R_{j,b,l})$$
$$= 0.5(13.50\% - 15.00\%) = -0.75\%$$

$$\text{security selection for Mexico} = w_{j,p}(R_{j,p,l} - R_{j,b,l})$$
$$= 0.5(22.00\% - 18.00\%) = 2.00\%$$

$$\text{total security selection effect} = -0.75\% + 2.00\% = +1.25\%$$

**Synopsis**

The manager allocated 50% to Canadian stocks and 50% to Mexican stocks, while the benchmark weights were 80% to Canada and 20% to Mexico. Compared to the benchmark, the manager decided to increase Mexico's weight and decrease Canada's weight in anticipation of better performance by Mexican stocks as compared to Canadian stocks.

The market (sector) allocation effect is positive, so the manager's bet was right—but only in terms of local returns. After taking the currency effects into account, the Canadian market outperformed the Mexican market.

Selection effect is positive for Mexico and negative for Canada. If this is a normal pattern over a number of years, we may be able to conclude that the manager has superior stock selection skills in the Mexican market but not in the Canadian market.

## Active and Passive Currency Management

**LOS 42.d: Explain active and passive currency management, relative to a global benchmark, and formulate appropriate strategies for hedging currency exposure.**

*CFA® Program Curriculum, Volume 6, page 207*

**Passive currency management** has been defined in two ways, which are both flawed:

1. Fully hedging all currency exposures. This could be done with derivatives.
2. Allowing currency exposures to be determined by investment decisions. If the manager has no opinions on currency, the manager can select the best markets and investments, allowing those decisions to determine currency exposure.

The flaw in both of these approaches is that they do not consider the exposure of the manager's benchmark to currency. Some benchmarks are constructed with currency always hedged, and others are not. Any deviation from the currency exposure of the benchmark is an **active currency management decision. Passive currency management** would require matching the currency exposures of the benchmark.

Another situation arises if a currency overlay manager is employed. In this case, the asset manager is not responsible for currency exposures and deviations from the benchmark. The asset manager should simply select the desired markets and assets. The overlay manager is then responsible for all currency decisions.

*Professor's Note: The CFA text includes a discussion of adjusting currency exposure by buying or selling currency forward. Because that is covered extensively in greater depth elsewhere, we are not repeating it here.*

## MULTI-PERIOD PERFORMANCE ATTRIBUTION

### LOS 42.e: Explain the difficulties in calculating a multi-period performance attribution and discuss various solutions.

*CFA® Program Curriculum, Volume 6, page 209*

To measure the return to active management, the *difference* in portfolio and benchmark returns is allocated amongst the various attributes (e.g., security selection, market allocation). For any single time period, the process is straightforward because any difference in returns can be attributed to active management. In fact, even the difference in total multi-period returns can be attributed to active management. The problem is that the multi-period *attribution* cannot be determined directly from the single-period attributions, or vice versa.

To see this, assume portfolio returns of 10% and 15% and benchmark returns of 9% and 11% over two successive time periods. The individual 1-period attributions to active management are 1% (10% – 9%) in the first period and 4% (15% – 11%) in the second period. This would appear to add to an overall return to active management of 5%. However, if we compare the 2-period returns for the benchmark and portfolio, we arrive at a different conclusion.

The 2-period return for the portfolio is 26.5% (= 1.10 × 1.15 – 1). For the same two periods, the benchmark return is 21% (1.09 × 1.11 – 1 = 20.99). The difference (5.5%) can be attributed to active management over the two periods, yet the simple sum of the individual 1-period active returns is 5%, and compounding them yields only 5.04% (1.01 × 1.04 – 1 = 0.0504).

The complication in measuring multiple-period active returns arises from the effects of changing values. Measuring the second period active return as the difference in portfolio

and benchmark returns for that period (15% – 11% = 4%) misses two important value considerations:

1. With no active management in the second period, the active return in the first period will compound at the benchmark return in the second period. Even if the manager pursues a pure indexing strategy in the second period, the value generated through active management in the first period should earn the benchmark return in the second period. This is value that would not have been realized had the manager not earned the active return in the first period.

2. The value of the portfolio at the end of the first period (the beginning value plus the return earned in the first period) will impact the measured active return in the second period. This can be seen by assuming the portfolio and benchmark values are equal at the beginning of the first period. If the portfolio active return is positive for the first period, the sizes of the benchmark and portfolio are different at the beginning of the second period. To separate out the increase in value over the second period, we must consider the value of the portfolio at the end of the first period.

To measure the overall return to active management, we use the following formula:

$$R_{A,2} = R_{a,1}\left(1 + R_{b,2}\right) + R_{a,2}\left(1 + R_{p,1}\right)$$

where:
$R_{A,2}$ = 2-period active return
$R_{a,i}$ = active return in period $i$; i = 1 or 2
$R_{b,2}$ = benchmark return in period 2
$R_{p,1}$ = portfolio return in period 1

The first term in the equation, $R_{a,1}(1 + R_{b,2})$, is the active return on the portfolio in the first period multiplied by the return on the benchmark in the second period. It shows the value added by the manager's actions in the first period. The active return in the first period will compound at least at the benchmark rate of return over the second period, even if the manager pursues a pure indexing strategy in that period.

The second term, $R_{a,2}(1 + R_{p,1})$, takes into account the manager's active decisions in the second period. It is measured as the active return in the second period multiplied by the total return on the portfolio in the first period.

For our example, the 2-period return to active management is calculated as:

$$\begin{aligned} R_{A,2} &= R_{a,1}\left(1 + R_{b,2}\right) + R_{a,2}\left(1 + R_{p,1}\right) \\ &= 1\%(1.11) + 4\%(1.10) = 1.1\% + 4.4\% = 5.5\% \quad (= 26.5\% - 21\%) \end{aligned}$$

There are no multi-period considerations when we measure the return to active management for the first period (10% – 9% = 1%). Because we know the total 2-period return to active management is 5.5%, the true return to active management for the second period must be 4.5%.

Thus far we have made one assumption: the difference in portfolio and benchmark returns is due to active management. This is equivalent to assuming the active return is

generated by a single attribute or by a combination of attributes (e.g., security selection, market allocation, currency allocation) without attempting to value them individually. The analysis can be extended to separate out the effects of the individual attributes.

## Multi-Attribute Analysis

The single-period contributions for each attribute are calculated as we saw in micro attribution analysis or global attribution analysis. Just as when we considered only a single attribute, however, adding or compounding the 1-period attribute contributions only approximates the overall contribution to each attribute for multiple periods.

Let's assume we want to measure the security selection effect and the market allocation effect for multiple periods. You will recall that the security selection effect measures the manager's ability to select superior securities to represent each sector (market) in the portfolio. It is calculated as the weight of each sector in the portfolio multiplied by the return for the sector in the portfolio minus the return for the sector in the benchmark, summed across all sectors:

$$SSE = \sum_{i=1}^{n} w_{p,i}\left(R_{p,i} - R_{b,i}\right)$$

where:
SSE = security selection effect
$w_{p,i}$ = weight of sector *i* in the portfolio
$R_{p,i} - R_{b,i}$ = portfolio return for sector *i* less benchmark return for sector *i*

The market allocation effect measures the manager's ability to overweight outperforming sectors (markets) and underweight underperforming sectors. It is calculated as the difference between the weights of the sector in the portfolio and the benchmark multiplied by the return of the sector in the benchmark less the benchmark return, summed across all sectors: (Note: See following For the Exam.)

$$MAE = \sum_{i=1}^{n}\left(w_{p,i} - w_{b,i}\right)\left(R_{b,i} - R_b\right)$$

where:
MAE = market allocation effect
$w_{p,i} - w_{b,i}$ = weight of sector *i* in the portfolio less its weight in the benchmark
$R_{b,i} - R_b$ = return for sector *i* in the benchmark less the benchmark return

**For the Exam:** You might have noticed that the market allocation effect as calculated in the 2012 Level III curriculum, Volume 6, page 224, is actually the *pure sector allocation effect*, as measured in micro attribution analysis on page 162 of Volume 6. When questioned about this, a CFA Institute representative responded that the two formulas measure the same thing and they yield the same answer. Actually, they yield the same *total* market allocation effect but different *individual* market allocation effects.

Using the market allocation formula on page 213 of Volume 6 and the weights and returns from the example on page 224 of Volume 6, the individual effects are 2% for Europe and 0% for Japan for a total of 2%:

$$\begin{aligned} MAE_{Europe} &= \left(w_{p,Europe} - w_{b,Europe}\right)\left(R_{Europe}\right) \\ &= (0.60 - 0.50)0.20 = 0.02 \\ MAE_{Japan} &= \left(w_{p,Japan} - w_{b,Japan}\right)\left(R_{Japan}\right) \\ &= (0.40 - 0.50)0.00 = 0.00 \end{aligned}$$

The example on page 224 uses the pure sector allocation formula from page 162 to measure the market allocation effects, yielding 1% for Europe and 1% Japan for a total of 2%. Note that in that example, the benchmark return ($R_b$) is the average of the European and Japanese market returns of 20% and 0%, respectively:

$$\begin{aligned} SAE_{Europe} &= \left(w_{p,Europe} - w_{b,Europe}\right)\left(R_{Europe} - R_b\right) \\ &= (0.60 - 0.50)(0.20 - 0.10) = 0.01 \\ SAE_{Japan} &= \left(w_{p,Japan} - w_{b,Japan}\right)\left(R_{Japan} - R_b\right) \\ &= (0.40 - 0.50)(0.00 - 0.10) = 0.01 \end{aligned}$$

Thus, although the *total* market allocation effects are the same, the *individual* market allocation effects are different for the two formulas. As the LOS does not require calculations, however, this contradiction can probably be ignored for the exam.

As demonstrated previously with a single attribute, determining the multi-period attribute contributions is not a simple matter of adding or compounding their contributions for each period. Similar to our single attribute multi-period example, there are compounding and value effects that must be considered for each attribute when multiple periods are considered. Regardless of the number of attributes being measured or the number of periods, however, the total return to active management remains the final difference in the portfolio and benchmark returns.

In addition to adding or compounding the individual period contributions for each attribute, another possible and also incorrect method is maintaining the attributes' *proportional contributions*. For example, if security selection contributes 75% of the active return in period 1 and market allocation 25%, we assume those contributions are the same in period 2. This method is not a recommended method either because it implicitly assumes consistency in the manager's performance from period to period.

To more accurately assess the contribution of each factor, we must apply the same basic framework we used with a single attribute, namely:

1. Each attribute's contribution in the first period must be compounded at the benchmark rate of return over the second period.

2. Each attribute's contribution in the second period must be compounded with the portfolio return from the first period.

Let's return to the original example, but assume two attributes, security selection and market allocation. The portfolio returns are 10% and 15% and the benchmark returns are 9% and 11% for the same two periods. We will further assume we have already broken down the 1% active return in the first period (10% – 9% = 1%) into 0.70% to security selection and 0.30% to market allocation. The second period's 4% active return (15% – 11% = 4%) is broken down into 1.80% for security selection and 2.20% to market allocation. Keep in mind that the total active return for the two periods is 5.5% (= 26.5% – 21%).

## The Correct Method

Remember, calculating the individual attributes' multi-period contributions must follow the same general process we used when we did not separate out the individual attributes:

1. Each attribute's contribution in the first period must be compounded at the benchmark rate of return over the second period.

2. Each attribute's contribution in the second period must be compounded with the portfolio return from the first period.

Start by calculating the 2-period security selection effect using the same formula we used when we did not separate out the individual attributes. First security selection:

$$R_{SS,2} = R_{ss,1}\left(1 + R_{b,2}\right) + R_{ss,2}\left(1 + R_{p,1}\right)$$

where:
$R_{SS,2}$ = 2-period return to security selection
$R_{ss,i}$ = return to security selection in period $i$
$R_{b,2}$ = benchmark return in period 2
$R_{p,1}$ = portfolio return in period 1

$$\begin{aligned} R_{SS,2} &= 0.70\%(1.11) + 1.80\%(1.10) \\ &= 0.77\% + 1.98\% = 2.75\% \end{aligned}$$

When we calculate the 2-period return to market allocation, we see that the 2-period contributions now add to the true 2-period return to active management of 5.5%:

$$\begin{aligned} R_{MA,2} &= R_{ma,1}\left(1+R_{b,2}\right)+R_{ma,2}\left(1+R_{p,1}\right) \\ &= 0.30\%(1.11)+2.20\%(1.10) \\ &= 0.33\%+2.42\% = 2.75\% \end{aligned}$$

$$R_{\text{active management},2} = R_{SS,2} + R_{MA,2} = 2.75\% + 2.75\% = 5.5\%$$

Several flawed methods are unfortunately used as well. The flawed methods include adding the individual attribute contributions, compounding the individual attribute contributions, and maintaining the same proportional contributions. These three **incorrect methods** produce the following results:

1. Adding individual attribute contributions:
   a. 2-period security selection = 0.70% + 1.80% = 2.50%
   b. 2-period market allocation = 0.30% + 2.20% = 2.50%
   c. Total 2-period return to active management:
      2.50% + 2.50% = 5.00% ≠ 5.50%

2. Compounding individual attribute contributions:
   a. 2-period security selection = (1.0070)(1.018) – 1 = 2.51%
   b. 2-period market allocation = (1.0030)(1.022) – 1 = 2.507%
   c. Total 2-period return to active management:
      2.51% + 2.507% = 5.017% ≠ 5.50%

3. Maintaining proportions of individual attribute contributions:
   a. The 2-period security selection effect: three steps:
      i. Determine the proportion of the active return in the first period attributable to security selection: 0.0070 / 0.01 = 70%
      ii. Using the proportion from the first period, determine the amount of active return in the second period attributable to security selection: 70% of 4% = 2.80%
      iii. 2-period security selection effect = 0.70% + 2.80% = 3.50%
   b. The 2-period market allocation effect: three steps:
      i. Determine the proportion of the active return in the first period that can be attributed to market allocation: 0.0030 / 0.01 = 30%
      ii. Using the proportion from the first period, determine the amount of active return in the second period attributable to market allocation: 30% of 4% = 1.20%
      iii. 2-period market allocation effect = 0.30% + 1.20% = 1.50%
   c. Total 2-period return to active management:
      3.50% + 1.50% = 5% ≠ 5.50%

**For the Exam:** The LOS asks you to explain and discuss the difficulties associated with estimating multi-period contributions and various methods for overcoming those difficulties. Therefore, although you can refer to the previous calculations for examples of the difficulties, be sure you know the following when you enter the exam room:

1. The total return to active management over multiple periods is the difference between compounded portfolio and benchmark returns.
2. Returns to individual attributes can be calculated for each individual period using the formulas we have seen for domestic and global attribution analysis.
3. The multiple-period return to active management for an individual attribute cannot be determined by adding the attribute's contributions in each period.
4. The multiple-period return to active management for an individual attribute cannot be determined by compounding the attribute's contributions in each period.
5. The multiple-period return to active management for an individual attribute cannot be determined by assuming it stays at the same proportion of the active return in each period.
6. Each attribute's contribution in the first period must be compounded at the benchmark rate of return over the second period.
7. Each attribute's contribution in the second period must be compounded with the portfolio return from the first period.

## RISK MEASURES

### LOS 42.f: Compare and interpret alternative measures of portfolio risk and risk-adjusted portfolio performance.

*CFA® Program Curriculum, Volume 6, page 217*

**For the Exam:** Note that the LOS asks you to compare and interpret, not calculate, the risk measures, but you should be ready to calculate the information ratio and the Sharpe measure. Also note how these risk measures are virtually identical to those presented in Topic Review 41, so any of the discussions about them in 41 would also be applied in a global context, when all data are presented in either local or domestic terms.

There are two widely used measures of risk in global performance evaluation.

## Standard Deviation

**Standard deviation** measures the **total** or **absolute risk** of the portfolio. It is not measured relative to a benchmark. It measures the variability of the portfolio's return around its historical mean:

$$\sigma = \sqrt{\frac{\sum\left(R_t - \bar{R}\right)^2}{n-1}}$$

where:
$R_t$ = return for period $t$
$\bar{R}$ = average portfolio return over $n$ periods

The standard deviation for a period of less than one year can be annualized by multiplying by the square root of the number of subperiods in a year. For example, if the monthly standard deviation is 5%, multiply 5% by the square root of 12 for the annualized standard deviation.

## Tracking Error or Relative Risk

$$SR_t = R_t - R_{b,t} \text{ and } \sigma_{SR} = \sqrt{\frac{\sum(SR_t - SR_{avg})^2}{n-1}}$$

where:
$SR_t$ = surplus return (also called alpha or excess return) for period $t$
$R_t$ = portfolio return for period $t$
$R_{b,t}$ = benchmark return for period $t$
$\sigma_{SR}$ = standard deviation of surplus returns (a.k.a. tracking error)
$SR_{avg}$ = average surplus return

Obviously, fund sponsors prefer a positive surplus return. The variability of the surplus return, measured by its standard deviation, is an indication of the ability of the manager to consistently outperform the benchmark. The greater the standard deviation, however, the more variable the surplus return and the lower the sponsor's confidence in the ability of the manager to be consistent in superior performance.

**Risk-adjusted performance** is typically measured by either the information ratio or the Sharpe ratio.

## Information Ratio

The information ratio is the ratio of the average *surplus return* to its standard deviation (which is the tracking error just discussed):

$$\text{information ratio} = \frac{SR}{\sigma_{SR}}$$

It indicates the amount of risk undertaken (denominator) to achieve a certain level of return above the benchmark (numerator). An active manager makes specific cognitive bets to achieve a positive surplus return. The variability in the surplus return is a measure of the risk taken to achieve the surplus. The ratio computes the surplus return relative to the risk taken. A higher information ratio indicates better performance.

### Sharpe Ratio

The Sharpe ratio compares the return above the risk-free rate (i.e., the risk premium) that the fund earned and the corresponding risk that the fund took (as measured by its standard deviation). A higher Sharpe ratio indicates superior performance.

$$\text{Sharpe ratio} = \frac{\overline{R}_P - \overline{R}_F}{\sigma_P}$$

where:

$\overline{R}_P$ = average return to the fund over the measurement period

$\overline{R}_F$ = average risk-free rate over the measurement period

$\sigma_P$ = standard deviation of the portfolio returns over the measurement period

In a global setting, it is appropriate to examine the Sharpe ratio of an investor's global portfolio, but not the Sharpe ratio of the investor's foreign assets only. The Sharpe ratio of the foreign assets only will be misleading because when the foreign assets are combined with the investor's domestic assets there will be significant diversification effect. The standard deviation of the foreign assets only and resulting Sharpe ratio are misleading.

## RISK ALLOCATION AND BUDGETING IN GLOBAL PERFORMANCE EVALUATION

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**LOS 42.g: Explain the use of risk budgeting in global performance evaluation.**

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*CFA® Program Curriculum, Volume 6, page 220*

Performance attribution assesses where managers add value. The client can use these attribution results to allocate funds to various managers. Allocating funds allocates the risk the client is taking by manager and is hence called **risk budgeting**.

The client can control and budget risk by assigning each manager a tracking error. If the client has less confidence in a manager, the client might assign a small tracking error that will effectively require the manager to manage the assets in ways similar to the manager's benchmark. If the client has greater confidence in a manager and is willing to accept greater risk, the manager can be assigned a larger tracking error that will allow the manager to make greater deviations from the manager's benchmark. The manager can do more active management and be less index like.

The total risk (standard deviation) of the portfolio will have two components:

1. **Absolute risk allocation** is driven by the standard deviation of the asset classes used. Choosing less risky asset classes will tend to reduce the riskiness of the client's portfolio.

2. **Active risk allocation** is driven by the amount of deviation managers are allowed to take from their benchmarks.

Unfortunately, this is much more complicated when correlation is considered (but no further details are covered in the CFA material).

Another complication can be the difficulty of assessing the true return and risk of the managers.

- Past results can reflect skill or luck.
- Returns can be distorted by infrequently traded and priced assets.
- Option-like return patterns with skew distort risk measures such as standard deviation.
- Survivorship bias in both return and risk measures of a manager can arise if the manager only reports results of surviving (not terminated) portfolios under management. These are likely to be the higher return less risky portfolios of the manager.

## GLOBAL AND INTERNATIONAL BENCHMARKS

**LOS 42.h: Discuss the characteristics of alternative global and international benchmarks used in performance evaluation.**

*CFA® Program Curriculum, Volume 6, page 223*

The performance of a portfolio manager is usually compared to a passive benchmark portfolio. The benchmark selected by the plan sponsors is usually consistent with the plan's investment objective and may be specifically incorporated into the investment policy statement. Sometimes, existing and widely used indices are used as benchmarks. These may not be suitable for all portfolios, however, so some portfolios have custom benchmarks created specifically for performance evaluation.

Custom benchmarks should identify specific weights assigned to individual countries and/or sectors and specific industries within each country or sector. A currency-hedging component may also be present (if desired by the plan sponsor). The individual country weights may be based on the total market capitalization of the country's publicly traded securities or another macroeconomic measure such as GDP.

Sometimes, benchmarks bypass country weights and assign weights to industries worldwide, irrespective of the companies' countries of registration. This has become more popular with multiple listings of shares of large international corporations and expansion of world trade.

Sometimes, benchmarks are established purely on the basis of style, ignoring countries. For example, a small-cap growth manager may be assigned an international small-cap growth index as the benchmark. The key is to have a custom benchmark that accurately reflects the investment objectives of the portfolio.

# KEY CONCEPTS

## LOS 42.a

For a domestic portfolio, the return on the portfolio can be broken down into capital gains (price change) and cash flow yield (dividends or coupons):

$$R_j = CG_j + CF_j$$

where:
$R_j$ = return on asset $j$
$CG_j$ = capital gain/loss on asset $j$
$CF_j$ = cash flow yield (dividend or coupon yield) for asset $j$

For a global portfolio, the equation must be modified to capture the effects of currency value fluctuations:

$$R_{j,d} = CG_j + CF_j + C_j$$

where:
$R_{j,d}$ = return on asset $j$ in the domestic (base) currency
$C_j$ = return due to currency movements = $e_j(1 + CG_j + CF_j)$
$e_j$ = percentage change in the value of currency $j$

## LOS 42.b

We start our global performance attribution by defining the domestic return on the global portfolio as the sum of local capital gains, local income yields, and currency effects for all the markets in the portfolio:

$$R_{p,d} = \sum_i w_{j,p} CG_{j,l} + \sum_j w_{j,p} I_{j,l} + \sum_i w_{j,p} C_j$$

where:
$R_{p,d}$ = domestic return on the portfolio
$w_{j,p}$ = weight of market $j$ in the portfolio
$CG_{j,l}$ = capital gain for market $j$ in the local currency
$I_{j,l}$ = income yield for market $j$ in the local currency
$C_j$ = currency effect for market $j$

The capital gains component is the total percentage change in the value of the investment in the market as measured in the local (foreign) currency.

The income yield is the percentage cash flow (e.g., dividends, coupons), also measured in the local currency.

The currency effect for each market is the difference between the local and domestic returns caused by translating back into the domestic currency. The currency effect for market *j* is calculated as:

$$C_j = e_j\left(1 + CG_j + I_j\right)$$

where:
$C_j$ = currency effect for market *j*
$e_j$ = percentage change in the foreign currency *j* relative to the domestic currency
$CG_j$ = capital gain for market *j* in the local currency
$I_j$ = income yield for market *j* in the local currency

## LOS 42.c

To determine whether the global portfolio manager was able to effectively allocate the portfolio among and within markets, we break out the components assuming the manager's performance will be measured against a global index.

Market allocation contribution. In an attempt to generate extra return relative to the benchmark, the manager can choose to alter the weights of the global markets relative to their weights in the index.

$$\text{market allocation contribution} = \sum_j \left(w_{j,p} - w_{j,b}\right) R_{j,b,l}$$

where:
$w_{j,p}$ = weight of market *j* in the portfolio
$w_{j,b}$ = weight of market *j* in the benchmark
$\left(w_{j,p} - w_{j,b}\right)$ = amount by which the manager chose to over- or underweight market *j* relative to the benchmark
$R_{j,b,l}$ = return for market *j* in the benchmark in its local currency

Currency allocation contribution is the percentage increase or decrease in the value of the investment due solely to translating it back into the investor's domestic currency due only to relative currency movements:

$$\text{currency allocation contribution} = \sum_j \left(w_{j,p} C_{j,p} - w_{j,b} C_{j,b}\right)$$

where:
$C_{j,p}$ = currency effect for market *j* in the portfolio
$= \left(R_{j,p,d} - R_{j,p,l}\right)$ = domestic return for market *j* in the portfolio minus the local return for market *j* in the portfolio
$C_{j,b}$ = currency effect for market *j* in the benchmark
$= \left(R_{j,b,d} - R_{j,b,l}\right)$ = domestic return for market *j* in the benchmark minus the local return for market *j* in the benchmark

Security selection contribution. The return component generated by the manager's ability to select superior securities to represent markets.

$$\text{security selection contribution} = \sum_{j} w_{j,p}\left(R_{j,p,l} - R_{j,b,l}\right)$$

## LOS 42.d

Any strategy that produces currency exposures different from those of the benchmark is an active currency management strategy. Differences can arise through asset selection or through deliberately over- or underweighting the currencies themselves. When currency exposures are managed by a currency overlay manager, the portfolio manager's performance is assessed net of currency movements.

The derivatives most commonly used for currency hedging are forward and futures contracts. The manager sells the foreign currency forward, in the amount of the invested principal, for the domestic currency. The manager is said to be short the foreign currency and long the domestic currency. To the extent that the value of the investment does not change, the manager has hedged the exposure to the currency.

## LOS 42.e

- The total return to active management over multiple periods is the difference between compounded portfolio and benchmark returns.
- Returns to individual attributes can be calculated for each individual period using the formulas we have seen for domestic and global attribution analysis.
- The multiple-period return to active management for an individual attribute cannot be determined by adding the attribute's contributions in each period.
- The multiple-period return to active management for an individual attribute cannot be determined by compounding the attribute's contributions in each period.
- The multiple-period return to active management for an individual attribute cannot be determined by assuming it stays at the same proportion of the active return in each period.
- Each attribute's contribution in the first period must be compounded at the benchmark rate of return over the second period.
- Each attribute's contribution in the second period must be compounded with the portfolio return from the first period.

## LOS 42.f

There are four generally accepted measures of risk in the context of global performance evaluation: standard deviation, tracking error, information ratio, and Sharpe ratio.

- Standard deviation.

  Standard deviation measures the total risk of the portfolio. It is not measured relative to a benchmark. It measures the variability of the portfolio's return around its historical mean.

$$\sigma = \sqrt{\frac{\sum (R_t - \overline{R})^2}{n-1}}$$

where:
$R_t$ = return for period $t$
$\overline{R}$ = average portfolio return over $n$ periods

- Tracking error.

$$SR_t = R_t - R_{b,t} \text{ and } \sigma_{SR} = \sqrt{\frac{\sum (SR_t - SR_{avg})^2}{n-1}}$$

where:
$SR_t$ = surplus return (also called alpha or excess return) for period $t$
$R_t$ = portfolio return for period $t$
$R_{b,t}$ = benchmark return for period $t$
$\sigma_{SR}$ = standard deviation of surplus returns (a.k.a. tracking error)
$SR_{avg}$ = average surplus return

- Information ratio.

The information ratio is the ratio of the average surplus return to its standard deviation.

$$\text{information ratio} = \frac{SR}{\sigma_{SR}}$$

- Sharpe ratio.

A higher Sharpe ratio indicates superior performance.

$$\text{Sharpe ratio} = \frac{\overline{R}_P - \overline{R}_F}{\sigma_P}$$

where:
$\overline{R}_P$ = average return to the fund over the measurement period
$\overline{R}_F$ = average risk-free rate over the measurement period
$\sigma_P$ = standard deviation of the portfolio returns over the measurement period

## LOS 42.g

Risk budgeting is the risk counterpart of performance attribution. Just as performance attribution tries to identify sources contributing to the portfolio's performance, risk budgeting is allocating varying amounts of risk among managers.

The overall risk of a portfolio has two major sources:

- **Sector risk**—the risk of individual sectors or countries. It is a measure of risk for a passive benchmark portfolio.
- **Selection risk**—the additional risk undertaken by the manager by deviating from the benchmark. The manager takes this additional risk to produce positive alphas for the sectors in the portfolio.

Typically, the investment policy statement of a portfolio specifies the risk allowances for the manager, effectively limiting the manager's ability to take risk. For example, the plan sponsor might limit the manager to benchmark tracking error of 5%.

### LOS 42.h

The performance of a portfolio manager can sometimes be compared to an existing index. This may not be suitable for all portfolios, however, so some portfolio managers use custom benchmarks.

Custom benchmarks should identify specific weights assigned to individual countries and/or sectors and specific industries within each country or sector. A currency-hedging component may also be present. The individual country weights may be based on a macroeconomic measure such as GDP. Sometimes, benchmarks bypass country weights and assign weights to industries worldwide, irrespective of the companies' countries of registration. Sometimes, benchmarks are established purely on the basis of style, ignoring countries.

The key is to have a custom benchmark that accurately reflects the investment objectives of the portfolio.

## CONCEPT CHECKERS

1. Explain the importance of currency effect on a global portfolio return.

2. Mike Gill's international stock portfolio consisted of BMW and Cadbury. Gill, a U.S. investor, bought 1,000 shares of Cadbury at £3.65 and 200 shares of BMW at €33.58 on July 1, 2003. On July 31, 2003, the price of a Cadbury share was quoted at £3.85 and the price of a BMW share was quoted at €34.40. There was no dividend paid on either stock during the month. On July 1, 2003, the foreign exchange rates were $1.58/£ and $1.12/€. On July 31, 2003, the foreign exchange rates were $1.67/£ and $1.17/€. Calculate the portfolio's return in local and base currency and the effect of currency movement on the portfolio.

3. Rick Milo is the manager of portfolio G with the U.S. dollar as the base currency. The portfolio invests in three emerging markets: China (renminbi), Argentina (peso), and Indonesia (rupiah). The benchmark portfolio has 45% weight in China, 20% weight in Argentina, and 35% weight in Indonesia.

   During the third quarter of 2003, the renminbi, peso, and rupiah appreciated against the U.S. dollar by 5%, 3%, and 1%, respectively. The following additional information is available about the portfolio and benchmark:

| | *Weight* | | *Local Currency Return* | | *U.S. $ Return* | |
|---|---|---|---|---|---|---|
| *Country* | *Portfolio* | *Benchmark* | *Portfolio* | *Benchmark* | *Portfolio* | *Benchmark* |
| China | 50% | 45% | 6.50% | 5.50% | 11.83% | 10.78% |
| Argentina | 10% | 20% | 12.00% | 33.00% | 15.36% | 36.99% |
| Indonesia | 40% | 35% | 1.00% | –2.50% | 2.01% | –1.53% |

A. **Compute** the base currency return for portfolio G and the benchmark.

B. **Compute** the currency allocation effect for portfolio G.

C. **Compute** the market allocation effect for portfolio G.

D. **Compute** the security selection effect for portfolio G.

E. **Evaluate** the overall portfolio performance and **comment** on the strengths and weaknesses of the manager.

4. **Define** and **explain** three measures of risk in the context of global performance evaluation.

5. **Explain** the need for custom benchmarks for global performance evaluation.

6. A manager of an international portfolio uses country weights that are identical to the country weights in the benchmark. Based upon this information, which of the following statements is *most accurate*?
   A. Both the currency allocation effect and the market allocation effect are zero.
   B. Neither the currency allocation effect nor the market allocation effect is zero.
   C. The market allocation effect is zero, but the currency allocation effect may be nonzero.

7. Which of the following *most accurately* represents active currency management?
   A. A portfolio closely matches the benchmark, but neither is hedged against currency risk.
   B. A portfolio manager sold a foreign currency forward contract in the amount invested in the foreign asset.
   C. A portfolio that tracks the benchmark is not hedged against currency risk, but the benchmark is hedged.

8. Which of the following statements regarding measuring a manager's multiple-period active return is *least accurate?*
   A. The multiple-period return to active management for an individual attribute cannot be determined by adding the attribute's contributions in each period.
   B. The sum of the attribute contributions in each period (e.g., security selection, market allocation) must be the difference between the compounded portfolio and benchmark multiple-period returns.
   C. The multiple-period return to active management for an individual attribute cannot be determined by compounding the attribute's contributions in each period.

9. In creating a global benchmark, the weights assigned to the markets of different countries can be based upon:
   A. either the market capitalizations or GDPs of the countries represented in the benchmark.
   B. the market capitalizations but not the GDPs of the countries represented in the benchmark.
   C. the GDPs but not the market capitalizations of the countries represented in the benchmark.

10. If the plan sponsor limits the manager of a portfolio to a benchmark tracking error of 10%, this would *most likely* be an example of:
   A. risk budgeting, and it would appear in the investment policy statement of a portfolio.
   B. risk budgeting, but it would not appear in the investment policy statement of a portfolio.
   C. performance attribution, and it would appear in the investment policy statement of a portfolio.

# ANSWERS – CONCEPT CHECKERS

1. When a manager invests in a foreign security, he needs to consider not only the return on the investment in local currency, but also the impact of currency fluctuation on the return in the base (domestic) currency. For example, if an investment in a Mexican stock has a return of 15% in local currency and the peso devalues by 3% versus the U.S. dollar, the return in U.S. dollars will be lower by 3.45% [= 0.03(1 + 0.15)]. The lower return due to devaluation of the Mexican peso is called the currency effect. Hence, the manager must consider expectations of currency values while making international investment decisions.

2. Columns 1, 2, 3, and 4 show the name of the company, number of shares purchased, and price in local currency at the beginning and end of the month, respectively.

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|
| *Stock* | *# Shares* | *1-Jul Price* | *31-Jul Price* | *Return in Local Currency* | *1-Jul $/£,€* | *31-Jul $/£,€* | *1-Jul Value ($)* | *31-Jul Value($)* | *1-Jul Weight($)* |
| BMW | 200 | 33.58 | 34.40 | 2.44% | 1.12 | 1.17 | 7,521.92 | 8,049.60 | 57% |
| Cadbury | 1,000 | 3.65 | 3.85 | 5.48% | 1.58 | 1.67 | 5,767.00 | 6,429.50 | 43% |
| | | | | | | Total | 13,288.92 | 14,479.10 | 100% |

Column 5 shows the return in local currency. Columns 6 and 7 show the value of the currencies at the beginning and end of the month. Columns 8 and 9 show the value of the portfolio at the beginning and end of the month. The return in local currency was 2.44% for BMW and 5.48% for Cadbury. Assigning weights based on the beginning U.S. dollar investment in the two stocks, we get the portfolio return of 3.75% in local currencies. The portfolio return in U.S. dollars is the appreciation of the portfolio value from 13,288.92 to 14,479.10 or 8.96% [i.e., the portfolio return in base (domestic) currency is 8.96%]. The difference in the two portfolio returns is 5.21% and is attributable to favorable currency movement for the portfolio.

3. The following table summarizes the results:

| *Country* | *Weight* | | *Currency Change* | *Local Currency Return* | | *U.S. $ Return* | | $C_{j,p}$ | $C_{j,b}$ | *Currency Effect* | *Market Allocation* | *Security Selection* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Portfolio* | *Bench* | | *Portfolio* | *Bench* | *Portfolio* | *Bench* | | | | | |
| China | 50% | 45% | 5.00% | 6.50% | 5.50% | 11.83% | 10.78% | 5.33% | 5.28% | 0.29% | 0.28% | 0.50% |
| Argentina | 10% | 20% | 3.00% | 12.00% | 33.00% | 15.36% | 36.99% | 3.36% | 3.99% | –0.46% | –3.30% | –2.10% |
| Indonesia | 40% | 35% | 1.00% | 1.00% | –2.50% | 2.01% | –1.53% | 1.01% | 0.98% | 0.06% | –0.13% | 1.40% |
| TOTAL | 100% | 100% | | 4.85% | 8.20% | 8.25% | 11.71% | | | –0.11% | –3.15% | –0.20% |

A. The U.S. dollar return for the portfolio and benchmark is 8.26% and 11.71%, respectively. The portfolio underperformed the benchmark by 3.46%.

Example: For portfolio G, $R_{p,d}$ = 0.50(11.83%) + 0.10(15.36%) + 0.40(2.01%)
= 5.92% + 1.54% + 0.80% = 8.26%

B. The currency allocation effect is –0.11%.

Example: For China, $(w_{j,p}C_{j,p} - w_{j,b}C_{j,b}) = 0.5(5.33\%) - 0.45(5.28\%) = 0.289\%$

C. The market allocation effect is –3.15%.

Example: For China, $(w_{j,p} - w_{j,b})R_{j,b,f} = (0.50 - 0.45)(5.5\%) = 0.275\%$

D. The security selection effect is –0.20%.

Example: For China, $w_{j,p}(R_{j,p,f} - R_{j,b,f}) = 0.50(6.50\% - 5.50\%) = 0.50\%$

E. The portfolio underperformed the benchmark mostly due to market allocation effect of –3.15%. This was because the manager underweighted the best-performing sector, Argentina. The manager also had poor currency allocation effect and selection effect. The glaring difference is that the manager has positive currency and security selection effect in China and Indonesia, but that is offset by large negative currency and security selection effects in Argentina. If this was part of a normal pattern, it would seem that the manager's strengths lie in the Chinese and Indonesian markets and not in the Argentinean market.

4. Three measures of risk:

A. Standard deviation is a measure of total risk. It computes the variability of portfolio returns around its historical mean. The standard deviation is not measured relative to a benchmark and is not comparable across portfolios because it measures absolute, rather than relative, risk.

B. Sharpe ratio is the ratio of the risk premium earned by the portfolio (portfolio return minus the risk-free rate) divided by the risk as measured by standard deviation. The Sharpe ratio is a benefit-cost ratio where the benefit of return is compared with the cost of the risk taken to achieve the return. A higher Sharpe ratio indicates a better risk-adjusted performance. The Sharpe ratio is not directly measured relative to a specific benchmark but compares returns to the risk-free rate.

C. Information ratio is the ratio of the surplus return earned by the portfolio (portfolio return minus benchmark return) divided by the tracking error, as measured by standard deviation of the surplus returns. The information ratio is measured relative to the benchmark. A higher information ratio indicates better risk-adjusted performance.

5. The performance of a portfolio manager is usually compared to a passive benchmark portfolio. The benchmark selected by the plan sponsors usually is consistent with the plan's investment objective and may be specifically incorporated in the investment objective. Sometimes, existing and widely used indices are used as benchmarks. These may not be suitable for all portfolios due to defined objectives and/or constraints. As a result, some portfolios have specific custom benchmarks. Custom benchmarks should be designed to be consistent with the investment objective of the portfolio. Usually, the custom benchmark specifies the weights for each market in the benchmark. A currency-hedging component may also be present.

6. C Because the country weights (market weights) are identical, the market allocation effect must be zero:

$$\text{market allocation effect (MAE)} = \sum_{j=1}^{n}\left(w_{j,p} - w_{j,b}\right) \times R_{j,b,l}$$

$$\text{if } w_{j,p} = w_{j,b} \Rightarrow \text{MAE} = 0$$

The manager's currency allocation effect is calculated as:

$$\text{currency allocation effect (CAE)} = \sum_{j=1}^{n}\left(w_{j,P}C_{j,P} - w_{j,b}C_{j,b}\right)$$

$C_{j,P}$ and $C_{j,b}$ are the currency effects for the portfolio and benchmark, respectively, and are determined by subtracting the local return from its respective domestic return. If the manager uses the same market weights as the benchmark, he has the same currency exposures as the benchmark. If he does not hedge any of the currency exposures and the returns for the sectors in the benchmark and portfolio are the same, the currency effects must be the same for the manager and the benchmark, and the currency allocation effect is zero.

If, on the other hand, the returns for the sectors (markets) in the portfolio are different from those in the benchmark, there may be a small currency allocation effect. For example, assume 10% and 12% local returns for the benchmark and portfolio, respectively. Further assume the foreign currency appreciates 2% relative to the domestic currency. The general form of the equation to calculate a domestic return and the domestic returns for the benchmark and portfolio are below:

$$R_D = R_L + S + (R_L)(S)$$
$$R_{D,B} = 0.10 + 0.02 + 0.10(0.02) = 0.1220\%$$
$$R_{D,P} = 0.12 + 0.02 + 0.12(0.02) = 0.1424\%$$

where:
$R_D$ = domestic return for the benchmark (B) or the portfolio (P)
$R_L$ = local return for the benchmark (B) or the portfolio (P)
$S$ = percentage change in the value of the currency *i*

Note that the difference between the two domestic returns is 2.04% (= 14.24 – 12.20). The difference in the two local returns of 2% would be attributed to security selection and not to a currency allocation effect. We therefore remove the 2% from the difference in the domestic returns and are left with the difference in returns resulting solely from a currency effect:

2.04% – 2.0% = 0.04%

Note that 0.04% is the cross product term consisting of the difference in the local returns multiplied by the change in the value of the currency:

(0.12 – 0.10) × 0.02 = 0.0004 = 0.04% = 4 bps

Other than the 4 bps, the impact of the change in the value of the currency (i.e., the currency effect) is the same for the portfolio and the benchmark.

*Professor's Note: Because the currency effects for the portfolio and the benchmark are usually so close, the overall currency allocation effect is sometimes estimated as the difference in weights multiplied by the percentage change (sj) in the value of the currency:*

$$\text{currency allocation effect} \approx \sum_{j}\left(w_{j,p} - w_{j,b}\right)\left(s_j\right)$$



7. C Active currency management is represented by any difference between the benchmark currency and the portfolio currency; thus, if the benchmark is hedged against currency risk but the portfolio is not, this is active currency management. Passive currency management is represented by a portfolio that is hedged against currency risk by using currency forward or futures contracts or a portfolio that closely matches the benchmark.

8. B Taking the difference in multi-period returns between the compounded portfolio and the benchmark returns will yield the total active return for the portfolio but will not tell us how the active return for each attribute was achieved. The active return for each attribute would be calculated using the following equation for a 2-period return analysis.

$$R_{A,2} = R_{a,1}\left(1 + R_{b,2}\right) + R_{a,2}\left(1 + R_{p,1}\right)$$

where:
$R_{A,2}$ = 2-period active return
$R_{a,i}$ = active return in period $i$
$R_{b,2}$ = benchmark return in period 2
$R_{p,1}$ = portfolio return in period 1

The multi-period active return for each separate attribute would then be added together to get the total multi-period active return for the portfolio.

9. A The individual country weights may be based on the total market capitalization of the country's publicly traded securities or another macroeconomic measure such as GDP.

10. A This is an example of risk budgeting. Such guidelines are a part of the investment policy statement.

## Self-Test: Performance Evaluation and Attribution

**Use the following information for Questions 1 through 6.**

Patty McDaniel and Peggy Peterson are consultants to Sigma Advisors. Sigma manages funds for wealthy individuals and small institutions. McDaniel and Peterson have been asked by Sigma to develop a plan to evaluate investment manager performance and to create customized benchmarks, when necessary.

As part of her service to Sigma Advisors, McDaniel creates a returns-based benchmark using monthly portfolio returns and the returns for large-cap value, large-cap growth, small-cap value, and small-cap growth indices over the past year. An algorithm is then used to determine the manager's exposures to various styles. McDaniel uses this information to evaluate managers. She believes that this will help Sigma identify underperforming and outperforming managers.

Regarding the identification of underperforming managers, the null hypothesis is that the manager adds no value. McDaniel states that Sigma should avoid a Type I error, which, McDaniel continues, is failing to reject the null when it is false. Peterson adds that another danger for Sigma would be a Type II error, where Sigma would reject the null hypothesis when it is true. In both cases, McDaniel and Peterson agree that the decisions reached would be faulty.

Discussing returns-based style analysis further, McDaniel insists the model is purely statistical in nature, and one advantage to using this type of benchmark is that it is useful where the only information available is account returns. Peterson answers that a disadvantage to using this type of benchmark is that it is generally difficult to understand and not very intuitive.

As part of McDaniel's and Peterson's task, Sigma asks them to perform micro performance attribution on one of its managers, Frank Matson. Matson invests primarily in large-cap value stocks. Matson's performance relative to the appropriate benchmark is shown below.

| | *Portfolio Sector Weight* | *Benchmark Sector Weight* | *Portfolio Sector Return* | *Benchmark Sector Return* |
|---|---|---|---|---|
| Agricultural | 4.00% | 6.00% | –2.00% | –1.00% |
| Capital Goods | 8.00% | 9.00% | –4.00% | –5.00% |
| Consumer Durables | 32.00% | 35.00% | 2.00% | 3.00% |
| Energy | 6.00% | 6.00% | 8.00% | 2.00% |
| Financial | 20.00% | 18.00% | 6.40% | 4.00% |
| Technology | 16.00% | 16.00% | 2.60% | –2.00% |
| Utilities | 12.00% | 10.00% | 4.00% | –2.00% |
| Cash | 2.00% | 0.00% | 0.20% | |
| Total | 100.00% | 100.00% | | |
| Portfolio Plus Cash Return | | | 2.90% | 0.86% |

1. Regarding McDaniel's use of a returns-based benchmark, the characteristic that is *most likely* to make it invalid is that the typical returns-based style analysis:
   A. is not investable.
   B. is ambiguous.
   C. lacks statistical reliability.

2. Concerning McDaniel's and Peterson's statements about Type I and Type II errors:
   A. both are correct.
   B. both are incorrect.
   C. only one is correct.

3. Regarding their statements concerning the advantages and disadvantages of returns-based style analysis:
   A. both are correct.
   B. both are incorrect.
   C. only one is correct.

4. From the data in the table, does Matson demonstrate an ability to wisely allocate funds to the capital goods and/or financial sectors?
   A. Yes, but only in the capital goods sector.
   B. Yes, but only in the financial sector.
   C. Yes, in both capital goods and financial sectors.

5. Does Matson demonstrate an ability to select stocks in the consumer durables and/or technology sectors?
   A. Yes, in both technology and consumer durables sectors.
   B. Yes, but only in the technology sector.
   C. No, he does not demonstrate the ability to select stocks in either sector.

6. Does Matson demonstrate an ability to generate a positive return from selection/allocation interaction effects in the agricultural and/or utilities sectors?
   A. Yes, but only in the agricultural sector.
   B. Yes, in both agricultural and utilities sectors.
   C. Yes, but only in the utilities sector.

**Use the following information for Questions 7 through 12.**

John Willis and Mike Dunn are employees with Taylor Advisors. Taylor offers independent investment advice to institutional clients throughout the United States and Canada. Willis's and Dunn's primary responsibility is evaluating the performance of portfolio managers that Taylor's clients are considering. When necessary, they create customized benchmarks and use the Sharpe, Treynor, ex post alpha, and $M^2$ measures. These measures adjust a manager's return for the risk undertaken, where risk is defined as total using the standard deviation or as systematic using beta.

Willis and Dunn are preparing an analysis of the performance of the Jaguar and Theta mutual funds. Jaguar and Theta are being considered by the endowment of National University as an addition to its portfolio. Henry Roll is the portfolio manager for the National endowment. National's current endowment is well diversified, consisting of U.S. and international stocks and bonds, hedge funds, real estate investment trusts, and a small cash position necessary to meet next quarter's expenses. In addition to the Jaguar and Theta mutual funds under consideration, Roll is also considering adding individual bonds

to National's portfolio because individual bonds have become increasingly more liquid. Willis believes that municipal bonds would be a good consideration because their after-tax return is often higher than that available from corporate bonds. Roll informs them that National is also considering adding BBB rated bonds as a small portion of their portfolio, but Dunn believes that this is probably not a good idea because, although he has not reviewed National's investment policy statement, endowments typically have a low ability and willingness to take risk because the endowment must meet the spending needs created by university operating budgets, student scholarships, and faculty salaries.

The most recent risk and return measures for both Jaguar and Theta are shown below. The minimum acceptable return (MAR) for National is the 5.0% spending rate on the endowment, which the endowment has determined using a geometric spending rule. The T-bill return over the same fiscal year was 4.5%. The return on the Wilshire 5000 was used as the market index. The Wilshire 5000 index had a return of 10% with a standard deviation of 21% and a beta of 1.0.

| | *Jaguar* | *Theta* |
|---|---|---|
| Return | 16.5% | 15.9% |
| Standard Deviation | 38.1% | 35.6% |
| Beta | 0.8 | 1.25 |
| Downside Deviation | 14.9% | 14.0% |

Analyzing the results of their performance evaluation, Willis notices that the results demonstrate that the Jaguar portfolio is less diversified than the Theta portfolio. Dunn adds that the Theta portfolio would be a better addition to the National portfolio than the Jaguar fund.

7. Regarding Willis's and Dunn's comments concerning the addition of municipal and BBB bonds to National's portfolio:
   A. both are correct.
   B. both are incorrect.
   C. only one is correct.

8. The M-squared measure for the Jaguar fund is *closest* to:
   A. 8.10%.
   B. 11.11%.
   C. 6.70%.

9. The Sharpe ratio for the Theta fund is *closest* to:
   A. 0.15.
   B. 0.32.
   C. 2.31.

10. The Treynor ratio for the Theta fund is *closest* to:
    A. 31.5.
    B. 15.0.
    C. 9.1.

11. The ex post alpha for the Jaguar fund is *closest* to:
    A. 7.1%.
    B. 7.6%.
    C. 9.3%.

12. Regarding Willis's and Dunn's statements concerning the diversification and addition of the Jaguar and Theta funds to National's portfolio:
    A. both are correct.
    B. both are incorrect.
    C. only one is correct.

# Self-Test Answers: Performance Evaluation and Attribution

1. C McDaniel's returns-based benchmark is likely not a valid benchmark because it is not statistically reliable. She uses only 12 data points (the monthly returns over the past year), and this is not enough data points to generate a statistically reliable model. Returns-based benchmarks are measurable, investable, and unambiguous.

2. B McDaniel is incorrect. Although the null hypothesis is stated correctly (the manager adds no value), McDaniel's definition of a Type I error is incorrect. A Type I error is when the null hypothesis is rejected when it is true. Peterson is also incorrect. A Type II error is failure to reject the null when it is false.

3. C McDaniel is correct. One advantage to using a returns-based benchmark is that it is useful where the only information available is account returns. Peterson is incorrect. Returns-based benchmarks are generally easy to use and intuitive.

4. C To answer this question, we must first examine the return for the overall benchmark versus the return for the benchmark in both sectors. The overall return for the benchmark is given at 0.86%. The capital goods sector return in the benchmark was –5.00%. For the financial sector, it was 4.00%. Thus, relative to the overall benchmark return of 0.86%, the capital goods sector was an underperforming sector and the financial sector outperformed. Now determine whether Matson overweighted or underweighted each sector. He underweighted the weak capital goods sector (8.00% allocation for the manager versus 9.00% for the benchmark), and he overweighted the strong financial sector (20.00% allocation for the manager versus 18.00% for the benchmark). Because Matson underweighted a weak sector and he overweighted a strong sector, he made correct decisions for both.

   No calculations are needed to reach the above conclusions. However, the sector allocation returns can be calculated by multiplying the difference between the portfolio and benchmark allocation by the difference in sector benchmark return and overall benchmark return for each sector. For the capital goods sector, it is (8.0% – 9.0%) × (–5.00% – 0.86%) = 0.0586%. For the financial sector, it is (20.0% – 18.0%) × (4.00% – 0.86%) = 0.0628%.

5. B To answer this question, examine the return for the manager against the return for the benchmark in each sector. Matson's return in the consumer durables sector was 2% versus 3% for the benchmark, so he did not outperform the benchmark for security selection in this sector. However, the return for the manager in the technology sector was 2.6% versus –2% for the benchmark, so he did outperform the benchmark for security selection in this sector.

   No calculations are needed to reach the above conclusions. However, the within-sector allocation returns can be calculated by multiplying the difference between the portfolio and benchmark return in each sector by the benchmark's weight. For the consumer durables sector, it is (2.0% – 3.0%) × 35% = –0.35%. For the technology sector, it is (2.6% + 2.0%) × 16% = 0.736%.

6. B To answer this question, multiply the difference in weightings for the manager and the benchmark by the difference in returns for the manager and the benchmark in each sector. In the agricultural sector, this is (4% – 6%) × (–2% + 1%) = 0.02%. In the utilities sector, this is (12% – 10%) × (4% + 2%) = 0.12%.

7. B Willis is incorrect. Endowments are not taxable entities so the tax advantage of the municipal bonds is not a valid reason for the endowment to consider the municipal bonds. Dunn is incorrect. Endowments typically have a high ability and willingness to take risk because of

their infinite time horizon. It is also imprudent for Dunn to state whether an investment is appropriate for National until he has reviewed the investment policy statement.

8. B The M-squared measure for the Jaguar fund is 11.11%.

To calculate the M-squared ratio for Jaguar, use the following formula:

$$M_P^2 = \overline{R}_F + \left(\frac{\overline{R}_P - \overline{R}_F}{\sigma_P}\right)\sigma_M$$

$$M_P^2 = 0.045 + \left(\frac{0.165 - 0.045}{0.381}\right)0.21 = 0.1111 = 11.11\%$$

Comparing the 11.11% to the return on the market of 10%, the Jaguar fund has superior performance. The M-squared measure for the Theta fund is 11.22%, which indicates that the Theta fund has superior performance relative to both the market and Jaguar fund.

9. B The Sharpe ratio for Theta would be calculated as:

$$S_P = \frac{\overline{R}_A - \overline{R}_F}{\sigma_A}$$

$$S_P = \frac{15.9 - 4.5}{35.6} = 0.32$$

The Sharpe ratio for the Jaguar fund is 0.31, which indicates that the Theta fund has superior performance relative to the Jaguar fund.

10. C The Treynor ratio for Theta would be calculated as:

$$T_P = \frac{\overline{R}_A - \overline{R}_F}{\beta_A}$$

$$T_P = \frac{15.9 - 4.5}{1.25} = 9.1$$

The Treynor ratio for the Jaguar fund is 15.0, which indicates that the Jaguar fund has superior performance relative to the Theta fund.

11. B The ex post alpha for Jaguar would be calculated as:

$$\hat{R}_P = R_F + \beta_P\left[\hat{R}_M - R_F\right]$$
$$\hat{R}_P = 0.045 + 0.8(0.10 - 0.045) = 8.90\%$$
$$\alpha_P = R_{P,t} - \hat{R}_P$$
$$\alpha_P = 0.165 - 0.0890 = 7.6\%$$

The ex post alpha for the Theta fund is 4.5%, which indicates that the Jaguar fund has superior performance relative to the Theta fund.

12. C Willis is correct. By the Sharpe ratio and M-squared measures, which use total risk (standard deviation), the Theta fund has superior performance. By the Treynor ratio and ex post alpha, which use systematic risk (beta), the Jaguar fund has superior performance. The discrepancy is because the Jaguar fund is poorly diversified. Dunn is incorrect. National's current endowment is well diversified and thus the appropriate measure of risk for additional investments would be beta. Because the Jaguar fund has a better Treynor ratio and ex post alpha, it is the better fund to add to the endowment.

**The following is a review of the Global Investment Performance Standards principles designed to address the learning outcome statements set forth by CFA Institute. This topic is also covered in:**

# GLOBAL INVESTMENT PERFORMANCE STANDARDS

**Study Session 18**

## EXAM FOCUS

I recommend that you spend considerable time on this topic review, as you will most likely have a GIPS question on the exam. There is virtually nothing in this material that can be ignored or simply skimmed. In addition to this review of the GIPS and the review of the Code and Standards in Book 1 of the SchweserNotes, you will find a review of each in the Level III online library customized to meet the needs of Level III candidates. They provide a review of everything you need to know about Study Sessions 1, 2, and 18 for the Level III CFA exam.

## THE CREATION AND EVOLUTION OF THE GIPS STANDARDS

The Global Investment Performance Standards (GIPS®) contain ethical and professional standards for the presentation of investment performance results. The GIPS are a *voluntary* set of standards. They are based on the fundamental principles of full disclosure and fair representation of performance results. When investment management firms comply with the GIPS, clients, prospective clients, and consultants are better equipped to fairly assess historical investment performance.

The GIPS are not all-encompassing because there is no practical way for a set of standards to address every possible situation a firm may face. The GIPS should, therefore, be viewed as a *minimum* set of investment performance presentation standards. Investment management firms should always include additional information in their performance presentations that would help current and prospective clients better understand the reported performance results.

**LOS 43.a: Discuss the reasons for the creation of the GIPS standards, their evolution, and their benefits to prospective clients and investment managers.**

*CFA® Program Curriculum, Volume 6, page 249*

Recognizing the need for one globally accepted set of investment performance presentation standards, CFA Institute [formerly Association for Investment Management and Research (AIMR)] sponsored and funded the Global Investment Performance Standards Committee to develop and publish a single global standard by which all firms calculate and present performance to clients and prospective clients. As a result of this initiative, the AIMR Board of Governors formally endorsed GIPS on February 19, 1999, as the worldwide standard. This was not the first time that such a unified approach had been conceived: as far back as 1966, Peter O. Dietz published a description for

pension fund investment performance,[1] and in 1980, Wilshire Associates was involved in the establishment of the Trust Universe Comparison Service, a database of portfolio returns for which members produced unified return calculations. Later, in 1993, AIMR published the Performance Presentation Standards, effectively the precursor to today's GIPS.

Since 1999, the Investment Performance Council (IPC), the replacement of the GIPS Committee, has developed the standards further. The IPC's purpose is "to promote the adoption and implementation of a single investment performance presentation standard throughout the world as the common method for calculating and presenting investment performance." As such, the IPC issued revised GIPS standards that were adopted by the CFA Institute Board of Governors on February 4, 2005, and became effective on January 1, 2006. The latest edition of the GIPS was adopted by the GIPS Executive Committee on January 29, 2010.

### Benefits to Managers and Clients

The benefits to existing and prospective clients derive from the underlying purpose of the GIPS—the ability to compare the performance of firms operating in different countries with different sets of established practices. With the increase in global investing and the accompanying increase in global competition comes the need for a standardized method for calculating and presenting investment results. The GIPS ensure that performance data are complete and fairly presented so that existing and prospective clients can have greater confidence in comparative investment results.

In addition to a more reliable measure of past investment performance results, the GIPS provide managers with the ability to compete fairly in foreign markets. Firms located in countries with little or no regulation can compete on an even basis with regulated countries by presenting performance results that have been verified through GIPS compliance. Simply put, investors can place more confidence in GIPS-compliant performance results. In addition to external benefits to GIPS compliance, firms can identify weaknesses in internal management controls during the implementation of GIPS.

## Objectives, Key Characteristics, and Scope of the GIPS

**LOS 43.b: Discuss the objectives, key characteristics, and scope of the GIPS standards.**

*CFA® Program Curriculum, Volume 6, page 269*

### GIPS Objectives

- Establish global, industry-wide best practices for the calculation and presentation of investment performance, so that performance presentations for GIPS-compliant firms can be compared regardless of their country location.

1. Peter O. Dietz, *Pension Funds: Measuring Investment Performance* (New York: The Free Press, 1966).

- Facilitate the accurate and unambiguous presentation of investment performance results to current and prospective clients.
- Facilitate a comparison of the historical performance of investment management firms so that clients can make educated decisions when hiring new managers.
- Encourage full disclosure and fair global competition without barriers to entry.
- Encourage self-regulation.

## GIPS Characteristics

- The GIPS are voluntary, minimum standards for performance presentation.
- The GIPS contain requirements that must be followed and recommendations that are considered industry best practice and should be followed but are not required. Firms must meet all requirements on a firm-wide basis in order to claim compliance.
- Only investment management firms may claim compliance; individuals may not claim GIPS compliance.
- The GIPS provide a minimum standard where local or country-specific laws, regulation, or industry standards may not exist.
- The GIPS require managers to include all actual fee-paying, discretionary portfolios in composites defined according to similar strategy and/or investment objective.
- Firms must present a minimum of five years of GIPS-compliant history or since inception if less than five years. After presenting at least five years of compliant history, the firm must add annual performance each year going forward, up to ten years, at a minimum.
- Firms may link years of noncompliant performance but must present only compliant data for periods beginning on or after January 1, 2000.
- Firms must use prescribed calculation and presentation methods and include required disclosures in presentations.
- The GIPS rely on the integrity of input data. The accuracy of input data is critical to the accuracy of the performance presentation.
- The GIPS must be applied with the goal of full disclosure and fair representation of investment performance. Meeting the objective of full and fair disclosure will likely require more than compliance with the minimum requirements of the GIPS.
- If an investment firm applies the GIPS in a performance situation that is not addressed specifically by the standards or that is open to interpretation, disclosures other than those required by the GIPS may be necessary. To fully explain the performance included in a presentation, firms are encouraged to present all relevant supplemental information.
- In cases in which applicable local or country-specific laws or regulations conflict with the GIPS, the standards require firms to comply with the local law or regulation and make full disclosure of the conflict.
- Firms are encouraged to develop monitoring processes and controls for maintaining GIPS compliance.
- Firms must document the policies used to ensure the existence and ownership of client assets.
- January 1, 2011, is the effective date of the 2010 edition of the GIPS. Presentations that include performance for periods beginning on or after January 1, 2011, must comply with the 2010 version of the GIPS.

### Scope of the GIPS

Firms from any country may come into compliance with the GIPS. Compliance with the standards will facilitate a firm's participation in the investment management industry on a global level.

For periods prior to January 1, 2006, firms are granted reciprocity, so that if pre-2006 data are presented in compliance with a previous edition of the GIPS or a Country Version of GIPS (CVG), such data may continue to be shown as compliant with the revised GIPS.

## GIPS Compliance

**LOS 43.c: Explain the fundamentals of compliance with the GIPS standards, including the definition of the firm and the firm's definition of discretion.**

*CFA® Program Curriculum, Volume 6, page 256*

GIPS compliance must be on a *firm-wide basis.* How a firm defines itself, therefore, is critically important because it determines total firm assets as well as the policies and practices that must be performed in compliance with the GIPS. *Total firm assets* are defined as the total fair value of all assets the firm manages, including non-fee-paying and non-discretionary portfolios. Also included in the definition are assets delegated to sub-advisers, as long as the firm has selected the sub-advisers. Assets managed by sub-advisers not selected by the firm are not included in total firm assets.

How a firm defines *discretion* is also of paramount importance. If (according to the firm's definition of discretion) a portfolio is deemed discretionary, it is considered sufficiently free of client-mandated constraints such that the manager is able to pursue its stated strategy, objectives, or mandate. The GIPS require that all actual, fee-paying discretionary portfolios are included in at least one composite.[2]

### Definition of the Firm[3]

A **firm** is defined as:

> "an investment firm, subsidiary, or division held out to clients or potential clients as a distinct business entity."

A **distinct business entity** is defined as:

> "a unit, division, department, or office that is organizationally or functionally separated from other units, divisions, departments, or offices and that retains discretion over the assets it manages and that should have autonomy over the investment decision-making process."

2. Actual means that the portfolio is assets under management, not a model or simulated portfolio. A composite is a portfolio or group of portfolios managed to the same investment strategy or mandate.
3. CFA Program 2013 Curriculum, Volume 6, Level III.

### Fundamentals of Compliance

In order to claim compliance with GIPS, a firm must adhere to all the requirements laid out in the sections that follow. Furthermore, firms need to have *written* documentation of those policies and procedures that ensure compliance with the standards.

Once a firm has met all of the required elements of the GIPS, the firm may use the following compliance statement to indicate that the performance presentation is in compliance with the GIPS:

> *(Insert name of firm) claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. (Insert name of firm) has not been independently verified.*

Note that firms cannot claim *partial* GIPS compliance. For example, a firm cannot claim GIPS compliance for a single composite, asset class, or strategy or for a single portfolio. This specifically prohibits statements such as "…in compliance with the Global Investment Performance Standards *except for*…." Incomplete GIPS compliance statements are also unacceptable, unless a GIPS compliant firm is providing client-specific performance data to that client.

Also note that only investment management firms may claim compliance with GIPS. Entities such as pension plan sponsors and consultants may not claim GIPS compliance.

## Input Data Requirements and Recommendations

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**LOS 43.d: Explain the requirements and recommendations of the GIPS standards with respect to input data, including accounting policies related to valuation and performance measurement.**

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*CFA® Program Curriculum, Volume 6, page 262*

### GIPS Input Data Requirements (Standards 1.A.1–7)

- **Standard 1.A.1.** All data and information necessary to support the firm's performance presentation, including calculations, must be stored and maintained.

  *Discussion:* Current and prospective clients as well as auditors and regulators should be able to confirm valuations and recreate return calculations.

- **Standard 1.A.2.** For periods beginning on or after January 1, 2011, portfolios must be valued at fair value according to GIPS principles. Cost or book values are not permitted.

  *Discussion:* Fair value is the price, including any earned income, at which willing and knowledgeable participants would trade. These should be observable prices for identical investments trading in active markets. For thinly traded securities or other assets for which current market prices are not readily available, firms should use recognized and justifiable methods for estimating fair value.

- **Standard 1.A.3.** Portfolio valuation.
  - Prior to January 1, 2001, portfolios must be valued at least quarterly.
  - Beginning on or after January 1, 2001, at least monthly.
  - Beginning on or after January 1, 2010, at least monthly and on the date of all large external cash flows.

  *Discussion:* What constitutes a *large cash flow* is not defined by the GIPS. Firms must define *large* either on a value or percentage basis for each portfolio or composite. A large cash flow is generally one that has the potential to distort valuations and, hence, return calculations.

- **Standard 1.A.4.** For periods beginning January 1, 2010, firms must value portfolios as of the calendar month-end or the last business day of the month.

  *Discussion:* Prior to this date, there is more flexibility, depending on the firm's reporting cycle.

- **Standard 1.A.5.** For periods beginning January 1, 2005, firms must use trade-date accounting.

  *Discussion:* The use of trade-date accounting establishes the true economic value of an asset and improves the accuracy of performance measurements. The result of this requirement is that an asset will be shown (along with changes in cash balances) on the date of trade rather than settlement date. Settlement date accounting, which is valid for periods prior to 2005, would not for instance show an asset that was purchased just before the period end if the settlement date was in the following period. Note that pre-2005 performance results calculated using settlement date accounting will *not* need to be recalculated.

- **Standard 1.A.6.** Accrual accounting must be used for fixed-income securities and all other assets that accrue interest income. Market values of fixed-income securities must include accrued income.

  *Discussion:* When a fixed-income security or other asset that accrues interest is sold, the amount of the accrued interest at the sale date is calculated and paid by the purchaser. Thus, to measure performance fairly and accurately, accrued interest (received or paid) must be accounted for in both beginning and ending portfolio valuations.

- **Standard 1.A.7.** For periods beginning January 1, 2006, composites must have consistent beginning and ending annual valuation dates. Unless the composite is reported on a non-calendar fiscal year, the beginning and ending valuation dates must be at calendar year-end (or on the last business day of the year).

  *Discussion:* The valuation dates given for each composite must be the same each year, and either December 31 (or the previous Friday if that was the last working day of the year) or the last working day of the corporate accounting year.

### GIPS Input Data Recommendations (Standards 1.B.1–4)

- **Standard 1.B.1.** Rather than only at large external cash flows, portfolios should be valued at each external cash flow.
- **Standard 1.B.2.** Valuations should be obtained from an independent third party.

*Discussion:* To avoid disagreements between managers and custodians and to make fair and accurate representation of performance, firms should utilize qualified third-party valuators.

- **Standard 1.B.3.** Dividends from equities should be accrued as of the ex-dividend date.
- **Standard 1.B.4.** When presenting net-of-fees returns, firms should accrue investment management fees.

  *Discussion:* Performance may be presented gross or net of management fees (see *Disclosures* discussed later). If data is shown net of fees, part-year performance should accrue the appropriate percentage.

## Calculation Methodology Requirements and Recommendations

**LOS 43.e: Discuss the requirements of the GIPS standards with respect to return calculation methodologies, including the treatment of external cash flows, cash and cash equivalents, and expenses and fees.**

*CFA® Program Curriculum, Volume 6, page 265*

**For the Exam:** Even though the LOS does not specifically say "calculate," equations and example calculations are included so you can fully understand the methodologies. Be able to discuss their similarities and differences and, if necessary, perform related calculations on the exam.

Achieving comparability among investment management firms' performance presentations requires uniformity in methods used to calculate returns. The GIPS-compliant calculation methodology is presented in this section.

### GIPS Calculation Methodology *Requirements*

- **Standard 2.A.1.** Total returns must be used.

  *Discussion:* Income and unrealized capital gains (losses) must be included in computing total returns. Given that assets *could* be sold to realize their increased value, it would make no sense just to show realized gains.
- **Standard 2.A.2.** Time-weighted rates of return that adjust for external cash flows must be used. Periodic returns must be geometrically linked. External cash flows must be treated in a consistent manner with the firm's documented, composite-specific policy in order to determine when portfolios in the composite require revaluation. At a minimum:

  1. For periods beginning January 1, 2005, firms must use approximated rates of return that adjust for daily weighted external cash flows.
  2. For periods beginning January 1, 2010, firms must value portfolios on the date of all large external cash flows.

*Discussion:* In calculating the performance of the portfolios within a composite, the GIPS require firms to use:

- A **total rate of return**, which includes income as well as realized and unrealized gains and losses. Standard 1.A.6 requires the use of accrual accounting for fixed-income securities and all other assets that accrue interest income. Standard 1.B.3 recommends that accrual accounting must be used for dividends.
- A **time-weighted rate of return** (TWRR), computed using a minimum of monthly valuations and adjusting for cash flows. Subperiod returns must be geometrically linked. The GIPS require the use of a TWRR because it removes the effects of cash flows, which are generally client-driven. By removing the effects of cash flows, a TWRR best reflects the firm's ability to manage portfolio assets according to a specified strategy or objective.

Calculation methodologies that include adjustments to remove the effect of cash flows from the performance return are considered TWRR methods. A total return formula for a portfolio for which no cash flows have occurred is the basic holding period return formula:

$$R_{TR} = \frac{EMV - BMV}{BMV}$$

where:
$R_{TR}$ = total return
EMV = ending market value
BMV = beginning market value

This formula represents the increase or decrease in the value of the portfolio, including both capital appreciation and income, as a proportion of the beginning market value in the absence of any cash flows over a period. In practice, however, most portfolios experience cash flows, and unless adjustments are made, cash flows may skew portfolio returns. For returns computations, cash flows include any addition or withdrawal of cash and/or securities (i.e., capital) to or from a portfolio. It is important to note that dividend payments and interest income are not considered cash flows that require adjustments because (unless stated) they are retained within the portfolio.

A more accurate method of calculating individual portfolio performance is to determine the market value of the portfolio immediately prior to each cash flow, calculate a rate of return for the subperiod according to the preceding formula, and geometrically link the subperiod returns to calculate the portfolio return for the full period. Adjustments must, therefore, be made to account for cash flows. As discussed later, the basic holding period return formula may also be used to calculate subperiod returns with the *daily valuation method*, where daily subperiod returns are geometrically linked to produce the total return for the period. Until January 1, 2010, calculation methods that approximate the effect of cash flows are acceptable. However, the philosophy of the GIPS is to present performance returns that are as accurate as possible. Just as the Standards transition to more frequent valuations (see Standard 1.A.3), the Standards also transition to more precise calculation methodologies. Therefore, the GIPS *require* TWRRs that adjust for *daily weighted* cash flows for periods beginning on or after January 1, 2005, and *require*

the use of TWRRs with valuations at the time of large external cash flows for periods beginning on or after January 1, 2010.

Firms are permitted to use different calculation methodologies for different portfolios in the same composite (provided the methodologies are permitted according to the dates stated previously), as long as they are consistently applied (e.g., they cannot change the methodology for an individual portfolio from month-to-month, depending on which methodology produces the highest return).

TWRR methodologies that adjust for cash flows are presented next. We will first discuss the original Dietz method that treats all cash flows as if they occur at the middle of the measurement period. Then we will discuss the modified Dietz and modified internal rate of return (IRR) methods, which use daily weighting. Last we discuss the method that values the portfolio at every major cash flow.

- Original Dietz method (permitted until January 1, 2005).

  The key assumption of the original Dietz method is that all cash flows occur at the *midpoint* of the period. This means that all of a period's cash flows are assigned a weight of one-half for the period in which they occur. The formula for the TWRR using the original Dietz method is:

$$R_{Dietz} = \frac{EMV - BMV - CF}{BMV + 0.5CF}$$

  where:
  CF = net cash flow for the period (contributions to the portfolio are entered as positive cash flows, and withdrawls are entered as negative cash flows)

As mentioned previously, beginning January 1, 2005, TWRR approximations will be required to use a daily weighted adjustment for cash flows that occur during a measurement period. This means that the denominator in the return formula for each period should reflect cash flow weights for the relative number of days that a cash flow has been invested during a given period. The difference between methods that use daily weighting and other approximation methods is that the latter normally assume all cash flows are evenly distributed throughout the period.

The *modified Dietz* and *modified internal rate of return* (MIRR) methods are examples of acceptable daily weighted methods. These two methods are an estimate of the true TWRR because they weight each cash flow according to the length of time it was actually held in or absent from the portfolio.

- TWRR methodologies that adjust for *daily* cash flows (required for periods beginning on or after January 1, 2005, until January 1, 2010).

  The **modified Dietz method** improves upon the original Dietz method by assuming a constant rate of return on the portfolio during the period. This simplifying assumption means that the value of the portfolio does not need to be determined on the date of each cash flow. Recall that under the original Dietz method, it is assumed that all cash flows occur at the midpoint of the period. The modified Dietz method, however, weights each cash flow by the actual amount of time it is held in

or absent from the portfolio. The modified Dietz method calculates a TWRR using the formula:

$$R_{MDietz} = \frac{EMV - BMV - CF}{BMV + \sum_{i=1}^{n} W_i \times CF_i}$$

where:

$\sum_{i=1}^{n} W_i \times CF_i$ = sum of each cash flow, $CF_i$, multiplied by its weight, $W_i$

Note here that weight ($W_i$) is the proportion of the total number of days in the period that cash flow $CF_i$ has been held in (or out of) the portfolio. $W_i$ is calculated as:

$$W_i = \frac{CD - D_i}{CD}$$

where:

CD = number of calendar days over the return period

$D_i$ = day during the return period on which the cash flow ($CF_i$) occurred

Because $D_i$ is the day the cash flow is received or paid, the numerator, $CD - D_i$, deducts that day in calculating the number of days the cash flow is in or out of the portfolio. This means that using $CD - D_i$ as the numerator implicitly assumes that cash flows occur at the *end* of the day (i.e., the cash flow is not invested on the day it occurs). For example, assume there are 30 days in the return period and the cash flow is received on the 12th day. In this case, *CD* is 30 and $D_i$ is 12, so the numerator becomes 30 – 12 = 18. The cash flow is, therefore, assumed to be invested for 18 days. If beginning-of-day cash flows were assumed, the numerator would be $(CD - D_i) + 1$. A firm may (and some do) assume beginning-of-day cash inflows and end-of-day cash outflows. Regardless of the time of day that cash flows are assumed, a firm must establish a policy for the consistent treatment of cash flows in TWRR computations.

The main attraction of the modified Dietz method is that it is not necessary to know the value of a portfolio on every day that a cash flow occurs. The cost of this convenience is that the method does not provide an accurate estimate of the true time-weighted rate of return (TWRR). TWRR estimates under the modified Dietz method are the most inaccurate when a combination of the following conditions exists: (1) one or more large cash flows occur and (2) cash flows occur when markets are highly volatile.

The **modified IRR method** (MIRR), which is also called the Modified Bankers Administration Institute (BAI) method, deviates from the traditional IRR formula by considering the timing of each cash flow. This has the effect of changing the traditional IRR method from a money-weighted calculation method to a

time-weighted method. The MIRR is defined as the return ($R$) that satisfies the following equation:

$$EMV = \sum_{i=1}^{n}\left(F_i\left(1+R\right)^{W_i}\right)+BMV\left(1+R\right)$$

where:
EMV = ending market value of the portfolio
$F_i$ = cash flow $i$
$W_i$ = weight of cash flow $i$ (i.e., the proportion of the period that the cash flow was in or if an outflow, absent from the portfolio)
R = MIRR

The cash flows ($F_i$) in this formula are the same as the cash flows used in the modified Dietz method except that the beginning-of-period market value is also treated as a cash flow. In other words, the initial cash flow is the portfolio's beginning market value (i.e., $F_0$ = BMV).

For example, if there are three cash flows, including the beginning-of-period market value, the MIRR formula will have three terms:

$$EMV = F_0\left(1+R\right)^{W_0} + F_1\left(1+R\right)^{W_1} + F_2\left(1+R\right)^{W_2}$$

The first term in this equation includes the first cash flow, BMV = $F_0$. As with the modified Dietz method, $W_i$ is the proportion of the period the cash flow ($F_i$) was in or absent from the portfolio. Note that $W_0$ equals one because $F_0$ (the BMV) is invested for the entire period. Also note that as the value of $F_i$ increases, the more it will contribute to the EMV, and the smaller the exponent, $W_i$, in each term, the less the term will contribute to the EMV.

Ordinarily, because the first cash flow ($F_0$) has a relatively large value and $W_0$ is equal to one, it will contribute much more to EMV than the other terms. The MIRR method has the same advantages and criticisms as the modified Dietz method. However, when manual calculation is required, the modified IRR method has the additional disadvantage of requiring an iterative process. Because calculator and computer programs are readily available for solving for the MIRR, this disadvantage is minimal. Another disadvantage of the MIRR method is that it is possible to have multiple solutions if there are both positive and negative cash flows over a given period.

It is important to note that beginning January 1, 2010, firms that use approximation methods, such as the modified Dietz method and modified internal rate of return method, will not be in compliance with the GIPS when the Standards will likely require the use of calculation methods that require valuations at the time of every external cash flow.

- TWRR using revaluation at the time of external cash flows (required for periods beginning on or after January 1, 2010).

  The actual valuation of the portfolio each time there is an external cash flow will result in the most accurate TWRR calculation. In practice, this requirement can only be met by having the ability to obtain daily valuations on all portfolio holdings on a more or less continuous basis.

The daily **valuation method** calculates the true TWRR rather than an estimate, as with the methods already discussed. It breaks the total performance period into subperiods that are defined by the occurrence of major cash flows. The formula for calculating the subperiod return, $R_i$, is:

$$R_i = \frac{EMV - BMV}{BMV}$$

where:
EMV = end-of-subperiod market value of the portfolio, before any cash flows in the period but including accrued income for the period
BMV = beginning-of-subperiod market value (i.e., value at the end of the previous subperiod), including any cash flows at the end of the previous subperiod and including accrued income up to the end of the previous period

The subperiod returns are then geometrically linked (chain-linked) to calculate a total return:

$$R_{TR} = \left[(1+R_1)(1+R_2)...(1+R_n)\right] - 1$$

where:
$R_{TR}$ = total return
$R_{1,2,..,n}$ = subperiod return for periods 1 through $n$

A subperiod extends from the day after the end of the previous subperiod and extends up to and including the date of the next cash flow. For example, subperiod 1 begins on the first day of the measurement period and extends up to and including the day of the first cash flow into or out of the portfolio. Subperiod 2 begins the next day and extends to the date of the second cash flow, and so forth. The final subperiod extends from the day after the final cash flow through the last day of the total return period.

A key assumption of the daily valuation method is that a cash flow is not available for investment until the beginning of the next day (i.e., the first day of the next subperiod). This means that when a portfolio is revalued on the date of a cash flow, the cash flow is not included in the ending market value but it is added in to determine the *beginning market value* for the next subperiod.

The main advantage of the daily valuation method is that it calculates the true TWRR. The major criticism of the method is that it requires precise valuation of the portfolio on each date that a cash flow occurs, which may not be practical for some firms, particularly for those that do not have daily valuation capabilities.

Another criticism of the daily valuation method is that if all securities are not accurately priced for each subperiod valuation, the errors reflected in the return calculation may be greater than the errors that result from the use of the approximation methods. Thus, it is important that firms are able to correct for errors, such as undetected stock splits, mispricings, and transaction recording errors because day-to-day compounding will not automatically correct for them if cash flows occur.

## Geometric Linking

*Professor's Note: In the GIPS, you will see the following phrases: geometrically linked returns, chain-linked returns, and cumulative returns. They are usually the same thing.*

Monthly portfolio returns are geometrically linked to compute a quarterly return using the following formula:

$$R_Q = \left[(1+R_{M1})(1+R_{M2})(1+R_{M3})\right]-1$$

where:
$R_Q$ = portfolio quarterly return
$R_{M1-3}$ = portfolio returns for months 1, 2, and 3, respectively

Applying this same concept, an annual return can be computed from quarterly portfolio returns with the following formula:

$$R_{YR} = \left[(1+R_{Q1})(1+R_{Q2})(1+R_{Q3})(1+R_{Q4})\right]-1$$

where:
$R_{Q1-4}$ = composite returns for quarters 1, 2, 3, and 4

Alternatively, of course, firms could geometrically link the 12 monthly returns to calculate the annual return.

**Example: Modified Dietz method**

Given the portfolio information in the figure below, use the modified Dietz method to calculate the rate of return for this portfolio for April, May, June, and the second quarter of 2005.

**Figure 1: Second Quarter 2005 Portfolio Data**

| *Date* | *Market Value ($)* | *Cash Flow ($)* | *Market Value After Cash Flow ($)* |
|---|---|---|---|
| 03/31/05 | 220,000 | | |
| 04/30/05 | 228,800 | | |
| 05/12/05 | 238,700 | +44,000 | 282,700 |
| 05/31/05 | 289,300 | | |
| 06/20/05 | 297,000 | –33,000 | 264,000 |
| 06/30/05 | 269,500 | | |

**Answer:**

April: $R_{Apr} = \frac{228{,}800 - 220{,}000}{220{,}000} = 4.0\%$

May: $W = \frac{31-12}{31} = 0.61$ $R_{May} = \frac{289{,}300 - 228{,}800 - 44{,}000}{228{,}800 + (44{,}000)(0.61)} = 6.45\%$

June: $W = \frac{30-20}{30} = 0.33$ $R_{June} = \frac{269{,}500 - 289{,}300 - (-33{,}000)}{289{,}300 + (-33{,}000)(0.33)} = 4.74\%$

**Second quarter return:**

$R_{QT2} = (1 + R_{April})(1 + R_{May})(1 + R_{June}) - 1 = (1.04)(1.0645)(1.0474) - 1 = 15.96\%$

**Example: Daily valuation method**

Given the information in the figure below, use the daily valuation method to **calculate** the rate of return for this portfolio for April, May, June, and the second quarter of 2005.

**Figure 2: Second Quarter 2005 Portfolio Data**

| *Date* | *Market Value ($)* | *Cash Flow ($)* | *Market Value After Cash Flow ($)* |
|---|---|---|---|
| 03/31/05 | 550,000 | | |
| 04/30/05 | 560,000 | | |
| 05/12/05 | 565,000 | 55,000 | 620,000 |
| 05/31/05 | 633,000 | | |
| 06/20/05 | 645,000 | –22,000 | 623,000 |
| 06/30/05 | 627,000 | | |

**Answer:**

April: $R_{Apr} = \frac{560{,}000 - 550{,}000}{550{,}000} = 1.82\%$

May: $May_1$ = 04/30/05 through 05/12/05 $R_{May_1} = \frac{565{,}000 - 560{,}000}{560{,}000} = 0.89\%$

$May_2$ = 05/12/05 through 05/31/05 $R_{May_2} = \frac{633{,}000 - 620{,}000}{620{,}000} = 2.10\%$

Geometrically linked return for May (04/30/05 through 05/31/05):

$$R_{May} = \left(1 + R_{May_1}\right)\left(1 + R_{May_2}\right) - 1 = (1.0089)(1.0210) - 1 = 3.01\%$$

June: $June_1$ = 05/31/05 through 06/20/05 $R_{June_1} = \dfrac{645{,}000 - 633{,}000}{633{,}000} = 1.90\%$

$June_2$ = 06/20/05 through 06/30/05 $R_{June_2} = \dfrac{627{,}000 - 623{,}000}{623{,}000} = 0.64\%$

Geometrically linked return for June (05/31/05 through 06/30/05):

$$R_{June} = \left(1 + R_{June_1}\right)\left(1 + R_{June_2}\right) - 1 = (1.019)(1.0064) - 1 = 2.55\%$$

Second quarter return:

$$R_{QT2} = (1 + R_{April})(1 + R_{May})(1 + R_{June}) - 1 = (1.0182)(1.0301)(1.0255) - 1 = 7.56\%$$

## Cash and Cash Equivalents

- **Standard** 2.A.3. Returns from cash and cash equivalents held in portfolios must be included in total return calculations.

  *Discussion:* Cash returns must be included in portfolio total-return calculations as long as the portfolio manager has control over the amount of the portfolio that is allocated to cash. This requirement stands even if the manager does not actually control the investment of the cash, as is the case when excess cash is held in a money market account. Keep in mind that the inclusion of cash is likely to reduce portfolios' positive gains.

## Fees and Expenses

- **Standard** 2.A.4. All returns must be calculated after the deduction of the actual trading expenses incurred during the period. Estimated trading expenses are not permitted.

  *Discussion:* Because trading expenses must be paid when implementing an investment strategy, they must be included in return calculations. *Direct trading expenses* include brokerage commissions, regulatory fees, and duty and/or tax associated with a transaction. *Indirect trading expenses* include bid/ask spread. Custody fees are not considered direct trading expenses (even if they are charged at a specified rate per transaction), and trading expenses may not be estimated. As a result of this, bundled fees may cause difficulties—see Standards 2.A.5 and 2.B.1 that follow.

- **Standard** 2.A.5. If the actual direct trading expenses cannot be identified and segregated from a bundled fee:

  1. When calculating gross-of-fees returns, returns must be reduced by the entire bundled fee or the portion of the bundled fee that includes the direct trading expenses. The use of estimated trading expenses is not permitted.

2. When calculating net-of-fees returns, returns must be reduced by the entire bundled fee or the portion of the bundled fee that includes the direct trading expenses and the investment management fee. The use of estimated trading expenses is not permitted.

*Discussion:* This Standard links in with Standard 2.A.4. A bundled fee is defined in the GIPS glossary as:

> "A fee that combines multiple fees into one 'bundled' fee. Bundled fees can include any combination of management, transaction, custody, and other administrative fees."

Examples given are all-in and wrap fees. Given the nature of bundled fees, it may not be possible to identify direct trading expenses. Because estimated costs may not be deducted (this point is important—it is mentioned twice in the same Standard), the entire bundled fee, or that component of it that is known to contain all the direct expenses, should be deducted instead.

## Composite Returns and Asset-Weighted Returns

**LOS 43.f: Explain the requirements and recommendations of the GIPS standards with respect to composite return calculations, including methods for asset-weighting portfolio returns.**

*CFA® Program Curriculum, Volume 6, page 274*

**For the Exam:** Again, the LOS does not ask you to calculate an asset-weighted return, but formulas and examples are included to facilitate your understanding of the process and help you perform the calculations if required.

- **Standard 2.A.6.** Composite returns must be calculated by asset-weighting the individual portfolio returns using beginning-of-period values or a method that reflects both beginning-of-period values and external cash flows.

  *Discussion:* A composite is a set of individual portfolios or asset classes representing similar investment objectives or strategies. When computing composite returns, a method should be used that will generate the same value as if the individual assets of all the individual portfolios in the composite were aggregated and a return was calculated for a master portfolio.

  The GIPS are based on the principle of asset-weighted returns. This implies that in a composite with two portfolios, one of which is twice the size of the other, the return for the larger portfolio should have more impact on the composite return than the return of the smaller portfolio. Asset-weighting accomplishes this by weighting each portfolio's return contribution to the composite return as a percentage of the composite's beginning market value.

  Under the GIPS standards, *portfolio returns* within a composite must be asset-weighted. This must be accomplished by using beginning-of-period weightings, beginning-of-period market values plus weighted cash flows, or by aggregating

portfolio assets and cash flows to calculate performance as a single master portfolio. Each of these methods is discussed later.

- The beginning market value-weighted composite return, $R_{BMV}$, can be calculated using the formula:

$$R_{BMV} = \frac{\sum_{i=1}^{n}(BMV_i)(R_i)}{BMV_{total}}$$

where:
$BMV_i$ = beginning-of-period market value for portfolio $i$
$R_i$ = rate of return for portfolio $i$
$BMV_{total}$ = total market value at the beginning of the period for all of the portfolios in the composite

- The beginning market value plus cash flow-weighted method represents a refinement to the asset-weighted approach. Consider the case in which one of two portfolios in a composite doubles in market value as the result of a contribution on the third day of a performance period. Under the asset-weighted approach, this portfolio will be weighted in the composite solely on the basis of its beginning market value (i.e., not including the contribution). This problem is resolved with the beginning market value plus cash flow-weighted method by including the effect of cash flows in the weighting calculation as well as in the market values. The calculation of the weighting factor in this case is similar to the weighting calculation with the modified Dietz method:

$$W_{i,j} = \frac{CD - D_{i,j}}{CD}$$

where:
CD = total number of calendar days in the period
$D_{i,j}$ = the day during the return period on which cash flow $j$ occurred in portfolio $i$

The beginning market value plus cash flow-weighted composite return (i.e., $R_{BMV+CF}$) can be calculated as follows:

$$R_{BMV+CF} = \frac{\sum_{i=1}^{n}\left\{\left[BMV_i + \left(\sum_{j=1}^{n}(CF_{i,j})(W_{i,j})\right)\right]R_i\right\}}{\sum_{i=1}^{n}\left[BMV_i + \left(\sum_{j=1}^{n}(CF_{i,j})(W_{i,j})\right)\right]}$$

where:
$CF_{i,j}$ = cash flow $j$ within the period for portfolio $i$ (contributions to the portfolio are positive flows, and withdrawals or distributions are negative flows)
$R_i$ = return for portfolio $i$

- The aggregate return method combines all of the composite assets and cash flows to calculate performance as if the composite were one portfolio. The method is also acceptable as an asset-weighted approach.

**Example: Comparison of composite returns calculation methods**

Using the data presented in portfolios A and B, calculate the composite return using the (1) beginning market value-weighted method, (2) beginning market value plus cash flow method, and (3) aggregate return method.

**Figure 3: Portfolio A**

| *Date* | *Market Value ($)* | *Cash Flow ($)* | *Market Value After Cash Flow ($)* |
|---|---|---|---|
| 03/31/05 | 500,000 | | |
| 04/10/05 | 515,000 | 100,000 | 615,000 |
| 04/18/05 | 650,000 | | |
| 04/30/05 | 665,000 | | |
| | Monthly return = 11.32% | | |

**Figure 4: Portfolio B**

| *Date* | *Market Value ($)* | *Cash Flow ($)* | *Market Value After Cash Flow ($)* |
|---|---|---|---|
| 03/31/05 | 250,000 | | |
| 04/10/05 | 256,000 | | |
| 04/18/05 | 265,000 | –35,000 | 230,000 |
| 04/30/05 | 235,000 | | |
| | Monthly return = 8.26% | | |

**Answer:**

Beginning market value method:

$$R_{BMV} = \frac{(500{,}000 \times 0.1132) + (250{,}000 \times 0.0826)}{500{,}000 + 250{,}000} = 10.30\%$$

Beginning market value plus cash flows method:

$$W_{PortA} = \frac{30-10}{30} = 0.67 \quad W_{PortB} = \frac{30-18}{30} = 0.40$$

$$R_{BMV+CF} = \frac{\left\{\begin{array}{l}\left[500{,}000 + (100{,}000 \times 0.67)\right] \times 0.1132 \\ +\left[250{,}000 + (-35{,}000 \times 0.40)\right] \times 0.0826\end{array}\right\}}{\left\{\begin{array}{l}\left[500{,}000 + (100{,}000 \times 0.67)\right] \\ +\left[250{,}000 + (-35{,}000 \times 0.40)\right]\end{array}\right\}} = 10.42\%$$

Aggregate method (using modified Dietz method):

$$W_{PortA} = \frac{30-10}{30} = 0.67$$

$$W_{PortB} = \frac{30-18}{30} = 0.40$$

$$R_{BMV+CF} = \frac{(665{,}000 + 235{,}000) - (500{,}000 + 250{,}000) - \left[100{,}000 + (-35{,}000)\right]}{500{,}000 + 250{,}000 + (100{,}000 \times 0.67) + (-35{,}000 \times 0.40)}$$

$$= 10.59\%$$

- **Standard 2.A.7.** For periods beginning January 1, 2006, firms must calculate composite returns by asset-weighting the individual portfolio returns at least quarterly. For periods beginning on or after January 1, 2010, composite returns must be calculated by asset-weighting the individual portfolio returns at least monthly.

  *Discussion:* Standard 2.A.6 (about asset-weighting the portfolio) does not specify the length of the period. It should be clear that the longer the period, the greater may be the inaccuracies that creep in as one portfolio within the composite outperforms another.

## GIPS Calculation Methodology *Recommendations*

- **Standard 2.B.1.** Returns should be calculated net of non-reclaimable withholding taxes on dividends, interest, and capital gains. Reclaimable withholding taxes should be accrued.

  *Discussion:* This Standard is similar to 2.A.4 stated previously. Foreign investments often have a tax on income or gains that is deducted at the source. It is often possible to reclaim this amount by applying to the relevant tax authorities. If the withheld tax is reclaimable, it should be accrued until recovered; if the tax is not reclaimable, it should be treated like a transactions cost.

## Composite Construction Requirements and Recommendations

A *composite* is an aggregation of discretionary portfolios into a single group that is managed according to a particular mandate, objective, or strategy. Composites are the primary vehicle for presenting performance to a prospective client. The composite return is the asset-weighted average of the performance results of all the portfolios in the composite. Creating meaningful, asset-weighted composites is critical to the fair presentation, consistency, and comparability of results over time and among firms.

## Discretionary Portfolios

**LOS 43.g: Explain the meaning of "discretionary" in the context of composite construction and, given a description of the relevant facts, determine whether a portfolio is likely to be considered discretionary.**

*CFA® Program Curriculum, Volume 6, page 278*

- **Standard 3.A.1.** All actual, fee-paying, discretionary portfolios must be included in at least one composite. Although non-fee-paying discretionary portfolios may be included in a composite (with appropriate disclosures), nondiscretionary portfolios must not be included in a firm's composites.

  *Discussion:* From the wording of this Standard, it is clear that the notion of "discretionary" is key to a portfolio because it determines whether the portfolio *must* be included in at least one composite or if it *must not* be included in any composite.

  The IPC defines discretion as "the ability of the firm to implement its intended strategy."[4] A client may place significant constraints on the manager—for instance, the investment policy statement (IPS) may specify limits on sectors, credit ratings, durations, et cetera. Furthermore, there may be total restrictions on certain transactions, such as the purchase of "unethical" or foreign investments, or the sale of specified stocks. These restrictions *do not* automatically remove the discretionary nature of the portfolio.

  A portfolio becomes nondiscretionary when the manager is no longer able to implement the intended investment strategy. If for instance the liquidity requirements are so great that much of the value must be in cash, or if the portfolio has minimal tracking limits from an index portfolio, then the description of "discretionary" is really no longer appropriate.

  Standard 3.A.1 also demonstrates that by including all fee-paying discretionary portfolios in at least one composite, managers cannot cherry-pick their best performing portfolios to present to prospective clients. Firms are permitted to include a portfolio in more than one composite, provided it satisfies the definition of each composite.

  Non-fee-paying portfolios may be included in the firm's composites, but if they are, firms are required to disclose the percentage of composite assets represented by non-fee-paying portfolios. If the firm includes non-fee-paying portfolios in its composites, those portfolios are subject to the same rules as fee-paying portfolios.

4. See the IPC Guidance Statement on Composite Definition at *http://www.gipsstandards.org/standards/guidance/archive/pdf/GSCompDefRevised.pdf*.

If a portfolio's status changes from discretionary to nondiscretionary, the portfolio may not be removed from a composite retroactively. However, the portfolio must be removed going forward.

## Constructing Composites: Mandates, Strategies, and Styles

**LOS 43.h: Explain the role of investment mandates, objectives, or strategies in the construction of composites.**

*CFA® Program Curriculum, Volume 6, page 280*

- **Standard** 3.A.4. Composites must be defined according to similar investment objectives and/or strategies. Composites must include all portfolios that meet the composite definition. The full composite definition must be made available on request.

  *Discussion:* Composites should be defined such that clients are able to compare the performance of one firm to another. Composites must be representative of the firm's products and be consistent with the firm's marketing strategy.

  - Firms are not permitted to include portfolios with different investment strategies or objectives in the same composite.
  - Portfolios may not be moved into or out of composites except in the case of valid, documented, client-driven changes in investment objectives or guidelines or in the case of the redefinition of the composite.

  Generic definitions such as "equity" or "fixed income" may be too broad to enable clients to make comparisons, so qualifiers such as sector, benchmark, capitalization (e.g., large, mid, small), style (e.g., value, growth, blend), or even risk-return profile may be useful. However, too many qualifiers could result in a plethora of similar composites, each containing a very small number of portfolios.

## Constructing Composites: Adding Portfolios and Terminating Portfolios

**LOS 43.i: Explain the requirements and recommendations of the GIPS standards with respect to composite construction, including switching portfolios among composites, the timing of the inclusion of new portfolios in composites, and the timing of the exclusion of terminated portfolios from composites.**

*CFA® Program Curriculum, Volume 6, page 283*

- **Standard** 3.A.2. Composites must include only assets under management within the defined firm.
- **Standard** 3.A.3. Firms are not permitted to link simulated or model portfolios with actual performance.

  *Discussion:* Simulated, back-tested, or model portfolio results do not represent the returns of actual assets under management and, thus, may not be included in composites performance results.

- **Standard 3.A.5.** Composites must include new portfolios on a timely and consistent basis after the portfolio comes under management.

  *Discussion:* For each individual composite, firms should have a policy for the inclusion of new portfolios. Ideally, the policy will prescribe inclusion of a new portfolio in a composite at the start of the next full performance measurement period.

  Recognizing that situations exist where firms may need time to invest the assets of a new portfolio, the Standards allow some discretion on this issue. For example, it will likely take longer to add a new portfolio to an emerging markets fixed-income portfolio than it will take to add portfolio assets to a developed market government bond portfolio, or a client may deposit the asset for a new portfolio over a period of time. In any case, firms must establish a policy for the inclusion of new portfolios on a composite-by-composite basis and apply it consistently.

- **Standard 3.A.6.** Terminated portfolios must be included in the historical returns of the appropriate composites up to the last full measurement period that the portfolio was under management.

  *Discussion*: Retaining the performance of a terminated portfolio through its final full period helps alleviate the effects of survivorship bias. For example, if the portfolio was in the composite for one quarter and the performance for the composite for that quarter is reported, the performance of the terminated portfolio must be included. However, presenting an annual return for a terminated portfolio with less than a full year's performance (e.g., creating an annual return from less than four quarterly returns) is not allowed. This would be equivalent to presenting simulated performance. (See Standard 3.A.3.)

- **Standard 3.A.7.** Portfolios must not be switched from one composite to another unless documented changes in client guidelines or the redefinition of the composite make it appropriate. The historical record of the portfolio must remain with the original composite.

  *Discussion*: Even if investment strategies change over time, firms usually do not change the definition of a composite. Rather, changes in strategy typically result in the creation of a new composite. In the rare case that it is deemed appropriate to redefine a composite, the firm must disclose the date and nature of the change. Changes to composite definitions must not be applied retroactively.

- **Standard 3.A.9.** If a firm sets a minimum asset level for portfolios to be included in a composite, no portfolios below that asset level can be included in that composite. Any changes to a composite-specific minimum asset level are not permitted to be applied retroactively.

  *Discussion:* If a composite specifies a minimum size for portfolios, the minimum size must be applied on a consistent basis. Because portfolios may drop below the minimum for a short period, the IPC Guidance Statement on Composite Definition recommends that a policy be put in place to identify percentage or period of breaches after which a portfolio should be removed from the composite. For instance, a portfolio may have to be removed after falling more than 10% below the limit or after being below the limit at the start of three successive periods.

Note that the performance history for a composite may not be adjusted as a result of a constituent portfolio being removed, and composite definitions may not be changed retroactively.

- **Standard 3.A.10.** A portfolio could receive a significant external cash flow (defined as a cash flow large enough that the portfolio temporarily does not reflect the composite's style). The recommendation is to put the cash in a temporary new account that is not part of the composite until the funds are invested in accordance with the style. At that time the temporary new account should be merged into the existing account. Only if this is not possible should the account be temporarily removed from the composite until the account again reflects the composite style.

  *Discussion*: The intent is to prevent the client contribution from creating a cash drag and disrupting the ability of the manager to implement the intended style. Either the temporary account or removal should be temporary and only for a period of time long enough for the manager to make investments that reflect the composite's style.

- **Standard 3.B.2.** To remove the effect of significant cash flows, firms should use temporary new accounts.

  *Discussion:* Significant cash flows are external cash flows directed by a client that are large enough to disrupt the management of the composite. In the case of significant inflows, the firm is encouraged to create a separate account until the funds can be invested according to the composite strategy. The inclusion of the new securities in the composite should be managed according to the firm's established policy on the inclusion of new portfolios. When the client directs a significant withdrawal, the firm is encouraged to establish a securities account separate from the composite until the securities can be liquidated and the cash distributed.

## Carve-Outs

### LOS 43.j: Explain the requirements of the GIPS standards for asset class segments carved out of multi-class portfolios.

*CFA® Program Curriculum, Volume 6, page 286*

- **Standard 3.A.8.** For periods beginning on or after January 1, 2010, carve-outs must not be included in a composite unless the carve-out is actually managed separately with its own cash balance.

  *Discussion:* For periods prior to January 1, 2010, if carve-outs are included in a composite, cash must be allocated to the carve-out in a timely and consistent manner. A carve-out is a sub-set of a portfolio's assets used to create a track record that reflects the performance of a specific asset class (e.g., the equity component of a balanced portfolio). This requirement assures that the effects of the cash allocation on the returns of a portfolio are realized.

## Disclosure Requirements and Recommendations

**LOS 43.k: Explain the requirements and recommendations of the GIPS standards with respect to disclosure, including fees, the use of leverage and derivatives, conformity with laws and regulations that conflict with the GIPS standards, and noncompliant performance periods.**

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### GIPS Required Disclosures

**For the Exam:** You will find these and all other GIPS requirements in the Schweser online Level III Library.

- **Standard** 4.A.1. Once a firm has met all the requirements of the GIPS standards, the firm must disclose its compliance with the GIPS standards using one of the following compliance statements.

  For firms that have not been verified:

  *[Insert name of firm] claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. [Insert name of firm] has not been independently verified.*

  For firms that are verified:

  *[Insert name of firm] claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. [Insert name of firm] has been independently verified for the periods [insert dates]. The verification report(s) is/are available upon request. Verification assesses whether (1) the firm has complied with all the composite construction requirements of the GIPS standards on a firm-wide basis and (2) the firm's policies and procedures are designed to calculate and present performance in compliance with the GIPS standards. Verification does not ensure the accuracy of any specific composite presentation.*

  For composites of a verified firm that have also had a performance examination:

  *[Insert name of firm] claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. [Insert name of firm] has been independently verified for the periods [insert dates]. Verification assesses whether (1) the firm has complied with all the composite construction requirements of the GIPS standards on a firm-wide basis and (2) the firm's policies and procedures are designed to calculate and present performance in compliance with the GIPS standards. The [insert name of composite] composite has been examined for the periods [insert dates]. The verification and performance examination reports are available upon request.*

- **Standard** 4.A.2. Firms must disclose the definition of "firm" used to determine the total firm assets and firm-wide compliance.
- **Standard** 4.A.3. Firms must disclose the composite description.

- **Standard 4.A.4.** Firms must disclose the benchmark description.
- **Standard 4.A.5.** When presenting gross-of-fees returns, firms must disclose if any other fees are deducted in addition to the direct trading expenses.
- **Standard 4.A.6.** When presenting net-of-fees returns, firms must disclose a) if any other fees are deducted in addition to the investment management fee and direct trading expenses, b) if model or actual investment management fees are used, and c) if returns are net of performance-based fees.
- **Standard 4.A.7.** Firms must disclose the currency used to express performance.
- **Standard 4.A.8.** Firms must disclose which measure of internal dispersion is used.
- **Standard 4.A.9.** Firms must disclose the fee schedule appropriate to the compliant presentation.
- **Standard 4.A.10.** Firms must disclose the composite creation date.
- **Standard 4.A.11.** Firms must disclose that the firm's list of composite descriptions is available upon request.
- **Standard 4.A.12.** Firms must disclose that policies for valuing portfolios, calculating performance, and preparing compliant presentations are available upon request.
- **Standard 4.A.13.** Firms must disclose the presence, use, and extent of leverage, derivatives, and short positions, if material, including a description of the frequency of use and characteristics of the instruments sufficient to identify risks.

  *Discussion:* It is important that prospective clients understand how leverage or derivatives affected past performance and could affect future performance (i.e., risk and return). Many clients may never have dealt with some of these complex strategies, so a clear and comprehensive description is essential. For instance, a manager may use equity or debt futures to adjust the beta or duration of a portfolio. The description of the strategy should highlight possible differences in performance between the derivative and the underlying assets, such as rollover, basis, or call risk.

  An example of an acceptable disclosure under this Standard is as follows: "Eurodollar CD futures are used occasionally to hedge against adverse interest rate changes. The positions are not leveraged."

- **Standard 4.A.14.** Firms must disclose all significant events that would help a prospective client interpret the compliant presentation.
- **Standard 4.A.15.** For any performance presented for periods prior to January 1, 2000, that does not comply with the GIPS standards, firms must disclose the periods of non-compliance.

  *Discussion:* In order to claim compliance with the GIPS, performance presentations for periods beginning January 1, 2000, must be GIPS-compliant. For periods prior to January 1, 2000, firms may present performance results that do not comply with the Standards as long as they disclose the periods of non-compliance.

- **Standard 4.A.16.** If the firm is redefined, the firm must disclose the date of, description of, and reason for the redefinition.
- **Standard 4.A.17.** If a composite is redefined, the firm must disclose the date of, description of, and reason for the redefinition.
- **Standard 4.A.18.** Firms must disclose any changes to the name of a composite.
- **Standard 4.A.19.** Firms must disclose the minimum asset level, if any, below which portfolios are not included in a composite. Firms must also disclose any changes to the minimum asset level.

- **Standard 4.A.20.** Firms must disclose relevant details of the treatment of withholding tax on dividends, interest income, and capital gains, if material. Firms must also disclose if benchmark returns are net of withholding taxes if this information is available.
- **Standard 4.A.21.** For periods beginning January 1, 2011, firms must disclose and describe any known material differences in the exchange rates or valuation sources used among the portfolios within a composite and between the composite and the benchmark. For periods prior to January 1, 2011, firms must disclose and describe any known inconsistencies in the exchange rates used among the portfolios within a composite and between the composite and the benchmark.
- **Standard 4.A.22.** If the compliant presentation conforms with laws and/or regulations that conflict with the requirement of the GIPS standards, firms must disclose this fact and disclose the manner in which the local laws and regulations conflict with the GIPS standards.

  *Discussion:* Recall from the discussion of key characteristics (LOS 43.b) that if there is a conflict between the requirements of GIPS and those of local laws, the local requirements prevail, though ***full disclosure of the differences must be made.*** This enables firms to compete on an equal footing in markets with a lower level of regulations.

- **Standard 4.A.23.** For periods prior to January 1, 2010, if carve-outs are included in a composite, firms must disclose the policy used to allocate cash to the carve-outs.
- **Standard 4.A.24.** If a composite contains portfolios with bundled fees, firms must disclose the types of fees that are included in the bundled fee.
- **Standard 4.A.25.** Beginning January 1, 2006, firms must disclose the use of a sub-adviser and the periods a sub-adviser was used.
- **Standard 4.A.26.** For periods prior to January 1, 2010, firms must disclose if any portfolios were not valued at calendar month end or on the last business day of the month.
- **Standard 4.A.27.** For periods beginning January 1, 2011, firms must disclose the use of subjective unobservable inputs for valuing portfolio investments if the portfolio investments valued using subjective unobservable inputs are material to the composite.
- **Standard 4.A.28.** For periods beginning January 1, 2011, firms must disclose if the composite's valuation hierarchy materially differs from the recommended hierarchy in the GIPS Valuation Principles.
- **Standard 4.A.29.** If the firm determines no appropriate benchmark for the composite exists, the firm must disclose why no benchmark is presented.
- **Standard 4.A.30.** If the firm changes the benchmark, the firm must disclose the date of, description of, and reason for the change.
- **Standard 4.A.31.** If a custom benchmark or combination of multiple benchmarks is used, the firm must disclose the benchmark components, weights, and rebalancing process.
- **Standard 4.A.32.** If the firm has adopted a significant cash flow policy for a specific composite, the firm must disclose how the firm defines a significant cash flow for that composite and for which periods.

- **Standard 4.A.33.** Firms must disclose if the 3-year annualized ex post standard deviation of the composite and/or benchmark is not presented because 36 monthly returns are not available.
- **Standard 4.A.34.** If the firm determines that the 3-year annualized ex post standard deviation is not relevant or appropriate, the firm must a) describe why ex post standard deviation is not relevant or appropriate and b) describe the additional risk measure presented and why it was selected.
- **Standard 4.A.35.** Firms must disclose if the performance from a past firm or affiliation is linked to the performance of the firm.

### GIPS Recommended Disclosures

- **Standard 4.B.1.** Firms should disclose material changes to valuation policies and/or methodologies.
- **Standard 4.B.2.** Firms should disclose material changes to calculation policies and/or methodologies.
- **Standard 4.B.3.** Firms should disclose material differences between the benchmark and the composite's investment mandate, objective, or strategy.
- **Standard 4.B.4.** Firms should disclose the key assumptions used to value portfolio investments.
- **Standard 4.B.5.** If a parent company contains multiple defined firms, each firm within the parent company should disclose a list of the other firms contained within the parent company.
- **Standard 4.B.6.** For periods prior to January 1, 2011, firms should disclose the use of subjective unobservable inputs for valuing portfolio investments if the portfolio investments valued using subjective unobservable inputs are material to the composite.
- **Standard 4.B.7.** For periods prior to January 1, 2006, firms should disclose the use of a sub-adviser and the periods a sub-adviser was used.
- **Standard 4.B.8.** Firms should disclose if a composite contains proprietary assets.

### GIPS Presentation and Reporting Requirements

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**LOS 43.l: Explain the requirements and recommendations of the GIPS standards with respect to presentation and reporting, including the required timeframe of compliant performance periods, annual returns, composite assets, and benchmarks.**

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*CFA® Program Curriculum, Volume 6, page 293*

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**LOS 43.m: Explain the conditions under which the performance of a past firm or affiliation must be linked to or used to represent the historical performance of a new or acquiring firm.**

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*CFA® Program Curriculum, Volume 6, page 298*

**LOS 43.n: Evaluate the relative merits of high/low, range, interquartile range, and equal-weighted or asset-weighted standard deviation as measures of the internal dispersion of portfolio returns within a composite for annual periods.**

*CFA® Program Curriculum, Volume 6, page 293*

After constructing composites, gathering input data, calculating returns, and determining the necessary disclosures, firms must integrate this information in presentations based on the guidelines set out in GIPS for presenting the investment performance results. No finite set of guidelines can cover all potential situations or anticipate future developments in investment industry structure, technology, products, or practices. When appropriate, firms have the responsibility to include information not covered by the Standards.

- **Standard 5.A.1.** The following items must be reported for each composite presented:
  a. At least five years of annual performance (or a record for the period since firm or composite inception if the firm or composite has been in existence less than five years) that meets the requirements of the GIPS standards; after presenting five years of performance, the firm must present additional annual performance up to a minimum of ten years.
  b. Annual returns for all years clearly identified as gross- or net-of-fees.
  c. For composites with a composite inception date beginning on or after January 1, 2011, when the initial period is less than a full year, firms must present returns from the composite inception through the initial year-end.
  d. For composites with a termination date of January 1, 2011, or later, returns from the last annual period through the termination date.
  e. Annual returns for a benchmark, which reflects the mandate, objective, or strategy of the portfolio.
  f. The number of portfolios in the composite at each year-end. If the composite contains *five portfolios or less,* the number of portfolios is not required.
  g. The amount of assets in the composite at the end of each annual period.
  h. Either total firm assets or composite assets as a percentage of firm assets at each annual period end.
  i. A measure of dispersion of individual portfolio returns for each annual period. If the composite contains *five portfolios or less* for the full year, a measure of dispersion is not required.

  Internal dispersion is a measure of the range of returns for only those portfolios that are included in the composite over the entire period. Portfolios added to or removed from a composite during the period are not included in that period's calculation of internal dispersion.

**Example: Internal dispersion**

The following figure illustrates the structure of a composite during 2010. An *X* indicates that the portfolio was included in the composite for the quarter. If a cell is blank, the portfolio was not included in the composite for the entire quarter. **Determine** which portfolios should be contained in the internal dispersion measure for 2010.

**Figure 5: Composite Structure, 2010**

| *Portfolio* | *Quarter 1* | *Quarter 2* | *Quarter 3* | *Quarter 4* |
|---|---|---|---|---|
| A | X | X | X | X |
| B | X | X | X | |
| C | X | X | X | X |
| D | | X | X | X |
| E | X | X | X | X |
| F | | | X | X |

**Answer:**

Based on the information contained in the previous figure, Portfolios A, C, and E would be included in the internal dispersion measure for 2010. Portfolios B, D, and F should be excluded from the calculation of the composite's 2010 internal dispersion because they do not have an entire year of performance results. The GIPS Handbook identifies the following acceptable methods for calculating internal dispersion:

- The range of annual returns.
- The high and low annual returns.
- Interquartile range.
- The standard deviation of equal-weighted annual return.
- The asset-weighted standard deviation of annual returns.

The **range** of annual returns and the **high** and **low** annual returns are the simplest and most easily understood measures of dispersion. The advantages of these measures include simplicity, ease of calculation, and ease of interpretation. Disadvantages include the fact that an extreme value can skew the data, and they do not stand alone as adequate risk measures.

The **interquartile range** is the middle 50% of a population, excluding the top 25% and bottom 25%. Hence, it measures the part of the population between the bottom of the first quartile and the bottom of the third quartile.

The **standard deviation** across equally weighted portfolios is the most widely accepted measure of dispersion within a composite. It is calculated as:

$$\sigma_C = \sqrt{\frac{\sum_{i=1}^{n}[R_i - MEAN(R)]^2}{n-1}}$$

where:
$R_i$ = return on portfolio *i*
MEAN(R) = equal-weighted mean (composite) return
n = number of portfolios

*Professor's Note: The use of either n or n – 1 in the denominator can be supported, and firms are encouraged to disclose how they calculate standard deviation.*

The *standard deviation with asset-weighted composite* returns is calculated in the following manner:

$$\text{dispersion} = \sqrt{\sum_{i=1}^{n} w_i(R_i - C_{ASSET})^2}$$

where:
$R_i$ = unweighted return on portfolio *i*
$w_i$ = market weight of portfolio *i* relative to the market value of the composite
$C_{ASSET}$ = composite's asset-weighted return, or $C_{ASSET} = \sum w_i R_i$

- **Standard 5.A.2.** For periods beginning on or after January 1, 2011, firms must present for each annual period:
  a. Three-year annualized ex post standard deviation using monthly returns for the composite and benchmark.
  b. An additional 3-year ex post risk measure if management feels standard deviation is inappropriate. The firm must match the periodicity of calculated returns used for the composite and benchmark.
- **Standard 5.A.3.** Firms may link non-GIPS-compliant returns to their compliant history so long as the firms meet the disclosure requirements for noncompliant performance and only compliant returns are presented for periods after January 1, 2000.
- **Standard 5.A.4.** Returns of portfolios and composites for periods of less than one year must not be annualized.

  *Discussion:* The annualizing of partial-year returns is essentially the simulation of returns over a period in order to create a full-year return, which is not in the spirit of the Standards and is thus not allowed.

- **Standard 5.A.5.** For periods beginning on or after January 1, 2006, and ending prior to January 1, 2011, if a composite includes carve-outs, the presentation must include the percentage of the composite that is composed of carve-outs for each annual period.
- **Standard 5.A.6.** If a composite contains any non-fee-paying portfolios, the firm must present, as of the end of each annual period, the percentage of the composite assets represented by the non-fee-paying portfolios.

  *Discussion:* An example of a non-fee-paying portfolio is one that is managed on a *pro bono* basis. Portfolios that are non-fee-paying do not have to be included in any composite, and the firm need not make any disclosures regarding such portfolios.

- **Standard 5.A.7.** If a composite includes bundled-fee portfolios, the firm must present, as of the end of each annual period, the percentage of the composite assets represented by bundled-fee portfolios.
- **Standard 5.A.8.**

  a. Generally a performance track record of a composite *must* stay with the firm where it was generated. The record is not "portable," but if a past firm or affiliation is acquired and if three other conditions are met, the past record must be linked to and used by the new or acquiring firm. The three conditions are:

     i. Substantially all the investment decision makers are employed by the new firm (e.g., research department, portfolio managers, and other relevant staff);

     ii. The decision-making process remains substantially intact and independent within the new firm; and

     iii. The new firm has records that document and support the reported performance.

  b. If a firm acquires another firm or affiliation, the firm has one year to bring any noncompliant assets into compliance.

  *Discussion*: If ownership of the firm changes, through acquisition by a larger firm or other means, and the assets, managers, and management process remain substantially the same, the firm's composites are considered to have continued as if nothing happened. In addition, past returns for the firm's composites are linked to those of the new firm to represent historical performance, and returns are then linked going forward.

  For most *new affiliations* or *newly formed entities*, however, performance results of a prior firm cannot be used to represent a historical record. For example, when a manager leaves a firm to start or join another firm, the manager cannot present past performance as a historical record. The composite record is assumed to remain with the old firm because that firm *owns* the strategy and process.

## GIPS Presentation and Reporting Recommendations

- **Standard 5.B.1.** Firms should present gross of fees returns.
- **Standard 5.B.2.** Firms should present:
  a. Cumulative returns for composite and benchmarks for all periods.

  b. Equal-weighted mean and median returns for each composite.

c. Quarterly and/or monthly returns.

d. Annualized composite and benchmark returns for periods greater than 12 months.

- **Standard 5.B.3.** For periods prior to January 1, 2011, the 3-year annualized ex post standard deviation of monthly returns for each year for the composite and its benchmark.
- **Standard 5.B.4.** For each year in which an annualized ex post standard deviation is present for the composite and the benchmark, corresponding annualized return should be presented.
- **Standard 5.B.5.** For each year that annualized composite and benchmark returns are reported, the corresponding annualized standard deviation of monthly returns for the composite and benchmark.
- **Standard 5.B.6.** Additional ex post composite risk measures.
- **Standard 5.B.7.** Firms should present more than ten years of annual performance in the compliant presentation.
- **Standard 5.B.8.** Firms should comply with GIPS for all historical periods.
- **Standard 5.B.9.** Firms should update compliant presentations quarterly.

## Real Estate and Private Equity—Introduction

**LOS 43.o: Identify the types of investments that are subject to the GIPS standards for real estate and private equity.**

*CFA® Program Curriculum, Volume 6, page 300*

Most of the GIPS provisions we have discussed thus far apply to real estate and private equity, and there are some exceptions as well as additional standards for the two asset classes.

The GIPS standards relating to real estate and private equity are fairly complex due to the nature of the investments. Before describing the Standards, let us first consider exactly which investments are covered by the provisions. (The GIPS, in fact, describe investments that should *not* be included in the asset classes.)

For **real estate**, the following investment types would fall under the *general provisions* of the GIPS standards (as opposed to the provisions dealing directly with real estate and private equity):

- Publicly traded real estate securities, including any listed securities issued by public companies.
- Commercial mortgage-backed securities (CMBS).
- Private debt investments, including commercial and residential loans where the expected return is solely related to contractual interest rates without any participation in the economic performance of the underlying real estate.

Note that publicly traded securities include Real Estate Investment Trusts (REITs). If a portfolio consists of real estate plus other investments, the carve-out provisions of GIPS (Standard 3.A.8) would apply.

The exclusions to the definitions of **private equity** are *open-end* and *evergreen* funds, both of which are covered by the general provisions of the GIPS. Because redemptions and subscriptions may be made after the funds' inceptions, open-end and evergreen funds do not have fixed levels of capital with a set number of investors.

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**LOS 43.p: Explain the provisions of the GIPS standards for real estate and private equity.**

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*CFA® Program Curriculum, Volume 6, page 301*

## GIPS Real Estate Requirements

- **Standards 6.A.1–A.3.** For periods prior to January 1, 2008, real estate investments must be valued at market value at least once every 12 months. For periods beginning January 1, 2008, real estate investments must be valued at least quarterly. For periods on or after January 1, 2010, firms must value portfolios as of the end of each quarter or the last business day of each quarter.
- **Standards 6.A.4 and A.5.** For periods prior to January 1, 2012, real estate investments must have an external valuation done at least once every three years. External valuation means an outside, independent party certified to perform such valuations. For periods beginning January, 1, 2012, real estate investments must have an external valuation done at least once every 12 months or if a client agreement states otherwise, at least once every three years.
- **Standards 6.A.6 and A.7.** Real estate portfolio returns must be calculated at least quarterly after the deduction of transaction costs during the period.
- **Standard 6.A.8.** Beginning January, 1, 2011, income and capital component returns must be calculated separately using geometrically linked time-weighted rates of return.
- **Standard 6.A.9.** Composite returns, including component returns, must be calculated at least quarterly by asset-weighting the individual portfolio returns using time-weighted rates of return.

**For the Exam:** Be ready to calculate capital employed, total return, income return, and capital return on the exam.

All the return calculations are based upon total capital employed (invested). You will notice that capital employed is the weighted average capital invested during the period:

$$C_E = C_0 + \sum_{i=1}^{n}(CF_i \times w_i)$$

where:
$C_E$ = capital employed
$C_0$ = beginning capital
$CF_i$ = cash flow *i*
$w_i$ = the weight of cash flow *i*, defined as the proportion of the period the cash flow was in or missing from the portfolio

**Example: Calculating capital employed**

The Bruin Real Estate Development Company (BDC) has $10,500,000 in capital tied up in a real estate portfolio at the beginning of the month. On day 10 (weight = 0.67), it inputs another $3,000,000, and on day 22 (weight = 0.27), another $1,500,000.

Over the month, it made capital expenditures totaling $1,350,000, and sales proceeds totaled $1,200,000. Non-recoverable expenses over the month totaled $125,000, it paid $75,000 and $5,000 on interest expense and taxes, respectively, and it received investment income amounting to $85,000.

The market value of the portfolio at the beginning of the month was $13,900,000, and at the end of the month, the value was $14,800,000.

**Calculate** the amount of *capital employed* ($C_E$) for BDC over the month.

**Answer:**

$$C_E = C_0 + \sum_{i=1}^{n}(CF_i \times w_i)$$

$$C_E = \$10{,}500{,}000 + \$3{,}000{,}000(0.67) + \$1{,}500{,}000(0.27) = \$12{,}915{,}000$$

The **capital return** (i.e., return *of* capital) is calculated as the percentage change in the value of the property after consideration of capital improvements and sales proceeds.

*Professor's Note: As when we calculate the return for a portfolio of securities, we make adjustments for cash flows that are beyond the manager's control. For example, an infusion of new capital that increases the ending portfolio value should not be considered part of the portfolio return. Likewise, a capital withdrawal should not count against the manager by reducing the ending value of the portfolio.*

$$R_C = \frac{V_1 - V_0 - E_C + S}{C_E}$$

where:
$R_C$ = capital return
$V_1$ = ending value
$V_0$ = beginning value
$E_C$ = capital expenditures (improvements)
$S$ = sales proceeds
$C_E$ = capital employed

**Example (Continued): Calculating capital return**

The Bruin Real Estate Development Company (BDC) has $10,500,000 in capital tied up in a real estate portfolio at the beginning of the month. On day 10 (weight = 0.67), it inputs another $3,000,000, and on day 22 (weight = 0.27), another $1,500,000.

Over the month, it made capital expenditures totaling $1,350,000, and sales proceeds totaled $1,200,000. Non-recoverable expenses over the month totaled $125,000, it paid $75,000 and $5,000 in interest expenses and taxes, respectively, and it received investment income amounting to $85,000.

The market value of the portfolio at the beginning of the month was $13,900,000, and at the end of the month, the value was $14,800,000.

**Calculate** the *capital return* ($R_C$) for BDC for the month.

**Answer:**

$$R_C = \frac{V_1 - V_0 - E_C + S}{C_E}$$

$$R_C = \frac{\$14{,}800{,}000 - \$13{,}900{,}000 - \$1{,}350{,}000 + \$1{,}200{,}000}{\$12{,}915{,}000}$$

$$= \frac{\$750{,}000}{\$12{,}915{,}000} = 0.058 = 5.8\%$$

The equation indicates that the value of a real estate portfolio can change due to:

1. A change in the intrinsic value of portfolio properties.
2. An infusion of new capital.
3. The sale of portfolio properties (amounts to a withdrawal of capital).

*Sales proceeds* (S) for the period are added back to the ending value of the property because the decrease in overall value is from a sale rather than a decrease in intrinsic value. This is analogous to a capital withdrawal from a portfolio. Not adding back the sales proceeds would give the impression that the real estate had fallen in value by that amount.

*Capital expenditures* ($E_C$) (i.e., capital improvements) are deducted because the increase in the value of the property is due to a cash infusion. Again, the portfolio manager should not get credit for an increase in the value of the portfolio that is due to a cash infusion rather than an increase in intrinsic value.

The **income return** is calculated as the *net investment income* earned over the period divided by capital employed ($C_E$). Net investment income is gross investment income less non-recoverable expenses, interest paid on debt, and property taxes (capital employed is as defined previously):

$$R_I = \frac{Y_A - E_R - I_D - T_P}{C_E}$$

where:
$R_I$ = income return
$Y_A$ = gross investment income
$E_R$ = nonrecoverable expenses, such as leasing and maintenance expenses that are not directly reimbursed by the tenants
$I_D$ = interest on debt
$T_P$ = property taxes

The **total return** for the period is the sum of the capital and income returns:

$$R_T = R_C + R_I$$

**Example (Continued): Calculating income return and total return**

The Bruin Real Estate Development Company (BDC) has $10,500,000 in capital tied up in a real estate portfolio at the beginning of the month. On day 10 (weight = 0.67), it inputs another $3,000,000, and on day 22 (weight = 0.27), another $1,500,000.

Over the month, it made capital expenditures totaling $1,350,000, and sales proceeds totaled $1,200,000. Non-recoverable expenses over the month totaled $125,000, it paid $75,000 and $5,000 in interest expenses and taxes, respectively, and it received investment income amounting to $85,000.

The market value of the portfolio at the beginning of the month was $13,900,000, and at the end of the month, the value was $14,800,000.

**Calculate** the *income return* ($R_I$) and *total return* ($R_T$) for BDC for the month.

**Answer:**

$$R_I = \frac{Y_A - E_R - I_D - T_P}{C_E}$$

$$= \frac{\$85{,}000 - \$125{,}000 - \$75{,}000 - \$5{,}000}{\$12{,}915{,}000}$$

$$= \frac{-\$120{,}000}{\$12{,}915{,}000} = -0.00929 = -0.93\%$$

$$R_T = R_C + R_i = 5.8\% - 0.93\% = 4.87\%$$

Figure 6 shows a hypothetical return presentation for real estate. You should notice:

- The income and capital return components sum to the total return for each quarter (i.e., $R_T = R_C + R_I$ for each quarter).
- The annual income and capital components DO NOT sum to the annual return (i.e., $R_T \neq R_C + R_I$ for the year).

*Professor's Note: GIPS only* recommends *the disclosure of income, capital, and total returns for an appropriate benchmark.*

**Figure 6: Hypothetical Real Estate Return Presentation**

| | *Income Return* | *Capital Return* | *Total Return* |
|---|---|---|---|
| Q1, 2011 | 2.05% | 0.03% | 2.08% |
| Q2, 2011 | 3.11% | 0.55% | 3.66% |
| Q3, 2011 | 2.85% | 0.02% | 2.87% |
| Q4, 2011 | 2.55% | 0.06% | 2.61% |
| 2011 | 10.56% | 0.66% | 11.69% |

The annual return is found by *geometrically linking* the quarterly returns:

$$R_{2011} = (1.0208)(1.0366)(1.0287)(1.0261) - 1 = 1.1169 - 1 = 11.69\%$$

This firm would have to disclose how the annual return is the chain-linked quarterly returns. Alternatively, the firm could force the component returns to equal the annual return but would have to disclose the method used in doing so.

*Professor's Note: Remaining GIPS real estate standards are covered in a later LOS.*

## Private Equity Requirements

*Professor's Note: The private equity requirements fall into five categories: (1) Input Data, (2) Calculation Methodology, (3) Composite Construction, (4) Disclosures, and (5) Presentation and Reporting. The LOS is restricted to performance presentation, so only the relevant Standards are shown.*

- Standard 7.A.21. Firms must present both the net-of-fees and gross-of-fees annualized SI-IRR of the composite for each year since inception.

  *Discussion:* SI-IRR is the *since inception internal rate of return.* Remember that the IRR is the interest rate that makes the net present value (NPV) of the investment equal to zero. In other words, it is the discount rate that makes the total present value of all cash inflows and outflows since inception equal to the total present value of capital invested.

- Standard 7.A.22. Beginning January 1, 2011, for fund of funds composites, firms must present the SI-IRR of the underlying investments grouped by vintage year as well as the other measures required by Standard 7.A.23. All measures must be presented gross of the fund of funds investment management fees and of the most recent annual accounting period.

**For the Exam:** You should not be asked to calculate an SI-IRR. Just remember that SI-IRR must be reported both gross and net of fees.

- Standard 7.A.23. For each period presented, firms must report:

  a. Since-inception paid-in capital.

  b. Cumulative committed capital.

  c. Since-inception distributions.

  *Discussion:* Since-inception paid-in capital represents all payments drawn to date from investors' capital.

  d. Total value to paid-in capital (investment multiple or TVPI).

  e. Cumulative distributions to paid-in capital (realization multiple or DPI).

  f. Paid-in capital to committed capital (PIC multiple).

  g. Residual value to paid-in capital (RVPI).

  *Discussion:* The TVPI calculation shows potential investors the ratio of total current value [cumulative distributions plus the "residual value" (equity reversion value) at the end of the period] to initial investment, though no timescale is considered. Investors can use this to assess the total increase in value to date based upon original cost.

  The other ratios listed in this Standard provide prospective investors other information on the historic performance of the composite. As mentioned earlier, this is a complex area, and this brief description in the handbook ignores many of the intricacies that are encountered with private equity investments.

- **Standard 7.A.24.** If a benchmark is shown, the cumulative annualized SI-IRR for the benchmark that reflects the same strategy and vintage year of the composite must be presented for the same periods for which the composite is presented. If no benchmark is shown, the presentation must explain why no benchmark is disclosed.

  *Discussion:* The vintage year is the year in which the private equity fund first draws down (calls for) capital. The statement of the year allows prospective investors to compare different composites more easily.

### GIPS Private Equity Recommendations

- **Standard 7.B.1–B.3.** Valuation should be done at least quarterly for private equity investments. For periods before January 1, 2011, the SI-IRR should be calculated using daily cash flows. Firms should disclose and explain any material differences between valuations used in performance reporting and those used in financial reporting as of the end of each annual reporting period.

### Wrap Fee/Separately Managed Accounts

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**LOS 43.q: Explain the provisions of the GIPS standards for Wrap fee/ Separately Managed Accounts.**

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*CFA® Program Curriculum, Volume 6, page 310*

With a wrap fee/separately managed account (SMA) a fund sponsor (e.g., a pension fund sponsor) acts as a conduit between the account owner(s) and the investment management firm. For a single (i.e., wrapped) fee, the investment management firm, also known as a *sub-adviser*, provides investment management, custodial, and administrative functions, as well as trading for the client.

The GIPS provisions related specifically to SMAs are supplemental to the main body of the GIPS provisions. They apply to all compliant SMA performance presentations for periods beginning on or after January 1, 2006.

*Professor's Note: With SMAs, the sponsor usually provides investment guidance; hence, the investment management firm can be considered a sub-adviser. Also, note that the investment management firm's client is the sponsor, not the owner(s) of the account.*

Because of the relationships of the account owners, the sponsor, and the investment management firm, maintaining supporting documentation is especially important for SMAs. In some cases, rather than depend on the sponsor's records, account owners and investment management firms will engage in *shadow accounting*, which amounts to keeping their own set of books to keep track of investment performance and ensure compliance with the GIPS.

In addition to record keeping concerns, SMAs utilize bundled fees, which present their own special problems. First, firms must disclose the types of fees contained in the bundled fee. Then, in cases where direct trading expenses cannot be identified in the bundled fee, the GIPS require the entire bundled fee to be deducted in calculating returns.

Note that this treatment of SMA portfolios can cause concern for management firms. The GIPS require investment management firms to include SMA portfolios in an appropriate composite according to their written policies for inclusion. Thus, they must decide whether to create composites containing only SMAs or include SMAs in other composites containing non-wrap fee accounts.

If firms include SMAs in composites containing non-SMA accounts and are unable to isolate the direct trading expenses in wrap fees, the resulting SMA returns could bring down the reported performance of the composites. This could put the firm at a competitive disadvantage when presenting the performance of a composite to current and potential clients, especially non-wrap fee clients. Offsetting this concern, of course, is the ability to show more assets under management in the composite than if the SMA was in a totally separate, sponsor-specific composite.

*Professor's Note: Firms can create style composites containing several SMAs or sponsor-specific composites containing the account(s) of a single sponsor. Thus, firms are permitted to present performance results for style-specific SMA composites or for sponsor-specific SMA composites.*

SMA-specific GIPS provisions include:

- If a compliant presentation includes periods before the SMA was included in the composite, each period when the SMA was not in the composite must be identified.
- Firms must disclose any performance prior to January 1, 2006, that is not compliant with the SMA provisions.
- When soliciting business from potential SMA clients, firms must provide presentations that include all SMA accounts managed to the stated objective or strategy.
- Reported returns must be after deduction of all bundled fees.
- Firms may present performance results for sponsor-specific composites but must identify the name of the sponsor. If the returns presented are not net of the entire bundled fees, the firm must state that the presentation was prepared for that sponsor.
- Firms may link years of noncompliant performance with years of compliant performance as long as only GIPS-compliant performance is presented after January 1, 2006.

## GIPS Valuation Principles

**LOS 43.r: Explain the requirements and recommended valuation hierarchy of the GIPS Valuation Principles.**

*CFA® Program Curriculum, Volume 6, page 312*

For periods beginning on or after January 1, 2011, the GIPS require firms to use *fair values*. According to GIPS, fair value is defined as follows:

> "Fair value is the amount at which an investment could be exchanged in a current arm's length transaction between willing parties in which the parties act knowledgeably and prudently. The valuation must be determined using the objective, observable, unadjusted market price for an identical investment in an

active market on the measurement date, if this price is available; otherwise, the valuation must reflect the firm's best estimate of the market value. Fair value must include accrued income."

*Professor's Note: "Arm's length" refers to a transaction in which the parties are willing, independent participants acting on their own behalf.*

## GIPS Valuation Requirements

- If local laws or regulations related to valuation conflict with the GIPS, firms are required to follow the local laws or regulations and disclose the conflict.
- Firms must disclose their portfolio valuation policies and hierarchy.
- For periods beginning on or after January 1, 2011, firms must disclose any subjective valuation if the portfolio is a significant portion of the composite.
- Firms must disclose if the valuation hierarchy used to value composites differs from the GIPS recommended hierarchy.

The **GIPS valuation hierarchy** is a list of value sources.[5] Starting at the top, if the firm is unable to utilize the source, it *should* proceed to the next source on the list:

*Professor's Note: The use of the word* should *implies the hierarchy is only recommended. Firms are not allowed to proceed down the list unless source #1 is unavailable or inappropriate. The firm's valuation hierarchy must be disclosed and should be composite-specific.*

1. Objective, observable, unadjusted market prices for similar investments in active markets.

2. Quoted prices for identical or similar investments in markets that are not active.

3. Market-based inputs other than quoted prices that are observable for the investment.

4. Subjective, unobservable inputs.

## Real Estate Valuation Principles

- The GIPS require that real estate investments be valued externally by outside sources following accepted industry and governmental valuation standards.
- The amount of the external valuator's fee must not be based on the resulting value.
- Although appraisal standards allow reporting values in ranges, the GIPS recommend a single value be reported for returns purposes.
- The firm should rotate external valuators every three to five years.

## Private Equity Valuation Principles

- The valuation methodology utilized must be "the most appropriate for a particular investment based on the nature, facts, and circumstances of the investment."
- When valuing private enterprises, the process should consider:
  - Reliable appraisal data.

5. CFA Program 2013 Curriculum, Volume 6, Level III, page 313.

- Comparable enterprise or transaction data.
- The enterprise's stage of development.
- Additional characteristics unique to the enterprise.

The GIPS require *fair representation of values*. This means firms should follow standard industry and governmental valuation guidelines as closely and consistently as possible in an effort to obtain the best possible value estimates. Firms must also document valuation policies followed and disclose those policies to prospective clients. Firms are recommended to provide the input data to prospective clients as well, so they can feel comfortable relying on the presented values and returns.

## GIPS Advertising Guidelines

### LOS 43.s: Explain the requirements for compliance with the GIPS Advertising Guidelines.

*CFA® Program Curriculum, Volume 6, page 315*

Firms that present their performance in compliance with GIPS may wish to advertise that fact and must follow mandatory guidelines.

All advertisements that include a claim of compliance with the GIPS Advertising Guidelines must include the following:

1. A description of the firm.
2. How an interested party can obtain a presentation that complies with the requirements of GIPS standards and/or a list and description of all firm composites.
3. The GIPS Advertising Guidelines compliance statement:

   *[Insert name of firm] claims compliance with the Global Investment Performance Standards (GIPS®).*

   Note the difference between this statement and the performance presentation compliance statement discussed under LOS 43.c previously and reproduced below for your convenience:

   *(Insert name of firm) claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. (Insert name of firm) has not been independently verified.*

   All advertisements that include a claim of compliance with the GIPS Advertising Guidelines and that present performance results must also include the following information (the relevant information must be taken/derived from a presentation that adheres to the requirements of the GIPS standards):

4. A description of the composite being advertised.
5. One of the following sets of total returns:
   a. 1-, 3-, and 5-year annualized composite returns through the most recent period.

b. Period-to-date composite performance results in addition to 1-, 3-, and 5-year cumulative annualized composite returns with the end-of-period date clearly identified (or annualized period since composite inception if inception is greater than one and less than five years). Periods of less than one year are not permitted to be annualized. The annualized returns must be calculated through the same period of time as presented in the corresponding compliant presentation.

c. Period-to-date composite returns in addition to five years of annual composite returns calculated through the same period of time as presented in the corresponding compliant presentation.

6. Whether performance is shown gross and/or net of investment management fees.
7. The benchmark total return for the same periods for which the composite return is presented and a description of that benchmark. (The appropriate composite benchmark return is the same benchmark total return as presented in the corresponding GIPS-compliant presentation.) If no benchmark is presented, the advertisement must disclose why no benchmark is presented.
8. The currency used to express returns.
9. The description of the use and extent of leverage and derivatives if leverage or derivatives are used as an active part of the investment strategy (i.e., not merely for efficient portfolio management) of the composite. Where leverage/derivatives do not have a material effect on returns, no disclosure is required.
10. When presenting noncompliant performance information for periods prior to January 1, 2000, in an advertisement, firms must disclose the period(s) and which specific information is not in compliance with the GIPS standards.

    The Advertising Guidelines also suggest that firms may present other information, though this supplemental information should be of equal or lesser prominence than the required information described previously.

## GIPS Verification

### LOS 43.t: Discuss the purpose, scope, and process of verification.

*CFA® Program Curriculum, Volume 6, page 317*

Once a firm claims compliance with the GIPS, it is responsible for its claim of compliance and for maintaining its compliance. In doing so, the firm may *voluntarily* hire an independent third party to verify its claim of compliance, which adds credibility to the firm's claim of compliance.

The *primary purpose of verification* is to increase the level of confidence that a firm claiming GIPS compliance did, indeed, adhere to the Standards on a firm-wide basis.

Verification involves the review of an investment management firm's performance-measurement processes and procedures by an *independent third-party verifier*. Upon

completion of verification, a verification report is issued that must confirm the following:

- The investment firm has complied with all the composite construction requirements of GIPS on a firm-wide basis.
- The firm's processes and procedures are designed to calculate and present performance results in compliance with the GIPS.

Without such a report from the verifier, the firm cannot assert that its claim of compliance with GIPS has been verified.

Other noteworthy aspects of GIPS verification include the following:

- A single verification report is issued to the entire firm; *GIPS verification cannot be carried out for a single composite.*
- Verification cannot be partial: it is all or nothing. In other words, verification cannot enable a firm to claim that its performance presentation is in compliance with GIPS "except for …"
- Verification is not a requirement for GIPS compliance, but it is *strongly encouraged* and may eventually become mandatory.
- The initial minimum period for which verification can be performed is one year of a firm's presented performance. The recommended period over which verification is performed will be that part of the firm's track record for which GIPS compliance is claimed.
- After performing the verification, the verifier may conclude that the firm is not in compliance with GIPS or that the records of the firm cannot support a complete verification. In such situations, the verifier must issue a statement to the firm clarifying why a verification report was not possible.

## After-Tax Returns

**LOS 43.u: Discuss challenges related to the calculation of after-tax returns.**

*CFA® Program Curriculum, Volume 6, page 322*

Due to the large number of different global taxing authorities, as well as the variety of tax treatments specific to individual clients, calculating and presenting after-tax returns can be quite difficult and present considerable obstacles. Therefore, rather than building requirements or guidance for the presentation of after-tax returns into the GIPS standards, the GIPS Executive Committee places the responsibility for country-specific guidance on after-tax returns on GIPS country sponsors.

*Professor's Note: Country sponsors act as a liaison between the GIPS Executive Council and their respective local markets. They are charged with overseeing the implementation of the GIPS in their respective markets and with representing the varying needs of their markets as the GIPS evolve.*

For periods beginning on or after January 1, 2011, when firms include after-tax return information in a compliant performance presentation, the information must

be presented as supplemental information. As such, it is subject to the GIPS guidance statement[6] on the use of supplemental information.

*Professor's Note: Supplemental information is performance-related information included in a GIPS-compliant performance presentation. Its intention is to provide information above and beyond that required by the GIPS standards, including the GIPS required disclosures, to aid users in interpreting and understanding performance results.*

Two methods for incorporating the effects on returns are the pre-liquidation method and the mark-to-liquidation method. The *pre-liquidation* method calculates after-tax returns based on income earned and gains and losses actually recognized over the period through asset sales. This method may not represent the true accrued tax liability, however, due to unrealized gains or losses in the values of assets remaining in the portfolio. This method effectively ignores the effects of future capital gains taxes.

The *mark-to-liquidation* method assumes all gains, whether recognized or not, are taxed each period. This method can ultimately overstate the tax effect because it ignores the effects of tax-aware portfolio management. For instance, by assuming that capital gains are taxed each period (for estimating after-tax returns), it ignores the time value of money benefits of postponing capital gains and the associated taxes.

As you can see, neither method considers future gains or losses; each method considers only the current period's returns. Due to their respective deficiencies, neither the pre-liquidation method nor the mark-to-liquidation method measures the portfolio's true economic value. To measure a portfolio's true economic value would require numerous assumptions about the size, timing, and recognition of future investment results as well as tax laws and the client's tax status. Of course, future tax liabilities will depend on the initial cost of securities that are sold as well as the length of the investment period, as most tax regimes make a distinction between long- and short-term capital gains.

## After-Tax Benchmark Returns

In addition to difficulties we have discussed that are associated with estimating taxes in the client's portfolio, there is also the concern over the proper benchmark. If we are to present after-tax portfolio returns, we must also present after-tax benchmark returns. The appropriate after-tax benchmark should exhibit all seven of the characteristics of a valid benchmark, plus an eighth. An appropriate after-tax benchmark should be:

1. Specified in advance.
2. Appropriate.
3. Measureable.
4. Unambiguous.
5. Reflective of the manager's investment opinions.
6. Accountable.
7. Investable.
8. Reflective of the client's tax status.

6. Guidance Statement on the Use of Supplemental Information (Revised), effective January 1, 2006.

Because no index providers present after-tax returns, the portfolio manager is left with this complicated task.[7] To estimate the after-tax returns on an index, the manager must consider the following:

- The way the provider constructed the index, such as price, equal, or market value weighting.
- The rebalancing policy followed by the index provider.
- The effects of taxable events such as price changes, dividends, splits, et cetera, associated with each of the component firms.

As an alternative to using an index as a benchmark and trying to estimate the after-tax index returns, the manager can consider using mutual funds or exchange-traded funds as benchmarks. Unfortunately, mutual funds that track indices are subject to licensing fees, and their returns can differ from the index. In addition, their tax effects are driven by the trading actions of the manager and redemptions and deposits by shareholders. Because they are not subject to taxes related to investors' deposits or redemptions, exchange traded funds may make better after-tax benchmarks.

Managers can also consider the use of a custom security-based benchmark and adjust the components and value of the benchmark to reflect the client's actions and tax status. Alternatively, they can construct *shadow portfolios,* paper portfolios used as benchmarks constructed from mutual funds or exchange traded funds, and then adjust the shadow portfolios to reflect the client's transactions.



## Client-Directed Trades

Oftentimes, even in discretionary portfolios, managers must meet client-directed withdrawals by liquidating securities. The resulting tax effect is, therefore, out of the manager's control. Because we are attempting to measure the after-tax return resulting from the manager's actions, firms might want to remove the effects of the resulting capital gains taxes by adjusting the ending value of the portfolio (on paper) by adding back the amount of the these non-discretionary taxes before calculating returns.[8] The adjustment amount should be based on the resulting tax effect of selling a proportionate amount of each security in the portfolio.

*Professor's Note: In determining the amount of this tax adjustment, the manager might be tempted to assume that the security with the greatest embedded capital gain was sold. This would have created the greatest hypothetical capital gains tax and, hence, would maximize the tax adjustment and reported after-tax return. The GIPS, therefore, recommend assuming a proportionate amount of each security is sold.*

Of course, not all client directives result in a negative tax effect on the portfolio. Clients will also, at times, direct the manager to sell a security at a loss to recognize the loss for offsetting other gains (tax-loss harvesting). Because this will reduce the amount of the tax effect and is not the result of the manager's actions, firms should disclose the percentage effect on returns caused by losses in excess of gains.

7. Some index providers present returns net of withholding taxes on dividends.
8. The taxes are the result of the client's directives and are, therefore, non-discretionary from the manager's standpoint.

*Professor's Note: Throughout this discussion, we referred to the difficulties associated with presenting after-tax returns for individual portfolios. The problem is, of course, exacerbated when we consider that a composite can contain many portfolios. Thus, reporting after-tax returns for composites can be an extremely time consuming, data-intensive process.*

## GIPS: Sample Performance Presentation Analysis

### LOS 43.v: Identify and explain errors and omissions in given performance presentations, including real estate, private equity and wrap fee/ Separately Managed Account (SMA) performance presentations.

*CFA® Program Curriculum, Volume 6, page 337*

**Example: Evaluating a performance presentation**

Equity Investors, the equity management unit of Manhattan Investment Management, Incorporated (MIMI), has prepared the following performance presentation for its equity growth composite for use in its marketing materials to prospective clients. MIMI manages equity, fixed-income, and balanced portfolios for retail clients to a variety of investment strategies. **Evaluate** the presentation in the figure below, and **identify** any errors or omissions that would prevent Equity Investors from claiming compliance with the GIPS.

**Figure 7: Equity Investors Equity Growth Composite**

| *Year* | *Composite Return (%)* | *Number of Portfolios* | *Dispersion (%)* | *Total Assets at End of Period ($US 000s)* | *Percentage of Firm Assets* | *Total Firm Assets ($US 000s)* |
|---|---|---|---|---|---|---|
| 2006 | 16.49 | 19 | 4.7 | 235 | 19 | 1,237 |
| 2007 | 13.81 | 24 | 6.1 | 365 | 20 | 1,825 |
| 2008 | 28.20 | 27 | 8.8 | 400 | 25 | 1,600 |
| 2009 | 7.96 | 26 | 1.9 | 410 | 22 | 1,864 |
| 2010 | 9.83 | 32 | 4.5 | 470 | 27 | 1,741 |

Equity Investors has prepared and presented this report in compliance with the Global Investment Performance Standards (GIPS®).

Notes:

1. Equity Investors is defined as the equity management unit of Manhattan Investment Management, Incorporated. Equity Investors manages all dedicated equity portfolios for Manhattan Investment Management, Incorporated.
2. The Equity Growth Composite was created in February 2006.
3. Performance results are presented gross of management, wrap, and custodial fees but after all trading commissions.
4. Trade date prices, expressed in U.S. dollars, are used to calculate performance results.
5. The Equity Growth Composite includes all portfolios managed to the firm's equity growth strategy. The composite also includes the equity growth segments of the balanced portfolios managed by another unit of Manhattan Investment Management, Incorporated.
6. Dispersion is measured as the standard deviation of monthly composite returns.

Answer:

1. The equity management unit of a larger investment management firm usually does not satisfy one of the options for defining a firm. In the case of Equity Investors, it is affiliated with the parent company, Manhattan Investment Management, Incorporated, as indicated by the source of the carve-out returns. Thus, Equity Investors may not define itself as a firm. (GIPS Standard 0.A.12)
2. The Equity Growth Composite includes the carve-out returns of the equity growth segment of the firm's balanced composites. The GIPS require that cash be allocated to carve-out returns prior to 2010. The Standards also require disclosure of (1) the method by which cash is allocated to carve-out returns and (2) the percentage of each composite represented by the carve-outs. Starting in 2010 the carve-out must be managed separately with its own cash balance. (Standard 3.A.8, Standard 4.A.23, Standard 5.A.5)
3. The firm did not report an internal measure of dispersion of the composite's portfolio returns about the composite's aggregate return. The dispersion reported in Equity Investor's presentation is an external measure of dispersion, which is a recommended disclosure, but not required.
4. The compliance statement is incorrect. (GIPS Standard 4.A.1)
5. When wrap fees are present, performance results should have been presented net of all wrap fees. (Standard 8.A.6)
6. The presentation does not include a benchmark return. (Standard 5.A.1.e)
7. The firm failed to disclose that a complete list and description of the firm's composites is available upon request. (Standard 4.A.11)

## GIPS: Bringing a Presentation Into Compliance

With reference to the preceding example, the following changes will bring the presentation into compliance with the GIPS.

1. Because it is now assumed that Equity Investors is affiliated with MIMI, it does not satisfy the options for firm definition under GIPS, and the definition of the firm for this presentation must be revised. An appropriate firm definition for this presentation would be as follows: "Equity Investors is the equity management unit of Manhattan Investment Management, Incorporated. Manhattan Investment Management, Incorporated, is an investment firm that manages equity, fixed-income, and balanced portfolios for retail clients. Manhattan Investment Management, Incorporated, is registered with the United States Securities and Exchange Commission" (GIPS Standard 0.A.12). Defining the firm as Manhattan Investment Management, Incorporated, will necessitate the revision of all reported figures that are linked to firm assets. Cash must be allocated to the carve-out returns of the growth equities of the firm's balanced composites, and the method used to allocate cash to the carve-outs must be disclosed. An acceptable disclosure in this case would be as follows: "Prior to 2010 Equity Investor's Equity Growth Composite included all dedicated equity growth portfolios and the equity growth segments of Manhattan Investment Management's balanced portfolios. Starting in 2010 the carve-out was managed separately with its own cash account. Cash was allocated to the carve-out segment returns on a pro rata basis based on the market weight of growth equities in the balanced portfolios." The presentation must also include the percentage of each composite the carve-out represents. (Standard 3.A.8, Standard 4.A.23, Standard 5.A.5)
2. The firm must report an internal measure of dispersion of the composite's portfolio returns about the composite's aggregate return for each year in the presentation. The dispersion reported in Equity Investor's presentation is an external measure of dispersion, which may be included as supplemental information. For periods prior to January 1, 2011, firms should present the 3-year annualized ex post standard deviation of monthly returns of the composite and the benchmark as of the end of each annual period. (Standard 5.A.1.i, Standard 5.B.3.d)
3. An acceptable compliance statement in this presentation would be as follows: "Manhattan Investment Management, Incorporated, claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. Manhattan Investment Management, Incorporated, has not been independently verified." (GIPS Standard 4.A.1)
4. The wrap fees should have been deducted. Performance results presented to prospective wrap fee clients should be net of wrap fees. (Standard 8.A.6)
5. The presentation should include the total return for an appropriate benchmark for each year. For the composite reported in this presentation, the return on the Dow-Jones U.S. Growth Index may be an appropriate benchmark return. (Standard 5.A.1.e)
6. The firm must disclose that the firm's list of composite descriptions is available upon request. (Standard 4.A.11)

## GIPS: Writing a Compliant Presentation

An example of a GIPS-compliant performance presentation is provided in Figure 8.

*Professor's Note: The first six column headings are required. The presentation must include one of the last two, either % of Firm Assets or Total Firm Assets.*

**Figure 8: Firm XZX, Dedicated Equity Composite, March 1, 2006–December 31, 2010**

| *Year* | *Total Return (%)* | *Benchmark Return* | *Number of Portfolios* | *Composite Dispersion (%)* | *Total Assets at End of Period (€ millions)* | *% of Firm Assets* | *Total Firm Assets (€ millions)* |
|---|---|---|---|---|---|---|---|
| 2006 | 19.54 | 18.23 | 29 | 4.8 | 183 | 65 | 282 |
| 2007 | 12.81 | 11.75 | 34 | 5.9 | 329 | 75 | 439 |
| 2008 | 17.30 | 18.56 | 37 | 8.5 | 346 | 72 | 481 |
| 2009 | 11.86 | 11.20 | 36 | 1.7 | 333 | 68 | 490 |
| 2010 | 7.59 | 8.50 | 42 | 3.5 | 284 | 63 | 451 |

## GIPS-Compliant Performance Presentation

XZX Investment Management Firm claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. XZX Investment Management Firm has not been independently verified.

Notes:

1. XZX Investment Management Firm is a dedicated equity portfolio manager that invests entirely in German securities. XZX Investment Management Firm is defined as an independent investment management firm that is not affiliated with any parent organization.
2. The benchmark composition is 100% DAX 100. The annualized compound composite return is 13.7%; the annualized compound benchmark return is 13.6%.
3. Valuations are computed using euros and are obtained from Reuters.
4. The dispersion of annual returns is measured by the standard deviation among asset-weighted portfolio returns for portfolios that were in the composite over the entire year.
5. Performance results are presented before management and custodial fees but after all trading commissions. The management fee schedule is contained in the appendix to this report.
6. This composite was created in March 2006. No modifications to the composite as presented here have occurred as a result of changes in personnel or for any other reason at any time. A complete list of firm composites and performance results is available upon request.
7. Policies for valuing portfolios, calculating performance, and preparing compliant presentations are available upon request.

## GIPS: Real Estate and Private Equity Provisions

### LOS 43.v: Identify and explain errors and omissions in given performance presentations, including real estate, private equity and wrap fee/ Separately Managed Account (SMA) performance presentations. (continued)

*CFA® Program Curriculum, Volume 6, page 337*

**For the Exam:** In addition to the general provisions of the GIPS, there are provisions that are specific to real estate and private equity. As to the form of related questions on the exam, you might have to identify footnotes or other information on real estate or private equity in a performance presentation that indicate non-compliance. Alternatively, you might have to explain why statements made by analysts or portfolio managers are incorrect.

Remember that specific provisions put forth in the GIPS *override* the general provisions with respect to the covered investments. In addition, these specific provisions relate only to *direct* real estate and private equity investments, not investments that trade on exchanges (e.g., REITS, CMBS) or private debt, the return on which is related to interest rates rather than performance of the underlying assets. If only a portion of a portfolio is direct real estate investments, the specific provisions apply only to the direct real estate investments. On the exam, you could see them applied incorrectly to entire portfolios or not applied because the indirect investments are part of larger, diversified portfolios.

### GIPS: Real Estate Provisions

**Input data:**

1. Beginning January 1, 2011, real estate investments must be valued in accordance with the definition of fair value and the GIPS valuation principles.
2. Prior to January 1, 2008, real estate investments must be valued at fair value at least annually.
3. Beginning January 1, 2008, real estate investments must be valued at least quarterly.
4. Beginning January 1, 2010, real estate portfolios must be valued at the end of the quarter or the last business day of each quarter.
5. Real estate investments must be valued by an outside trained professional at least every three years prior to January 1, 2012, and yearly thereafter unless otherwise stipulated in the client agreement.

**Required disclosures:**

1. The methodology used to calculate returns, which must be chain-linked and time-weighted.
2. How the firm describes discretionary.
3. The internal valuation methods used for the most recent period.

4. The frequency at which outside valuators are used to value investments in the composite.
5. Beginning January 1, 2011, material changes to valuation policies or methods.
6. Beginning January 1, 2011, material differences between external valuation and the valuation used in reporting performance and the reason for the difference.
7. Prior to January 1, 2011, if component returns are adjusted so that the sum of the income and capital returns equals the total return.
8. Firms must disclose any periods of non-compliance for performance presented prior to January 1, 2006.
9. Firms must disclose if any other fees are deducted in addition to transaction expenses when presenting gross-of-fees returns.
10. Firms must disclose if any other fees are deducted in addition to the investment management fees and transaction expenses when presenting net-of-fees returns.

**Presentation and reporting:**

1. In addition to the total return, the capital return and income return components must be disclosed, must sum to the total return, and must be clearly identified as gross or net of fees.
2. Firms may only link non-GIPS-compliant performance for periods prior to January 1, 2006, to GIPS-compliant performance after that date.

3.a. The high and low annual time-weighted rates of return for the individual portfolios in the composite as a measure of internal dispersion. If the composite contains five or less portfolios for the whole year, a measure of internal dispersion is not required.

b. The percentage of composite assets valued using an external valuator as of the end of each annual period.

## Requirements for Real Estate Closed-End Fund Composites:

### Calculation Methodology

- Calculate annualized since inception internal rates of return (SI-IRR) using quarterly cash flows at a minimum.

### Composite Construction

- Defined by vintage year and investment mandate, objective, or strategy. The definition must remain consistent throughout the life of the composite.

### Disclosures

- The final liquidation date for liquidated composites.
- The frequency of cash flows used in the SI-IRR calculation.
- The vintage year of the composite and how the vintage year is defined.

**Presentation and Reporting**

- The net-of-fees SI-IRR of the composite through each annual period end, at least five years of performance or for the period since inception of the composite if less than five years, adding an additional year of performance for each subsequent year.
- For periods beginning January 1, 2011, when the initial period is less than a full year, present the nonannualized net-of-fees SI-IRR through the initial annual period end.
- For periods ending after January 1, 2011, present the net-of-fees SI-IRR through the composite final liquidation date.
- If the gross-of-fees SI-IRR of the composite is presented in the compliant presentation, present the gross-of-fees SI-IRR of the composite for the same periods as the net-of-fees SI-IRR is presented.
- Present, as of each annual period end:

  1. Since inception paid-in capital.
  2. Since inception distributions.
  3. Cumulative committed capital.
  4. Total value to since inception paid-in capital (TVPI investment multiple).
  5. Since inception distributions to since inception paid-in capital (DPI realization multiple).
  6. Since inception paid-in capital to cumulative committed capital (PIC multiple).
  7. Residual value to since inception paid-in capital (RVPI unrealized multiple).

- The SI-IRR of the benchmark through each annual period end. The benchmark must:

  1. Reflect the investment mandate, objective, or strategy of the composite.
  2. Be presented for the same time period as presented for the composite.
  3. Be the same vintage year as the composite.

## GIPS: Private Equity Provisions

**Input data:**

1. Private equity assets must be valued at least annually according to GIPS Private Equity Valuation Principles.
2. Beginning January 1, 2011, private equity must be valued at fair value.

**Calculation methodology:**

1. Annualized since-inception internal rate of return (SI-IRR).
2. SI-IRR must be calculated using daily or monthly cash flows prior to January 1, 2011.

3. Beginning January 1, 2011, the SI-IRR must be calculated using daily cash flows. Stock distributions must be valued at the time of the distribution and included as cash flows.
4. Net-of-fees returns must be calculated with consideration given to management fees and carried interest.
5. All returns must be calculated after deducting transaction expenses for the period.
6. For fund of funds, all returns must be net of all partnership fees, fund fees, expenses, and carried interest.

**Composite construction:**

1. Throughout the life of the composite, composite definitions must remain consistent.
2. Primary funds must be included in at least one composite defined by vintage year and investment strategy, mandate, or objective.
3. Fund of funds must be included in at least one composite defined by vintage year and/or investment strategy, mandate, or objective.

**Required disclosures:**

1. Vintage year and definition of the vintage year for the composite.
2. The liquidation date for liquidated composites.
3. Valuation methodology used for the most recent period, and starting January 1, 2011, any material changes in methodology or policies.
4. Industry guidelines that have been followed in addition to the GIPS guidelines.
5. The benchmark used and the return calculation methodology applied to the benchmark.
6. If any other fees are deducted in addition to transaction expenses when presenting gross-of-fees returns.
7. If any other fees are deducted in addition to investment management fees and transaction expenses when presenting net-of-fees returns.
8. Any periods of non-compliance prior to January 1, 2006.
9. The frequency of cash flows if daily cash flows are not used in calculating the SI-IRR prior to January 1, 2011.

**Presentation and reporting:**

1. Both net-of-fees and gross-of-fees composite SI-IRR for each year-end since inception. Present at least five years of data or since inception if less than five years, adding an additional year of performance for subsequent years. Starting January 1, 2011, present net-of-fees and gross-of-fees SI-IRR through the composite final liquidation date.
2. For every annual period presented for the composite:
   a. Since-inception paid-in-capital.
   b. Since-inception distributions.

   c. Cumulative committed capital.

   d. Total value to paid-in-capital.

   e. Since-inception distributions to paid-in-capital (DPI multiple).

   f. Since-inception paid-in capital to committed capital (PIC multiple).

   g. Residual value to since-inception paid-in-capital (RVPI multiple).

3. The SI-IRR for the benchmark through the end of each annual period. The benchmark must reflect the same vintage year, time periods, and strategy as the composite.

4. Prior to January 1, 2006, firms may present non-GIPS-compliant performance.

5. Starting January 1, 2011, fund of funds composites must present the SI-IRR by vintage year as well as the other measures presented in Item 2 above gross of investment management fees for the most recent annual period-end.

6. For fund of funds composites, if a benchmark is presented, it must be of the same vintage year and investment objective, strategy, or mandate as the underlying investments.

7. Beginning January 1, 2011, fund of funds composites must present the percentage of composite assets invested in direct investments.

8. Beginning January 1, 2011, primary fund composites must present the percentage of composite assets invested in fund investment vehicles (instead of direct investments) as of the end of each annual period-end.

# Key Concepts

## LOS 43.a

Recognizing the need for one globally accepted set of investment performance presentation standards, CFA Institute (formerly Association for Investment Management and Research) sponsored and funded the Global Investment Performance Standards Committee to develop and publish a single global standard by which all firms calculate and present performance to clients and prospective clients. As a result of this initiative, the AIMR Board of Governors formally endorsed the GIPS on February 19, 1999, as the worldwide standard. The latest edition of the GIPS was adopted by the GIPS Executive Committee on January 29, 2010.

The benefits to existing and prospective clients derive from the ability to compare the performance of firms operating in different countries with different sets of established practices. The GIPS ensure that performance data are complete and fairly presented so that existing and prospective clients can have greater confidence in comparative investment results.

## LOS 43.b

GIPS objectives:

- Establish global, industry-wide best practices for the calculation and presentation of investment performance.
- Facilitate the accurate and unambiguous presentation of investment performance results to current and prospective clients.
- Facilitate a comparison of the historical performance of investment management firms.
- Encourage full disclosure and fair global competition without barriers to entry.
- Encourage self-regulation.

GIPS characteristics:

- Voluntary minimum standards for performance presentation.
- Firms must meet all requirements on a firm-wide basis in order to claim compliance.
- Only investment management firms may claim compliance.
- Provide a minimum standard where local or country-specific laws, regulation, or industry standards may not exist.
- Require managers to include all actual fee-paying discretionary portfolios in composites defined according to similar strategy and/or investment objective.
- Firms must present a minimum of five years of GIPS-compliant history or since inception if less than five years. After presenting at least five years of compliant history, the firm must add annual performance each year going forward up to ten years, at a minimum.
- Firms may link years of noncompliant performance but must present only compliant data for periods beginning on or after January 1, 2000.
- Firms must use prescribed calculation and presentation methods and include required disclosures in presentations.
- Meeting the objective of full and fair disclosure will likely require more than compliance with the minimum requirements of the GIPS.
- To fully explain the performance included in a presentation, firms are encouraged to present all relevant supplemental information.

- In cases in which applicable local or country-specific laws or regulations conflict with the GIPS, the standards require firms to comply with the local law or regulation and make full disclosure of the conflict.
- Firms are encouraged to develop monitoring processes and controls for maintaining GIPS compliance.
- Firms must document the policies used to ensure the existence and ownership of client assets.
- January 1, 2011, is the effective date of the 2010 edition of the GIPS. Presentations that include performance for periods beginning on or after January 1, 2011, must comply with the 2010 version of the GIPS.

Scope of the GIPS
Firms from any country may come into compliance with the GIPS. Compliance with the standards will facilitate a firm's participation in the investment management industry on a global level.

For periods prior to January 1, 2006, firms are granted reciprocity, so that if pre-2006 data are presented in compliance with a previous edition of the GIPS or a Country Version of GIPS (CVG), such data may continue to be shown as compliant with the revised GIPS.

## LOS 43.c

GIPS compliance must be on a firm-wide basis. Total firm assets are defined as the total fair value of all assets the firm manages, including non-fee-paying and non-discretionary portfolios. Also included in the definition are assets delegated to sub-advisers, as long as the firm has selected the sub-advisers. If (according to the firm's definition of discretion) a portfolio is deemed discretionary, it is considered sufficiently free of client-mandated constraints such that the manager is able to pursue its stated strategy, objectives, or mandate.

A **firm** is defined as "an investment firm, subsidiary, or division held out to clients or potential clients as a distinct business entity."

A **distinct business entity** is defined as "a unit, division, department, or office that is organizationally or functionally separated from other units, divisions, departments, or offices and that retains discretion over the assets it manages and that should have autonomy over the investment decision-making process."

In order to claim compliance with GIPS, a firm must adhere to all the requirements laid out in the sections that follow. Furthermore, firms need to have *written* documentation of those policies and procedures that ensure compliance with the standards. Once a firm has met all of the required elements of the GIPS, the firm may use the following compliance statement to indicate that the performance presentation is in compliance with the GIPS:

> *(Insert name of firm) claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPs standards. (Insert name of firm) has not been independently verified.*

Firms cannot claim *partial* GIPS compliance. This specifically prohibits statements such as "...in compliance with the Global Investment Performance Standards *except for*:..."

### LOS 43.d

GIPS input data requirements

- **Standard** 1.A.1. All data and information necessary to support the firm's performance presentation, including calculations, must be stored and maintained.
- **Standard** 1.A.2. For periods beginning on or after January 1, 2011, portfolios must be valued at fair value according to GIPS principles. Cost or book values are not permitted.
- **Standard** 1.A.3. Portfolio valuation.
  - Prior to January 1, 2001, portfolios must be valued at least quarterly.
  - Beginning on or after January 1, 2001, at least monthly.
  - Beginning on or after January 1, 2010, at least monthly and on the date of all large external cash flows.
- **Standard** 1.A.4. For periods beginning January 1, 2010, firms must value portfolios as of the calendar month-end or the last business day of the month.
- **Standard** 1.A.5. For periods beginning January 1, 2005, firms must use trade-date accounting.
- **Standard** 1.A.6. Accrual accounting must be used for fixed-income securities and all other assets that accrue interest income. Market values of fixed-income securities must include accrued income.
- **Standard** 1.A.7. For periods beginning January 1, 2006, composites must have consistent beginning and ending annual valuation dates. Unless the composite is reported on a non-calendar fiscal year, the beginning and ending valuation dates must be at calendar year-end (or on the last business day of the year).

GIPS input data recommendations

- **Standard** 1.B.1. Rather than only at large external cash flows, portfolios should be valued at each external cash flow.
- **Standard** 1.B.2. Valuations should be obtained from an independent third party.
- **Standard** 1.B.3. Dividends from equities should be accrued as of the ex-dividend date.
- **Standard** 1.B.4. When presenting net-of-fees returns, firms should accrue investment management fees.

### LOS 43.e

GIPS calculation methodology requirements

- **Standard** 2.A.1. Total returns must be used.
- **Standard** 2.A.2. Time-weighted rates of return that adjust for external cash flows must be used. Periodic returns must be geometrically linked. External cash flows must be treated in a consistent manner with the firm's documented, composite-specific policy in order to determine when portfolios in the composite require revaluation. At a minimum:

  1. For periods beginning January 1, 2005, firms must use approximated rates of return that adjust for daily weighted external cash flows.

  2. For periods beginning January 1, 2010, firms must value portfolios on the date of all large external cash flows.

Original Dietz method (permitted until January 1, 2005):

$$R_{Dietz} = \frac{EMV - BMV - CF}{BMV + 0.5CF}$$

TWRR methodologies that adjust for *daily* cash flows (required for periods beginning on or after January 1, 2005, until January 1, 2010). The modified Dietz method:

$$R_{MDietz} = \frac{EMV - BMV - CF}{BMV + \sum_{i=1}^{n} W_i \times CF_i}$$

The modified IRR method (MIRR) is also called the Modified Bankers Administration Institute (BAI) method:

$$EMV = \sum_{i=1}^{n} \left( F_i (1+R)^{W_i} \right) + BMV(1+R)$$

TWRR using revaluation at the time of external cash flows (required for periods beginning on or after January 1, 2010). The daily valuation method calculates the true TWRR rather than an estimate:

$$R_i = \frac{EMV - BMV}{BMV}$$

The subperiod returns are then geometrically linked (chain-linked) to calculate a total return:

$$R_{TR} = \left[ (1+R_1)(1+R_2)...(1+R_n) \right] - 1$$

Cash and cash equivalents

- **Standard 2.A.3.** Returns from cash and cash equivalents held in portfolios must be included in total return calculations.

Fees and expenses

- **Standard 2.A.4.** All returns must be calculated after the deduction of the actual trading expenses incurred during the period. Estimated trading expenses are not permitted.
- **Standard 2.A.5.** If the actual direct trading expenses cannot be identified and segregated from a bundled fee:

  1. When calculating gross-of-fees returns, returns must be reduced by the entire bundled fee or the portion of the bundled fee that includes the direct trading expenses. The use of estimated trading expenses is not permitted.

  2. When calculating net-of-fees returns, returns must be reduced by the entire bundled fee or the portion of the bundled fee that includes the direct trading expenses and the investment management fee. The use of estimated trading expenses is not permitted.

## LOS 43.f

- **Standard 2.A.6.** Composite returns must be calculated by asset-weighting the individual portfolio returns using beginning-of-period values or a method that reflects both beginning-of-period values and external cash flows.

The beginning market value-weighted composite return, $R_{BMV}$, can be calculated using the following formula:

$$R_{BMV} = \frac{\sum_{i=1}^{n}(BMV_i)(R_i)}{BMV_{total}}$$

The beginning market value plus cash-flow-weighted composite return (i.e., $R_{BMV+CF}$) can be calculated as follows:

$$R_{BMV+CF} = \frac{\sum_{i=1}^{n}\left\{\left[BMV_i + \left(\sum_{j=1}^{n}(CF_{i,j})(W_{i,j})\right)\right]R_i\right\}}{\sum_{i=1}^{n}\left[BMV_i + \left(\sum_{j=1}^{n}(CF_{i,j})(W_{i,j})\right)\right]}$$

- **Standard 2.A.7.** For periods beginning January 1, 2006, firms must calculate composite returns by asset-weighting the individual portfolio returns at least quarterly. For periods beginning on or after January 1, 2010, composite returns must be calculated by asset-weighting the individual portfolio returns at least monthly.

GIPS calculation methodology recommendations

- **Standard 2.B.1.** Returns should be calculated net of non-reclaimable withholding taxes on dividends, interest, and capital gains. Reclaimable withholding taxes should be accrued.

## LOS 43.g

- **Standard 3.A.1.** All actual fee-paying discretionary portfolios must be included in at least one composite. Although non-fee-paying discretionary portfolios may be included in a composite (with appropriate disclosures), nondiscretionary portfolios must not be included in a firm's composites.

  The IPC defines discretion as "the ability of the firm to implement its intended strategy." A client may place significant constraints on the manager; for instance, the investment policy statement (IPS) may specify limits on sectors, credit ratings, durations, et cetera. Furthermore, there may be total restrictions on certain transactions, such as the purchase of "unethical" or foreign investments, or the sale of specified stocks. These restrictions *do not* automatically remove the discretionary nature of the portfolio.

  A portfolio becomes nondiscretionary when the manager is no longer able to implement the intended investment strategy. If, for instance, the liquidity requirements are so great that much of the value must be in cash, or if the portfolio has minimal tracking limits from an index portfolio, then the description of "discretionary" is really no longer appropriate.

### LOS 43.h

- **Standard 3.A.4.** Composites must be defined according to similar investment objectives and/or strategies. Composites must include all portfolios that meet the composite definition. The full composite definition must be made available on request.

### LOS 43.i

- **Standard 3.A.2.** Composites must include only assets under management within the defined firm.
- **Standard 3.A.3.** Firms are not permitted to link simulated or model portfolios with actual performance.
- **Standard 3.A.5.** Composites must include new portfolios on a timely and consistent basis after the portfolio comes under management.
- **Standard 3.A.6.** Terminated portfolios must be included in the historical returns of the appropriate composites up to the last full measurement period that the portfolio was under management.
- **Standard 3.A.7.** Portfolios must not be switched from one composite to another unless documented changes in client guidelines or the redefinition of the composite make it appropriate. The historical record of the portfolio must remain with the appropriate composite.
- **Standard 3.A.9.** If a firm sets a minimum asset level for portfolios to be included in a composite, no portfolios below that asset level can be included in that composite. Any changes to a composite-specific minimum asset level are not permitted to be applied retroactively.
- **Standard 3.A.10.** Firms that wish to remove portfolios from composites in cases of significant cash flows must define *significant* on an ex-ante composite-specific basis and must consistently follow the composite-specific significant cash flow policy.

### LOS 43.j

- **Standard 3.A.8.** For periods beginning on or after January 1, 2010, carve-outs must not be included in a composite unless the carve-out is actually managed separately with its own cash balance.
- **Standard 3.B.2.** To remove the effect of significant cash flows, firms should use temporary new accounts.

### LOS 43.k

GIPS required disclosures

- **Standard 4.A.1.** Once a firm has met all the requirements of the GIPS standards, the firm must disclose its compliance with the GIPS standards using one of the following compliance statements.

  For firms that have not been verified:

  *[Insert name of firm] claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. [Insert name of firm] has not been independently verified.*

  For firms that are verified:

  *[Insert name of firm] claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the*

*GIPS standards. [Insert name of firm] has been independently verified for the periods [insert dates]. The verification report(s) is/are available upon request. Verification assesses whether (1) the firm has complied with all the composite construction requirements of the GIPS standards on a firm-wide basis and (2) the firm's policies and procedures are designed to calculate and present performance in compliance with the GIPS standards. Verification does not ensure the accuracy of any specific composite presentation.*

For composites of a verified firm that have also had a performance examination:

*[Insert name of firm] claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. [Insert name of firm] has been independently verified for the periods [insert dates]. Verification assesses whether (1) the firm has complied with all the composite construction requirements of the GIPS standards on a firm-wide basis and (2) the firm's policies and procedures are designed to calculate and present performance in compliance with the GIPS standards. The [insert name of composite] composite has been examined for the periods [insert dates]. The verification and performance examination reports are available upon request.*

- **Standard 4.A.2.** Firms must disclose the definition of "firm" used to determine the total firm assets and firm-wide compliance.
- **Standard 4.A.3.** Firms must disclose the composite description.
- **Standard 4.A.4.** Firms must disclose the benchmark description.
- **Standard 4.A.5.** When presenting gross-of-fees returns, firms must disclose if any other fees are deducted in addition to the direct trading expenses.
- **Standard 4.A.6.** When presenting net-of-fees returns, firms must disclose: a) if any other fees are deducted in addition to the investment management fee and direct trading expenses; b) if model or actual investment management fees are used; and c) if returns are net of performance-based fees.
- **Standard 4.A.7.** Firms must disclose the currency used to express performance.
- **Standard 4.A.8.** Firms must disclose which measure of internal dispersion is used.
- **Standard 4.A.9.** Firms must disclose the fee schedule appropriate to the compliant presentation.
- **Standard 4.A.10.** Firms must disclose the composite creation date.
- **Standard 4.A.11.** Firms must disclose that the firm's list of composite descriptions is available upon request.
- **Standard 4.A.12.** Firms must disclose that policies for valuing portfolios, calculating performance, and preparing compliant presentations are available upon request.
- **Standard 4.A.13.** Firms must disclose the presence, use, and extent of leverage, derivatives, and short positions, if material, including a description of the frequency of use and characteristics of the instruments sufficient to identify risks.
- **Standard 4.A.14.** Firms must disclose all significant events that would help a prospective client interpret the compliant presentation.
- **Standard 4.A.15.** For any performance presented for periods prior to January 1, 2000, that does not comply with the GIPS standards, firms must disclose the periods of non-compliance.
- **Standard 4.A.16.** If the firm is redefined, the firm must disclose the date of, description of, and reason for the redefinition.
- **Standard 4.A.17.** If a composite is redefined, the firm must disclose the date of, description of, and reason for the redefinition.
- **Standard 4.A.18.** Firms must disclose any changes to the name of a composite.

- **Standard 4.A.19.** Firms must disclose the minimum asset level, if any, below which portfolios are not included in a composite. Firms must also disclose any changes to the minimum asset level.
- **Standard 4.A.20.** Firms must disclose relevant details of the treatment of withholding tax on dividends, interest income, and capital gains, if material. Firms must also disclose if benchmark returns are net of withholding taxes if this information is available.
- **Standard 4.A.21.** For periods beginning on or after January 1, 2011, firms must disclose and describe any known material differences in the exchange rates or valuation sources used among the portfolios within a composite and between the composite and the benchmark. For periods prior to January 1, 2011, firms must disclose and describe any known inconsistencies in the exchange rates used among the portfolios within a composite and between the composite and the benchmark.
- **Standard 4.A.22.** If the compliant presentation conforms with laws and/or regulations that conflict with the requirement of the GIPS standards, firms must disclose this fact and disclose the manner in which the local laws and regulations conflict with the GIPS standards.
- **Standard 4.A.23.** For periods prior to January 1, 2010, if carve-outs are included in a composite, firms must disclose the policy used to allocate cash to the carve-outs.
- **Standard 4.A.24.** If a composite contains portfolios with bundled fees, firms must disclose the types of fees that are included in the bundled fee.
- **Standard 4.A.25.** Beginning on January 1, 2006, firms must disclose the use of a sub-adviser and the periods a sub-adviser was used.
- **Standard 4.A.26.** For periods prior to January 1, 2010, firms must disclose if any portfolios were not valued at calendar month end or on the last business day of the month.
- **Standard 4.A.27.** For periods beginning January 1, 2011, firms must disclose the use of subjective unobservable inputs for valuing portfolio investments if the portfolio investments valued using subjective unobservable inputs are material to the composite.
- **Standard 4.A.28.** For periods beginning on January 1, 2011, firms must disclose if the composite's valuation hierarchy materially differs from the recommended hierarchy in the GIPS Valuation Principles.
- **Standard 4.A.29.** If the firm determines no appropriate benchmark for the composite exists, the firm must disclose why no benchmark is presented.
- **Standard 4.A.30.** If the firm changes the benchmark, the firm must disclose the date of, description of, and reason for the change.
- **Standard 4.A.31.** If a custom benchmark or combination of multiple benchmarks is used, the firm must disclose the benchmark components, weights, and rebalancing process.
- **Standard 4.A.32.** If the firm has adopted a significant cash flow policy for a specific composite, the firm must disclose how the firm defines a significant cash flow for that composite and for which periods.
- **Standard 4.A.33.** Firms must disclose if the 3-year annualized ex post standard deviation of the composite and/or benchmark is not presented because 36 monthly returns are not available.
- **Standard 4.A.34.** If the firm determines that the 3-year annualized ex post standard deviation is not relevant or appropriate, the firm must: a) describe why ex post standard deviation is not relevant or appropriate; and b) describe the additional risk measure presented and why it was selected.

- **Standard 4.A.35.** Firms must disclose if the performance from a past firm or affiliation is linked to the performance of the firm.

GIPS recommended disclosures

- **Standard 4.B.1.** Firms should disclose material changes to valuation policies and/or methodologies.
- **Standard 4.B.2.** Firms should disclose material changes to calculation policies and/or methodologies.
- **Standard 4.B.3.** Firms should disclose material differences between the benchmark and the composite's investment mandate, objective, or strategy.
- **Standard 4.B.4.** Firms should disclose the key assumptions used to value portfolio investments.
- **Standard 4.B.5.** If a parent company contains multiple defined firms, each firm within the parent company should disclose a list of the other firms contained within the parent company.
- **Standard 4.B.6.** For periods prior to January 1, 2011, firms should disclose the use of subjective unobservable inputs for valuing portfolio investments if the portfolio investments valued using subjective unobservable inputs are material to the composite.
- **Standard 4.B.7.** For periods prior to January 1, 2006, firms should disclose the use of a sub-adviser and the periods a sub-adviser was used.
- **Standard 4.B.8.** Firms should disclose if a composite contains proprietary assets.

## LOS 43.l,m,n

GIPS presentation and reporting requirements

- **Standard 5.A.1.** The following items must be reported for each composite presented:
  a. At least five years of annual performance (or a record for the period since firm or composite inception if the firm or composite has been in existence less than five years) that meets the requirements of the GIPS standards; after presenting five years of performance, the firm must present additional annual performance up to a minimum of ten years.
  b. Annual returns for all years clearly identified as gross- or net-of-fees.
  c. For composites with a composite inception date beginning on or after January 1, 2011, when the initial period is less than a full year, firms must present returns from the composite inception through the initial year-end.
  d. For composites with a termination date of January 1, 2011, or later, returns from the last annual period through the termination date.
  e. Annual returns for a benchmark, which reflects the mandate, objective, or strategy of the portfolio.
  f. The number of portfolios in the composite at each year-end. If the composite contains *five portfolios or less,* the number of portfolios is not required.
  g. The amount of assets in the composite at the end of each annual period.
  h. Either total firm assets or composite assets as a percentage of firm assets at each annual period end.
  i. A measure of dispersion of individual portfolio returns for each annual period. If the composite contains *five portfolios or less* for the full year, a measure of dispersion is not required.

- **Standard 5.A.2.** For periods beginning on or after January 1, 2011, firms must present for each annual period:
  a. Three-year annualized ex post standard deviation using monthly returns for the composite and benchmark.
  b. An additional 3-year ex post risk measure if management feels standard deviation is inappropriate. The firm must match the periodicity of calculated returns used for the composite and benchmark.
- **Standard 5.A.3.** Firms may link non-GIPS-compliant returns to their compliant history so long as the firms meet the disclosure requirements for noncompliant performance and only compliant returns are presented for periods after January 1, 2000.
- **Standard 5.A.4.** Returns of portfolios and composites for periods of less than one year must not be annualized.
- **Standard 5.A.5.** For periods beginning on or after January 1, 2006, and ending prior to January 1, 2011, if a composite includes carve-outs, the presentation must include the percentage of the composite that is composed of carve-outs for each annual period.
- **Standard 5.A.6.** If a composite contains any non-fee-paying portfolios, the firm must present, as of the end of each annual period, the percentage of the composite assets represented by the non-fee-paying portfolios.
- **Standard 5.A.7.** If a composite includes bundled-fee portfolios, the firm must present, as of the end of each annual period, the percentage of the composite assets represented by bundled-fee portfolios.
- **Standard 5.A.8.**
  a. Performance track records of a past firm or affiliation must be linked to or used to represent the historical record of the new or acquiring firm on a composite-specific basis if:
     i. Substantially all the investment decision makers are employed by the new firm (e.g., research department, portfolio managers, and other relevant staff).
     ii. The decision-making process remains substantially intact and independent within the new firm.
     iii. The new firm has records that document and support the reported performance.
  b. If a firm acquires another firm or affiliation, the firm has one year to bring any noncompliant assets into compliance.

GIPS presentation and reporting recommendations

- **Standard 5.B.1.** Firms should present gross of fees returns.
- **Standard 5.B.2.** Firms should present:
  a. Cumulative returns for composite and benchmarks for all periods.
  b. Equal-weighted mean and median returns for each composite.
  c. Quarterly and/or monthly returns.
  d. Annualized composite and benchmark returns for periods greater than 12 months.
- **Standard 5.B.3.** For periods prior to January 1, 2011, the 3-year annualized ex post standard deviation of monthly returns for each year for the composite and its benchmark.

- **Standard 5.B.4.** For each year in which an annualized ex post standard deviation is present for the composite and the benchmark, corresponding annualized return should be presented.
- **Standard 5.B.5.** For each year that annualized composite and benchmark returns are reported, the corresponding annualized standard deviation of monthly returns for the composite and benchmark.
- **Standard 5.B.6.** Additional ex post composite risk measures.
- **Standard 5.B.7.** Firms should present more than ten years of annual performance in the compliant presentation.
- **Standard 5.B.8.** Firms should comply with the GIPS for all historical periods.
- **Standard 5.B.9.** Firms should update compliant presentations quarterly.

### LOS 43.o

For real estate, the following investment types would fall under the *general provisions* of the GIPS (as opposed to the provisions dealing directly with real estate and private equity):

- Publicly traded real estate securities, including any listed securities issued by public companies.
- Commercial mortgage-backed securities (CMBS).
- Private debt investments, including commercial and residential loans where the expected return is solely related to contractual interest rates without any participation in the economic performance of the underlying real estate.

Note that publicly traded securities include Real Estate Investment Trusts (REITs). If a portfolio consists of real estate plus other investments, the carve-out provisions of GIPS (Standard 3.A.8) would apply.

The exclusions to the definitions of private equity are *open-end* and *evergreen* funds, both of which are covered by the general provisions of the GIPS. Because redemptions and subscriptions may be made after the funds' inceptions, open-end and evergreen funds do not have fixed levels of capital with a set number of investors.

### LOS 43.p

Real estate requirements

- **Standards 6.A.1–A.3.** For periods prior to January 1, 2008, real estate investments must be valued at market value at least once every 12 months. For periods beginning January 1, 2008, real estate investments must be valued at least quarterly. For periods on or after January 1, 2010, firms must value portfolios as of the end of each quarter or the last business day of each quarter.
- **Standards 6.A.4 and A.5.** For periods prior to January 1, 2012, real estate investments must have an external valuation done at least once every three years. External valuation means an outside, independent party certified to perform such valuations. For periods beginning January, 1, 2012, real estate investments must have an external valuation done at least once every 12 months, or if a client agreement states otherwise, at least once every three years.
- **Standards 6.A.6 and A.7.** Real estate portfolio returns must be calculated at least quarterly after the deduction of transaction costs during the period.
- **Standard 6.A.8.** Beginning January, 1, 2011, income and capital component returns must be calculated separately using geometrically linked time-weighted rates of return.

- **Standard 6.A.9.** Composite returns, including component returns, must be calculated at least quarterly by asset-weighting the individual portfolio returns using time-weighted rates of return.

The capital return (i.e., return of capital) is calculated as the percentage change in the value of the property after consideration of capital improvements and sales proceeds:

$$R_C = \frac{V_1 - V_0 - E_C + S}{C_E}$$

The income return is calculated as the *net investment income* earned over the period divided by capital employed ($C_E$). Net investment income is gross investment income less non-recoverable expenses, interest paid on debt, and property taxes:

$$R_I = \frac{Y_A - E_R - I_D - T_P}{C_E}$$

The total return for the period is the sum of the capital and income returns:

$$R_T = R_C + R_I$$

Private equity presentation and reporting requirements

- **Standard 7.A.21.** Firms must present both the net-of-fees and gross-of-fees annualized SI-IRR of the composite for each year since inception.
- **Standard 7.A.22.** Beginning January 1, 2011, for fund of funds composites, firms must present the SI-IRR of the underlying investments grouped by vintage year as well as the other measures required by Standard 7.A.23.
- **Standard 7.A.23.** For each period presented, firms must report:

  a. Since-inception paid-in capital.
  b. Cumulative committed capital.
  c. Since-inception distributions.
  d. Total value to paid-in capital (investment multiple or TVPI).
  e. Cumulative distributions to paid-in capital (realization multiple or DPI).
  f. Paid-in capital to committed capital (PIC multiple).
  g. Residual value to paid-in capital (RVPI).

- **Standard 7.A.24.** If a benchmark is shown, the cumulative annualized SI-IRR for the benchmark that reflects the same strategy and vintage year of the composite must be presented for the same periods for which the composite is presented. If no benchmark is shown, the presentation must explain why no benchmark is disclosed.

Private equity presentation and reporting recommendations

- **Standard 7.B.1–B.3.** Valuation should be done at least quarterly for private equity investments. For periods before January 1, 2011, the SI-IRR should be calculated using daily cash flows. Firms should disclose and explain any material differences between valuations used in performance reporting and those used in financial reporting as of the end of each annual reporting period.

Private equity valuation mandatory guidelines

1. Valuations must be prepared with integrity and in a professional manner.
2. Valuations must be prepared by individuals with the necessary experience and ability.

3. Individuals performing the valuation must be under direct supervision of senior management.
4. Valuation review procedures (i.e., for reviews by senior management) must be documented.
5. The valuation basis should be transparent.
6. Methodologies used for the most recent private equity valuations must be fully disclosed.
7. A fair value basis is *recommended* for all valuations, but any valuation *must* recognize when any portfolio asset has fallen in value.
8. Valuations must be performed and presented in a consistent manner.
9. Any changes in valuation method or basis must be explained. If material, effects of the change must be reported.
10. At a minimum, valuations must be prepared annually.

Private equity valuation recommended hierarchy

1. Market transaction.
2. Market-based multiples.
3. Discounted cash flows.

**LOS 43.q**

The GIPS provisions related specifically to SMAs are supplemental to the main body of the GIPS provisions. They apply to all compliant SMA performance presentations for periods beginning on or after January 1, 2006.

If firms include SMAs in composites containing non-SMA accounts and are unable to isolate the direct trading expenses in wrap fees, the resulting SMA returns could bring down the reported performance of the composites. This could put the firm at a competitive disadvantage when presenting the performance of a composite to current and potential clients, especially non-wrap fee clients. Offsetting this concern, of course, is the ability to show more assets under management in the composite than if the SMA was in a totally separate, sponsor-specific composite.

SMA-specific GIPS provisions include:

- If a compliant presentation includes periods before the SMA was included in the composite, each period when the SMA was not in the composite must be identified.
- Firms must disclose any performance prior to January 1, 2006, that is not compliant with the SMA provisions.
- When soliciting business from potential SMA clients, firms must provide presentations that include all SMA accounts managed to the stated objective or strategy.
- Reported returns must be after deduction of all bundled fees.
- Firms may present performance results for sponsor-specific composites but must identify the name of the sponsor. If the returns presented are not net of the entire bundled fees, the firm must state that the presentation was prepared for that sponsor.
- Firms must not link years of noncompliant performance (prior to 2006) with years of compliant performance.

## LOS 43.r

GIPS valuation requirements

- If local laws or regulations related to valuation conflict with the GIPS, firms are required to follow the local laws or regulations and disclose the conflict.
- Firms must disclose their portfolio valuation policies and hierarchy.
- For periods beginning on or after January 1, 2011, firms must disclose any subjective valuation if the portfolio is a significant portion of the composite.
- Firms must disclose if the valuation hierarchy used to value composites differs from the GIPS recommended hierarchy.

The GIPS valuation hierarchy is a list of value sources. Starting at the top, if the firm is unable to utilize the source, it should proceed to the next source on the list:

1. Objective, observable, unadjusted market prices for similar investments in active markets.
2. Quoted prices for identical or similar investments in markets that are not active.
3. Market-based inputs other than quoted prices that are observable for the investment.
4. Subjective, unobservable inputs.

Real estate valuation principles

- The GIPS require that real estate investments be valued externally by outside sources following accepted industry and governmental valuation standards.
- The amount of the external valuator's fee must not be based on the resulting value.
- Although appraisal standards allow reporting values in ranges, the GIPS recommend a single value be reported for returns purposes.
- The firm should rotate external valuators every three to four years.

Private equity valuation principles

- The valuation methodology utilized must be "the most appropriate for a particular investment based on the nature, facts, and circumstances of the investment."
- When valuing private enterprises, the process should consider:
  - Reliable appraisal data.
  - Comparable enterprise or transaction data.
  - The enterprise's stage of development.
  - Additional characteristics unique to the enterprise.

The GIPS require *fair representation of values*. This means firms should follow standard industry and governmental valuation guidelines as closely and consistently as possible in an effort to obtain the best possible value estimates.

## LOS 43.s

All advertisements that include a claim of compliance with the GIPS Advertising Guidelines must include the following:

1. A description of the firm.
2. How an interested party can obtain a presentation that complies with the requirements of GIPS standards and/or a list and description of all firm composites.
3. The GIPS Advertising Guidelines compliance statement:

   *[Insert name of firm] claims compliance with the Global Investment Performance Standards (GIPS®).*

4. A description of the composite being advertised.
5. One of the following sets of total returns:
   a. 1-, 3-, and 5-year annualized composite returns through the most recent period.
   b. Period-to-date composite performance results in addition to 1-, 3-, and 5-year cumulative annualized composite returns with the end-of-period date clearly identified (or annualized period since composite inception if inception is greater than one and less than five years). Periods of less than one year are not permitted to be annualized. The annualized returns must be calculated through the same period of time as presented in the corresponding compliant presentation.
   c. Period-to-date composite returns in addition to five years of annual composite returns calculated through the same period of time as presented in the corresponding compliant presentation.
6. Whether performance is shown gross and/or net of investment management fees.
7. The benchmark total return for the same periods for which the composite return is presented and a description of that benchmark. (The appropriate composite benchmark return is the same benchmark total return as presented in the corresponding GIPS-compliant presentation.) If no benchmark is presented, the advertisement must disclose why no benchmark is presented.
8. The currency used to express returns.
9. The description of the use and extent of leverage and derivatives if leverage or derivatives are used as an active part of the investment strategy (i.e., not merely for efficient portfolio management) of the composite. Where leverage/derivatives do not have a material effect on returns, no disclosure is required.
10. When presenting noncompliant performance information for periods prior to January 1, 2000, in an advertisement, firms must disclose the period(s) and which specific information is not in compliance with the GIPS standards.

    The Advertising Guidelines also suggest that firms may present other information, though this supplemental information should be of equal or lesser prominence than the required information described previously.

### LOS 43.t

The *primary purpose of verification* is to increase the level of confidence that a firm claiming GIPS compliance did, indeed, adhere to the Standards on a firm-wide basis.

Verification involves the review of an investment management firm's performance-measurement processes and procedures by an *independent third-party verifier*. Upon completion of verification, a verification report is issued that must confirm the following:

- The investment firm has complied with all the composite construction requirements of GIPS on a firm-wide basis.
- The firm's processes and procedures are designed to calculate and present performance results in compliance with the GIPS.

Other noteworthy aspects of GIPS verification include the following:

- A single verification report is issued to the entire firm; *GIPS verification cannot be carried out for a single composite.*
- Verification cannot be partial: it is all or nothing. In other words, verification cannot enable a firm to claim that its performance presentation is in compliance with GIPS "except for ...."
- Verification is not a requirement for GIPS compliance, but it is *strongly encouraged* and may eventually become mandatory.
- The initial minimum period for which verification can be performed is one year of a firm's presented performance. The recommended period over which verification is performed will be that part of the firm's track record for which GIPS compliance is claimed.
- After performing the verification, the verifier may conclude that the firm is not in compliance with the GIPS or that the records of the firm cannot support a complete verification. In such situations, the verifier must issue a statement to the firm clarifying why a verification report was not possible.

## LOS 43.u

For periods beginning on or after January 1, 2011, when firms include after-tax return information in a compliant performance presentation, the information must be presented as supplemental information.

The *pre-liquidation* method calculates after-tax returns based on income earned and gains and losses actually recognized over the period through asset sales. This method effectively ignores the effects of future capital gains taxes.

The *mark-to-liquidation* method assumes all gains, whether recognized or not, are taxed each period. It ignores the time value of money benefits of postponing capital gains and the associated taxes.

The appropriate after-tax benchmark should exhibit all seven of the characteristics of a valid benchmark, plus it must reflect the client's tax status.

Client-directed trades: Because we are attempting to measure the after-tax return resulting from the manager's actions, firms might want to remove the effects of the resulting capital gains taxes by adjusting the ending value of the portfolio (on paper) by adding back the amount of the these non-discretionary taxes before calculating returns.

## LOS 43.v

The following are the minimum items that should be present in a performance presentation:

- The correct compliance statement of the firm claiming compliance with the GIPS standards.
- The definition of the firm.
- The composite description.
- The composite creation date and that a complete list of firm composites and performance results are available upon request.
- Policies for valuing portfolios, calculating performance, and preparing compliant presentations are available upon request.
- The currency used.

- A complete description of the benchmark used, and if no benchmark is used, explain why none is suitable.
- Present at least five years of annual returns if available, adding an additional year until ten years are present.
- Present gross-of-fees or net-of-fees.
  1. If gross-of-fees disclose, if any other fees are deducted in addition to trading expenses.
  2. If net-of-fees disclose, if any other fees in addition to trading expenses and management fees are deducted.
- The management fee schedule is available upon request.
- The presentation of the data should contain at least seven columns.
  1. The years.
  2. The composite return, either gross or net of fees for each year.
  3. The corresponding benchmark return for each year.
  4. Number of portfolios in the composite for each year.
  5. An internal measure of dispersion for each year.
  6. The amount of composite assets at the end of each year.
  7. Either total firm assets or composite assets as a percentage of total firm assets at the end of each year.
- Beginning 2011, present for each year an annualized 3-year ex post standard deviation, or some other measure, for both the composite and benchmark.

## Concept Checkers

1. McGregor Asset Management has prepared the performance presentation displayed in the following table. McGregor is of the opinion that the presentation is in compliance with the Global Investment Performance Standards (GIPS).

**McGregor Asset Management, Inc.**

**Investment Results: Aggressive Growth Equity Composite**

**January 1, 2007, through December 31, 2011**

| *Year* | *Total Return (%)* | *Benchmark Return (%)* | *Number of Portfolios* | *Total Assets at End of Period* | *Percentage of Firm Assets* | *Total Firm Assets* |
|---|---|---|---|---|---|---|
| 2007 | 16.5 | 13.9 | 25 | 130.65 | 67 | 195.00 |
| 2008 | 4.2 | 4.2 | 31 | 166.85 | 71 | 235.00 |
| 2009 | 18.9 | 23.0 | 34 | 197.82 | 63 | 314.00 |
| 2010 | 8.1 | 7.8 | 46 | 286.70 | 61 | 470.00 |
| 2011 | 7.5 | 9.1 | 47 | 550.00 | 58 | 948.28 |

*McGregor Asset Management has prepared and presented this report in compliance with the Global Investment Performance Standards (GIPS®).*

State *five* errors or omissions that invalidate McGregor's belief that its presentation is in compliance with GIPS.

2. Alan Tribon, compliance officer at Frankfurt Investment Management, has scheduled a meeting with one of Frankfurt's portfolio managers, Ashon Guptar, to discuss an investment performance presentation that he recently prepared for the period from January 1, 2007, through December 31, 2011.

The following are excerpts from the conversation between Tribon and Guptar:

**Excerpt 1**

Tribon: "I see that the returns in the presentation are reported net of investment management fees. I seem to recall that the GIPS require firms to present performance on a gross of management fees basis."

Guptar: "You are correct, and I will promptly see that the performance results are recalculated and the presentation is changed to reflect gross-of-fees performance."

**Excerpt 2**

Tribon: "I notice that there is disclosure of total firm assets for each period. I know this has always been a GIPS requirement, but must we disclose the assets that we direct to sub-advisers under client mandate?"

Guptar: "Yes, unfortunately, the GIPS require that the firm include as total assets under management those assets managed by client-appointed sub-advisers if the firm retains discretion of more than 50% of the portfolio from which the assets were drawn."

**Excerpt 3**

Tribon: "I couldn't help but notice that the only compliance statement in the presentation indicates firmwide compliance with the Global Performance Standards of CFA Institute. Does this also satisfy the statement of compliance requirements under the GIPS?"

Guptar: "Yes, under the GIPS, there is considerable flexibility in the wording of the GIPS compliance statement, but the one we included is recommended."

Using the template provided, **identify** whether each of the statements is correct or incorrect. If incorrect, briefly **expl**ain why.

**Template for Question 2**

| Comments | Correct or Incorrect (Circle One) | If Incorrect, State Reason |
|---|---|---|
| "I seem to recall that the GIPS require firms to present performance on a gross of management fees basis." | Correct<br>Incorrect | |
| "…the GIPS require that the firm include as total assets under management those assets managed by a client-selected sub-advisers if the firm retains discretion of more than 50% of the portfolio from which the assets were drawn." | Correct<br>Incorrect | |
| "Yes, under the GIPS, there is considerable flexibility in the wording of the GIPS compliance statement, but the one we included is recommended." | Correct<br>Incorrect | |

3. In July 2007, Edith Poloski, Jason Masserelli, and Rajesh Granta formed PMG Investment Management (PMG). Poloski has considerable experience in the area of security analysis, and Masserelli and Granta have expertise in fixed income and equity portfolio management, respectively.

Initially, PMG exclusively managed the portfolios of high-net-worth individuals with a minimum investment requirement of $3 million. However, recently, PMG has decided to broaden its client base by lowering its minimum investment requirement. To attract new clients and improve the information that its current clients receive, PMG has prepared a performance presentation that reflects the results of its major investment styles. Performance results are presented for a fixed income, an equity, and a balanced composite. The following list contains the actions that PMG took when preparing its 2011 performance presentation.

Action 1: The S&P 500 Index was used as the benchmark for comparison with all three composite styles.

Action 2: PMG used accrual accounting, and book values are used for computations of fixed-income returns.

Action 3: For fixed-income return calculations, accrued income is included.

Action 4: Due to the change in the firm's client base, PMG did not include its fee schedule.

Action 5: All actual fee-paying discretionary accounts were included in at least one of the three composites.

Action 6: Asset-weighted composite returns were calculated using end-of-period weightings.

Action 7: The performance of the equity portion of the balanced accounts, excluding cash, was combined with the equity composite results.

Action 8: All composites included only assets under management and were not linked with simulated or model portfolio performance.

Action 9: Equal-weighted rates of return that adjust for cash flows are used for portfolio returns.

Action 10: Performance calculations were made after the deduction of actual trading expenses.

Using the template provided, **cite** ***five*** actions in the list of actions that PMG took that are not in compliance with the GIPS, and **describe** how the actions you select are not compliant with the GIPS.

**Template for Question 3**

| | Action Number | Explanation of Why Action is Not GIPS Compliant |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |

4. Assume that Firm Z is the investment manager for 15 retail clients and has full discretion over the investment of the clients' assets. At the end of each day, any excess cash in the portfolios is swept into a money market fund. Firm Z does not manage the money market fund, so it does not include the cash portion of the portfolio in its total return performance calculation. Discuss whether it is an acceptable practice for Firm Z to claim compliance with the GIPS.

5. Consider the total quarterly returns for the growth and income composite of the investment firm ADA: Q1 = 3.00%, Q2 = 4.15%, Q3 = 3.75%, Q4 = 3.15%. **Calculate** the appropriate total annual return under the calculation methodology under the GIPS.

6. Johnson Investment Management (JIM) removes terminated portfolios from its composites on the first day of the quarter that the firm was notified of the termination. Assuming that JIM uses quarterly valuation, **discuss** when it would be appropriate to remove a portfolio from its composite if the portfolio is terminated on July 15, 2010.

7. Alocon Investment Management (AIM) has calculated its investment performance using quarterly valuation. On January 1, 2010, AIM has decided to show its performance history since its inception in 2000. **Discuss** what AIM must do with regard to this issue if it intends to claim compliance with the GIPS.

8. The investment management firm of Rangan, Rollins, and Cramer (RRC) manages portfolios using a long-short strategy. However, RRC does not ever intend to market this strategy and, thus, does not include the performance of these portfolios in any of the firm's composites. **Discuss** whether this practice is acceptable if RRC claims that its performance presentation results are compliant with the GIPS.

9. The Teletron Investment Management firm (TIM) plans to market an aggressive growth investment strategy using a newly developed proprietary prediction model. To test the model, TIM created an aggressive growth composite and produced years of returns history using hypothetical assets and a back-tested asset allocation strategy. TIM intends to show the model composite results in its performance presentation. **Discuss** whether this practice is acceptable under the GIPS.

10. For promotional purposes, the Jaspre Investment Management firm (JIM) wants to take advantage of the prestige associated with presenting performance results that are in compliance with the GIPS. To save time and expense, JIM decides to create five composites for marketing purposes. These portfolios represent 60% of the firm's fee-paying discretionary portfolios. Recognizing that the firm cannot claim compliance for all of its portfolios, JIM plans to include the following compliance statement with its performance presentation: "*The investment results presented in this report have been prepared and presented in compliance with the Global Investment Performance Standards (GIPS®) for the majority of the assets under management by Jaspre Investment Management, Incorporated.*" **Discuss** whether JIM's claim of compliance is acceptable under the GIPS.

11. Kenzo Fund Managers (KFM) manages a fund that has the following cash flows and valuations (in US$ millions) for the month of September:

| *Date* | *Value (Before Cash Flow)* | *Cash Flow* | *Value (After Cash Flow)* |
|---|---|---|---|
| 1 September | 50.0 | N/A | 50.0 |
| 10 September | 51.5 | 5.0 | 56.5 |
| 20 September | 59.0 | –2.0 | 57.0 |
| 30 September | 55.0 | N/A | 55.0 |

(a) Assuming this data is for September 2002, **calculate** an approximate time-weighted rate of return (TWRR) for KFM using the Original Dietz Method.

(b) Now suppose this data is for September 2005. **Calculate** the TWRR for KFM using the Modified Dietz Method.

(c) If this data were for September 2012, **calculate** the accurate TWRR for KFM for the month.

**Use the following information for Questions 12, 13, and 14.**

Sun Property Development (SPD) is a limited partnership private equity fund headquartered in Clearwater, Florida. SPD collects investment funds from wealthy individual investors and institutional investors and specializes in purchasing outdated office buildings in the downtown areas of large, successful cities. SPD extensively remodels the buildings to include upscale condominiums on the upper floors and professional office space on the lower floors. Completed buildings are sold as turn-key operations to other investors. The general partner has gathered the data to calculate and report quarterly returns to current and prospective limited partners. In addition to the figures in the table, the market value of the fund was estimated at $17,700,000 on January 1st and $18,500,000 on March 31st.

**Sun Property Development: First Quarter Data**

| | |
|---|---|
| Total capital as of January 1st (beginning of first quarter) | $16,450,000 |
| Capital contribution – February 10th (weight = 0.56) | 3,500,000 |
| Capital disbursement – March 1st (weight = 0.33) | 750,000 |
| Capital expenditure | 900,000 |
| Property taxes paid | 135,000 |
| Property sales | 2,350,000 |
| Total non-recoverable expenses | 171,000 |
| Interest paid on borrowed funds | 168,000 |
| Accrued investment income | 26,000 |

(Note: Weights assume 30-day months.)

12. The amount of capital employed by SPD over the first quarter is *closest* to:
    A. $16,450,000.
    B. $18,162,500.
    C. $18,657,500.

13. SPD's capital return for the first quarter is *closest* to:
    A. 8%.
    B. 10%.
    C. 12%.

14. SPD's income return and total return are *closest* to:

| | Income return | Total return |
|---|---|---|
| A. | –0.5% | 8.5% |
| B. | –2.0% | 10.0% |
| C. | –3.0% | 7.0% |

15. With respect to the performance presentation requirements and recommendations for private equity, which of the following is *only* recommended and *not* required?
    A. Reporting distributions since inception.
    B. Reporting paid-in capital since inception.
    C. For periods prior to January 1, 2011, the SI-IRR using daily cash flows.

16. Jeff Gunthorpe, CFA, is presenting recommendations to the team responsible for constructing and presenting composite performance. In his discussion, he mentions that, according to the GIPS, open-ended and evergreen funds must be presented as part of the company's managed private equity holdings. In the template below, **indicate** whether you agree or disagree with Gunthorpe and, if you disagree, **explain** your decision.

**Template for Question 16**

| Statement | Agree or Disagree | Explanation |
|---|---|---|
| "Open-ended and evergreen funds must be presented as part of the company's managed private equity holdings." | Agree<br><br>Disagree | |

17. **Indicate** whether *may be included* or *must be excluded* describes the GIPS with respect to the handling of a portfolio with the indicated characteristics. **Circle** the appropriate indicator in the following template and **explain** your decision.

**Template for Question 17**

| Characteristic | May be Included in a Composite<br>Must be Excluded From Composite | Explanation |
|---|---|---|
| Client has significant liquidity needs with an accompanying significant cash position. | May be Included<br><br>Must be Excluded | |
| Client does not pay fees. | May be Included<br><br>Must be Excluded | |
| Client requests strictly following an index. | May be Included<br><br>Must be Excluded | |

18. According to the GIPS, for periods beginning on or after January 1, 2008, real estate investments must be valued at *least:*
    A. annually, and only the presentation of total returns are required.
    B. quarterly, and only the presentation of total returns are required.
    C. quarterly, and income and capital appreciation component returns must be presented in addition to total return.

19. Lambert Capital Management (LCM) manages portfolios for wealthy individuals and serves as a sub-adviser to several pension funds and endowments through wrap fee/separately managed accounts. LCM manages several portfolios as a sub-adviser for a sponsor and is preparing a presentation in response to a request for proposal (RFP) to manage another account for that client. LCM has decided to construct a sponsor-specific composite to include in its response to the RFP. According to the GIPS standards, which of the following must LCM do?
    A. Disclose the style of the composite.
    B. Present performance net of the entire wrap fee.
    C. Disclose the name of the sponsor represented by the composite.

20. If a security does not have an observable, quoted market price available from an active market, the next best valuation basis, according to the GIPS valuation hierarchy, is:
    A. subjective, unobservable inputs.
    B. observable market-based inputs other than quoted prices.
    C. quoted prices from an inactive market for the same or a similar security.

21. Regarding the reporting of after-tax performance after January 1, 2011, which of the following is *most likely* correct?
    A. Firms are required to report returns on an after-tax basis.
    B. Firms may report after-tax performance as supplemental information.
    C. Because of the subjective nature of after-tax performance reporting, firms cannot show after-tax performance.

22. Hicks Capital Management manages assets for high-net-worth clients and specializes in managing taxable accounts. The management team implements strategies to reduce dividend and capital gains taxes. To illustrate its superior performance, the management team would like to report performance on an after-tax basis. Which of the following is *least likely* to be a suitable benchmark option for Hicks Capital Management?
    A. An after-tax capital market index.
    B. Mutual funds or exchange-trade funds.
    C. Developing a custom shadow portfolio.

## Answers – Concept Checkers

1. Standard 4.A lists 35 required disclosures which are not provided:
   1. The proper GIPS compliance statement.
   2. Definition of firm.
   3. Composite description.
   4. Benchmark description.
   5. If gross-of-fees returns, any fees in addition to trading expenses.
   6. If net-of-fees, any fees in addition to management fees and trading expenses that are deducted; if model or actual management fees are deducted; if net of any performance-based fees.
   7. Currency used to express returns.
   8. Internal dispersion and the measure used.
   9. Fee schedule.
   10. Composite creation date.
   11. That a list of composite descriptions is available.
   12. That the policies for valuing portfolios, calculating performance, and preparing compliant statements are available.
   13. If material, the presence, use, and extent of leverage, derivatives, and short positions, including frequency of use and instruments used.
   14. Any significant event that would facilitate understanding the presentation.
   15. Any presented periods prior to 2000 that are not GIPS-compliant.
   16. If appropriate, the date, description of, and reason for redefining the firm.
   17. If appropriate, the date, description of, and reason for redefining a composite.
   18. Any changes to the composite's name.
   19. Minimum asset level for a portfolio to be included in the composite and any changes to the level.
   20. Treatment of withholding taxes if material and whether benchmark returns are net of withholding taxes (if known).
   21. Periods beginning on or after January 1, 2011, any known material differences in exchange rates used between the portfolios and the composite and the composite and the benchmark.
   22. Any instances where the presentation conforms with local laws or regulations that conflict with the GIPS.
   23. If relevant for results prior to January 1, 2010, how cash is allocated to carve-outs.
   24. If appropriate, the types of fees included in bundled fees.
   25. For periods beginning on or after January 1, 2006, the use of sub-advisers and the periods used.
   26. For periods prior to January 1, 2010, if any portfolios were not valued at month-end or last business day of the month.
   27. If material for periods beginning on or after January 1, 2011, the use of unobservable subjective inputs for portfolio valuation.
   28. For periods beginning on or after January 1, 2011, whether the valuation hierarchy used differs from the GIPS suggested hierarchy.
   29. If no benchmark is presented, why.
   30. If appropriate, the date and reason for changing benchmarks.
   31. If a custom benchmark or a combination of benchmarks is used as benchmark, the components of and method for constructing the benchmark.
   32. How significant cash flow is defined, if appropriate.
   33. Whether a 3-year ex post standard deviation is not presented because three years of monthly data are not available.

34. If determined that a 3-year ex post standard deviation is not appropriate, describe why not appropriate, present an alternative ex post risk measure, and explain why that risk measure is appropriate.
35. Whether past performance from a past firm or affiliate is linked to the presentation.

Other omissions or errors:

- The correct compliance statement for an unverified GIPS-compliant performance presentation should read as follows:

  *McGregor Asset Management claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. McGregor Asset Management has not been independently verified.*

- Although not a violation, McGregor did not have to include three columns of asset values. The presentation must include the amount of assets in the composite and either the percentage they represent of total firm assets or total firm assets.
- No measure of internal dispersion is presented.
- For periods beginning on or after 2011, 3-year ex post standard deviation of monthly returns for composite and benchmark must be presented. Additional measure must be presented if management feels ex post standard deviation is inappropriate.

2. Comment: I seem to recall that the GIPS require firms to present performance on a gross of management fees basis.

*Incorrect.* Under the GIPS, firms may present performance net or gross of fees, but gross-of-fees performance is recommended. The GIPS do require firms to disclose whether performance results are calculated gross or net of investment management and other fees paid by clients to the firm or to the firm's affiliates.

Comment: GIPS require that the firm include as total assets under management those assets managed by client-selected sub-advisers if the firm retains discretion of more than 50% of the portfolio from which the assets were drawn.

*Incorrect.* Total firm assets include all discretionary and non-discretionary assets under management within the defined firm. They do not include assets assigned to a sub-adviser unless the firm has discretion over the selection of the sub-adviser.

Comment: Yes, under the GIPS, there is considerable flexibility in the wording of the GIPS compliance statement, but the one we included is recommended.

*Incorrect.* Firms that wish to claim non-verified compliance with the GIPS must use the following statement:

*McGregor Asset Management claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. McGregor Asset Management has not been independently verified.*

3.

| | Action Number | Explanation of Why Action is Not GIPS Compliant |
|---|---|---|
| 1. | 1 | The total return for the benchmark (or benchmarks) that reflects the investment strategy or mandate represented by the composite must be presented for the same periods for which the composite return is presented. The S&P 500 Index should not be used as a benchmark for the fixed-income and balanced composites. |
| 2. | 2 | Portfolio valuations must be based on fair values (not cost basis or book values). |
| 3. | 4 | GIPS requires the disclosure of an appropriate fee schedule. |
| 4. | 6 | Composites must be asset-weighted using beginning-of-period weightings or another method that reflects both beginning market value and cash flows. |
| 5. | 7 | For periods beginning on or after January 1, 2010, a carve-out cannot be included as part of a composite unless it is managed separately with its own cash balance. |
| 6. | 9 | Time-weighted rates of return that adjust for cash flows must be used. Periodic returns must be geometrically linked. |

*Actions 3, 5, 8, and 10 are in compliance with GIPS.*

4. GIPS require the returns from cash and cash equivalents held in portfolios must be included in total-return calculations as long as the portfolio manager has control over the amount of the portfolio allocated to cash. This requirement stands even if the manager does not actually invest the cash, as is the case when it is held in a money market sweep account. This would not be an acceptable practice.

5. GIPS require periodic returns to be geometrically linked. Thus, the annual return is computed as follows:

$$R_{annual} = [(1 + R_{Q1}) \times (1 + R_{Q2}) \times (1 + R_{Q3}) \times (1 + R_{Q4})] - 1 = [(1.0300)(1.0415)(1.0375)(1.0315)] - 1 = 14.8\%$$

6. GIPS require terminated portfolios to be included in the historical record of the appropriate composite(s) through the last full reporting period that the portfolio was under management. This prevents the inclusion of the returns from a terminated portfolio for partial periods in a composite's return. Also, retaining the performance of a terminated portfolio in a composite's historical performance avoids survivorship bias. In the case of JIM, the terminated portfolio should be included in the composite until June 30 (i.e., the end of the quarter preceding July 15) in reports of quarterly returns. Note: For annual return presentations, the portfolio should be included only through its last *full* year of management (i.e., through the most recent year end).

7. Firms must use monthly valuation for periods beginning January 1, 2001. There is no need to recalculate performance for periods prior to January 1, 2001, in order to claim compliance with GIPS. Thus, assuming AIM is GIPS compliant in all other areas, it can show its performance history based on quarterly valuation for 2000. AIM must, however, recalculate its performance results using monthly valuation for 2001 through 2009. For periods beginning on or after January 1, 2010, portfolios must be valued at each large external cash flow.

8. All actual fee-paying discretionary portfolios must be included in at least one composite. This requirement prevents firms from *cherry-picking* their best performing portfolios for presentation purposes. It does not matter if the firm ever plans to market the particular strategy to which a portfolio is being managed; if the portfolio is fee-paying and discretionary, it must be included in a composite.

9. TIM cannot include model performance results in its presentation and claim compliance with the GIPS. Composites must include only assets under management and may not link simulated or model portfolios with actual performance. Simulated, back-tested, or model portfolio results do not represent the returns of actual assets under management and, thus, may not be included in the composites' GIPS-compliant performance results. The model results must be presented as simulated rather than real assets.

10. JIM may not claim compliance with the GIPS. A firm must be in full compliance with the GIPS in order to claim GIPS compliance. There is no such thing as *partial* compliance under the GIPS.

11. (a) The original Dietz method assumes that cash flows occur on average halfway through the month. This method is permissible for periods up to January 1, 2005.

$$R_{Dietz} = \frac{EMV - BMV - CF}{BMV + 0.5CF}$$

$$= \frac{55 - 50 - 3}{50 + 0.5 \times 3}$$

$$= 3.88\%$$

(b) The modified Dietz method gives a weighting to each cash flow but assumes that returns are even during the month. This method may be used for any period up to January 1, 2010.

$$R_{MDietz} = \frac{EMV - BMV - CF}{BMV + \sum_{i=1}^{n} W_i \times CF_i}$$

$$= \frac{55 - 50 - 3}{50 + \left(\frac{20}{30} \times 5\right) + \left(\frac{10}{30} \times (-2)\right)}$$

$$= 3.80\%$$

(c) The most accurate calculation is the Daily Valuation Method, for which a new subperiod is defined on the date of any cash flows. This method will be necessary for all periods after January 1, 2010.

The month divides into three periods:

period 1 return = (51.5 – 50.0) / 50 = 1.5 / 50 = 3.00%

period 2 return = (59.0 – 56.5) / 56.5 = 2.5 / 56.5 = 4.42%

period 3 return = (55.0 – 57.0) / 57.0 = –2 / 57.0 = –3.51%

geometric linking for the month = (1.0300 × 1.0442 × 0.9649) – 1 = 3.78%

12. B $C_E = C_0 + \sum_{1}^{n}(CF_i \times w_i)$

$= \$16{,}450{,}000 + \$3{,}500{,}000(0.56) + (-\$750{,}000)(0.33)$

$= \$16{,}450{,}000 + \$1{,}960{,}000 - \$247{,}500 = \$18{,}162{,}500$

13. C $R_C = \dfrac{MV_1 - MV_0 - E_C + S}{C_E}$

$= \dfrac{\$18{,}500{,}000 - \$17{,}700{,}000 - \$900{,}000 + \$2{,}350{,}000}{\$18{,}162{,}500}$

$= \dfrac{\$2{,}250{,}000}{\$18{,}162{,}500} = 0.12 = 12\%$

14. B $R_I = \dfrac{INC_A - E_{NR} - INT_D - T_P}{C_E}$

$= \dfrac{\$26{,}000 - \$171{,}000 - \$168{,}000 - \$135{,}000}{\$18{,}162{,}500}$

$= \dfrac{-\$448{,}000}{\$18{,}162{,}500} = -0.02 = -2\%$

$R_T = R_C + R_I = 12\% - 2\% = 10\%$

**For the Exam:** Notice the "double jeopardy" incorporated into Questions 12 through 14. Your answer for Question 12 determines whether your answers for Questions 13 and 14 can be correct. CFA Institute has announced that, especially at Level III, double jeopardy questions are sometimes necessary. Unless asked as part of a larger constructed response question, this is the likely form for a real estate return question on the exam.

15. C This is only a recommendation. The other choices must be reported for each period presented.

16.

| Statement | Agree or Disagree | Explanation* |
|---|---|---|
| "Open-ended and evergreen funds must be presented as part of the company's managed private equity holdings." | Disagree | *Open-ended and evergreen funds are covered by the general provisions of the GIPS.** This is because redemptions and subscriptions may be made after the funds' inceptions; therefore, open-ended and evergreen funds do not have fixed levels of capital with a set number of investors. |

* Italics indicate an answer that would be sufficient for the exam.

17.

| Characteristic | May be Included in a Composite<br>Must be Excluded From Composite | Explanation* |
|---|---|---|
| Client has significant liquidity needs with an accompanying significant cash position. | Must be Excluded | With both a significant liquidity requirement and cash position, *the manager's actions are limited to the point that the portfolio would probably not qualify as discretionary and thus should not be included.* |
| Client does not pay fees. | May be Included | Fee-paying portfolios are required to be in a composite. *Non-fee-paying portfolios that are discretionary may be included.* |
| Client requests strictly following an index. | Must be Excluded | If the portfolio has minimal tracking limits from an index portfolio, then *the description of discretionary is no longer appropriate.* |

* Italics indicate an answer that would be sufficient for the exam.

18. **C** For periods beginning January 1, 2008, real estate investments must be valued at least quarterly. External valuation must be done at least every 36 months by an outside, independent party certified to perform such valuations. For periods beginning on or after January 1, 2012, this must be done at least every 12 months. The income and capital appreciation component returns must be presented in addition to the total return.

19. **C** The firm must disclose the name of the sponsor represented by the sponsor-specific composite. Because the composite is sponsor-specific, there would not be a specific style to disclose. The firm is not required to present performance in a sponsor-specific composite net of the entire wrap fee if the presentation is to be used to generate additional wrap fee/SMA business and the presentation states that the presentation is only for the use of the sponsor named on the presentation.

20. **C** The GIPS valuation hierarchy is as follows:

1. Quoted prices from an active market for the same or a similar security.
2. Quoted prices from an inactive market for the same or a similar security.
3. Observable market-based inputs other than quoted prices.
4. Subjective, unobservable inputs.

Based on this hierarchy, if observed market prices from an active market are not available, the next best valuation basis is to use quoted prices from an inactive market.

21. **B** Prior to January 1, 2011, after-tax performance reporting was encouraged. Effective January 1, 2011, after-tax performance reporting is considered supplemental information.

22. **A** One of the major difficulties with after-tax performance reporting is finding an appropriate benchmark. There are no after-tax capital market indices available that account for capital gains taxes, so an after-tax capital market index would not be a suitable benchmark.

## Self-Test: Global Investment Performance Standards

**Use the following information for Questions 1 through 6.**

Tom Hall is a portfolio manager for Falcon Wealth Managers, Inc. Falcon advises wealthy individual investors and provides recommendations for stocks, bonds, and alternative assets. Falcon uses the CFA Institute's Global Investment Performance Standards (GIPS®) to provide a standardized presentation of its firm's performance. The table below and its footnotes are from Hall's presentation of the performance for Falcon's Global Fixed-Income Composite. Although Falcon claims GIPS compliance, it has not been externally verified.

| | *Total Return (gross of fees)* | *Benchmark Return* | *Number of Portfolios* | *Composite Dispersion* | *Total Composite Assets at the End of Period (in U.S. $million)* | *Total Firm Assets at the End of Period (in U.S. $million)* |
|---|---|---|---|---|---|---|
| 1996 | 45.8% | 38.2% | 42 | 8.2% | 202 | 3202 |
| 1997 | −6.8% | −9.9% | 43 | 9.9% | 205 | 3205 |
| 1998 | 2.2% | 3.6% | 42 | 7.6% | 200 | 3200 |
| 1999 | 9.7% | 8.2% | 42 | 8.2% | 202 | 3202 |
| 2000 | 33.2% | 29.2% | 47 | 9.2% | 224 | 3234 |
| 2001 | 22.6% | 29.4% | 48 | 9.4% | 235 | 3235 |
| 2002 | 22.9% | 22.2% | 52 | 20.2% | 245 | 3245 |
| 2003 | −28.3% | −22.2% | 52 | 22.2% | 243 | 3243 |
| 2004 | −25.3% | −29.8% | 47 | 9.8% | 238 | 3238 |
| 2005 | 29.8% | 27.9% | 48 | 7.9% | 242 | 3242 |

Falcon Wealth Managers, Inc., claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. Falcon Wealth Management, Inc., has not been independently verified.

Notes:

1. Falcon Wealth Managers, Inc., is defined as an independent investment management firm that is not affiliated with any parent organization. The firm invests in U.S. and international securities.

2. Portfolio valuations were performed every month. For thinly traded junk bonds, Falcon uses an average of three independent bids. For thinly traded international bonds, Falcon values the bonds using its original cost.

3. The benchmark for this composite is from the appropriate Lehman Brothers Global Fixed-Income Index.

4. The Falcon Wealth Managers Global Fixed-Income Composite was created in 1992. No modifications to the composite presented here have occurred as a result of changes in personnel or for any other reason at any time. A complete list of firm composites and performance results is available upon request.

5. The dispersion of annual returns is measured by the equal-weighted standard deviation of portfolio returns included within the composite for the full year.

6. The historical performance record presented for the Global Fixed-Income Composite includes the performance of terminated portfolios. If a portfolio is terminated within a year, the performance of that portfolio is annualized to represent its return for the last measurement period. After that year, the returns for terminated portfolios are then dropped.

7. Performance results are presented before management fees but net of all actual trading costs. A management fee schedule is attached to this report.

8. Performance results are presented in U.S. dollar terms.

Martha Sims is one of Falcon's oldest clients. She would like to know how her portfolio has performed over the most recent quarter. She received a mid-year performance bonus at work, which she invested in August. As her grandson has just started college, Sims liquidated a portion of her portfolio to pay for his tuition in September. The market value of her portfolio and its cash flows are shown below:

| | *Market Value* | *Cash Flow* | *Market Value After CF* |
|---|---|---|---|
| 6/30/2006 | 800,000 | | |
| 7/31/2006 | 860,000 | | |
| 8/8/2006 | 890,700 | 42,000 | 932,700 |
| 8/31/2006 | 780,000 | | |
| 9/18/2006 | 920,000 | (32,000) | 888,000 |
| 9/30/2006 | 910,000 | | |

1. Considering only the table headings, Falcon's presentation:
   A. should list composite assets as a percent of total firm assets to be in compliance with GIPS standards.
   B. is in compliance with GIPS standards.
   C. should list the returns net of management fees to be in compliance with GIPS standards.

2. Regarding the valuation of portfolios in Falcon's presentation:
   A. the valuation method used for international bonds is not in compliance with GIPS standards.
   B. it is in compliance with GIPS standards.
   C. the valuation method used for the junk bonds is not in compliance with GIPS standards.

3. The handling of returns for terminated portfolios in the Falcon Global Fixed-Income Composite is:
   A. in compliance with GIPS standards.
   B. not in compliance with GIPS standards because the partial-year returns for terminated portfolios should not be annualized, and the historical record for terminated portfolios should be dropped.
   C. not in compliance with GIPS standards because the partial-year returns for terminated portfolios should not be annualized.

4. Using the modified Dietz method, the return on Sims's portfolio in August is *closest* to:
   A. –13.69%.
   B. –9.30%.
   C. –14.19%.

5. Using the modified Dietz method, the return on Sims's portfolio in September is *closest* to:
   A. 16.67%.
   B. 20.77%.
   C. 21.12%.

6. Using the method required by the GIPS standards (i.e., time-weighted returns), the return on Sims's portfolio for the third quarter of the year using the July, August, and September returns is *closest* to:
   A. 11.41%.
   B. 15.66%.
   C. 12.38%.

# Self-Test Answers: Global Investment Performance Standards

1. B The table headings are in compliance with GIPS standards. To be in compliance with GIPS standards, the presentation can list either the total firm assets or percent of firm assets represented by the composite. The firm is not required by GIPS to report the returns net of management fees or returns gross of transactions costs. Returns can be presented as either gross or net of management fees but should be presented net of actual trading costs.

2. A The valuation method Hall used for international bonds is not in compliance with GIPS standards. Book values or original cost should not be used to value securities. Using a reasonable valuation method based on market values is acceptable, as long as it is applied consistently. So the valuation method for junk bonds is acceptable. Furthermore, Falcon's monthly valuation of portfolios is in compliance with GIPS standards. For periods beginning on or after January, 1, 2010, portfolios must be valued at each large cash flow.

3. C The handling of returns for terminated portfolios is not in compliance with GIPS standards because the partial-year returns for terminated portfolios should not be annualized. However, the historical record for terminated portfolios must be included in the record of performance for the composite up to the last full measurement period.

4. A To calculate the return using the modified Dietz calculation for August, first determine the portion of the month (W) between the investment and month-end:

   $W = (31 - 8) / 31 = 0.74$

   Next, adjust the beginning portfolio value and ending portfolio value in the numerator by the cash flow as follows:

   $R_{Aug} = (\$780{,}000 - \$860{,}000 - \$42{,}000) / [\$860{,}000 + (42{,}000 \times 0.74)] = -13.69\%$

5. C To calculate the return using the modified Dietz calculation for September, first determine the portion of the month (W) between the cash distribution and month-end:

   $W = (30 - 18) / 30 = 0.40$

   Next, adjust the beginning portfolio value and ending portfolio value in the numerator by the cash flow as follows:

   $R_{Sept} = [\$910{,}000 - \$780{,}000 - (-32{,}000)] / [\$780{,}000 + (-32{,}000 \times 0.40)] = 21.12\%$

6. C The method required by the GIPS standards is the time-weighted return. Because there were no cash distributions, the return for July is simply:

   $860{,}000 / 800{,}000 - 1 = 7.50\%$

   Compounding the July, August, and September returns together provides the quarterly time-weighted rate of return:

   $R_{twr} = (1 + 0.075)(1 - 0.1369)(1 + 0.2112) - 1 = 12.38\%$

# FORMULAS

CPPI strategies: $ in stock = m (TA – F)

cash flow at the *beginning* of the evaluation period:

$$r_t = \frac{MV_1 - (MV_0 + CF)}{MV_0 + CF}$$

cash flow at the *end* of the evaluation period:

$$r_t = \frac{(MV_1 - CF) - MV_0}{MV_0}$$

MWRR is the rate, *R*, that solves the following:

$$MV_1 = MV_0(1+R)^m + \sum_{i=1}^{n} CF_i(1+R)^{L(i)}$$

$$P = M + S + A$$

Sharpe ratio:

$$S_P = \frac{\overline{R}_P - \overline{R}_F}{\sigma_P}$$

incremental return to the asset category level:

$$R_{AC} = \sum_{i=1}^{A} (w_i)(R_i - R_F)$$

incremental return at the benchmark level:

$$R_B = \sum_{i=1}^{A}\sum_{j=1}^{M} (w_i)\left(w_{i,j}\right)\left(R_{B,i,j} - R_i\right)$$

return to the *investment managers* level:

$$R_{IM} = \sum_{i=1}^{A}\sum_{j=1}^{M} (w_i)\left(w_{i,j}\right)\left(R_{A,i,j} - R_{B,i,j}\right)$$

micro performance attribution:

$$R_V = \underbrace{\sum_{j=1}^{S}\left(w_{Pj} - w_{Bj}\right)\left(R_{Bj} - R_B\right)}_{\text{pure sector allocation}} + \underbrace{\sum_{j=1}^{S}\left(w_{Pj} - w_{Bj}\right)\left(R_{Pj} - R_{Bj}\right)}_{\text{allocation/selection interaction}} + \underbrace{\sum_{j=1}^{S} w_{Bj}\left(R_{Pj} - R_{Bj}\right)}_{\text{within-sector selection}}$$

SML: $\hat{R}_A = R_F + \beta_A\left(\hat{R}_M - R_F\right)$

ex post alpha: $\alpha_A = R_{At} - \hat{R}_A$

information ratio: $IR_P = \dfrac{\text{active return}}{\text{active risk}} = \dfrac{R_P - R_B}{\sigma_{(R_P - R_B)}}$

Treynor measure: $T_A = \dfrac{\bar{R}_A - \bar{R}_F}{\beta_A}$

Sharpe ratio: $S_A = \dfrac{\bar{R}_A - \bar{R}_F}{\sigma_A}$

$M^2$ measure: $M_P^2 = \bar{R}_F + \left(\dfrac{\bar{R}_P - \bar{R}_F}{\sigma_P}\right)\sigma_M$

purely domestic portfolio return: $R_j = CG_j + CF_j$

global portfolio return: $R_{j,d} = CG_j + CF_j + C_j$

domestic return on a global portfolio: $R_{p,d} = \sum_j w_{j,p} CG_{j,l} + \sum_j w_{j,p} I_{j,l} + \sum_j w_{j,p} C_j$

currency effect for market $j$: $C_j = e_j\left(1 + CG_j + I_j\right)$

market return for the portfolio in local currencies: $R_{p,l} = \sum_j w_{j,p} R_{j,l}$

security selection effect:

$$R_{SecSel,p} = \sum_j w_{j,p} R_{SecSel,j}$$

global return decomposition:

$$R_{p,d} = \sum_j w_j R_{j,l} + \sum_j w_j R_{SecSel,j} + \sum_j w_j I_{j,l} + \sum_j w_j C_j$$
$$= \sum_j w_j R_{j,l} + \sum_j w_j \left(R_{j,p,l} - R_{j,b,l}\right) + \sum_j w_j I_{j,l} + \sum_j w_j C_j$$

where:

$\sum_j w_j R_{j,l}$ = portfolio market return in the local currencies

$\sum_j w_j \left(R_{j,p,l} - R_{j,b,l}\right)$ = portfolio security selection effect in the local currencies

$\sum_j w_j I_{j,l}$ = portfolio yield in local currencies

$\sum_j w_j C_j$ = portfolio currency effect

benchmark domestic return:

$$R_{b,d} = \sum_j \left(w_{j,b}\right)\left(R_{j,b,d}\right)$$

$$\text{market allocation contribution (MAC)} = \sum_j \left(w_{j,p} - w_{j,b}\right) R_{j,b,l}$$

$$\text{currency allocation contribution} = \sum_j \left(w_{j,p} C_{j,p} - w_{j,b} C_{j,b}\right)$$

$R_p$ = benchmark domestic return + market allocation contribution +
currency allocation contribution + security selection contribution + yield component

$$= \sum_j \left(w_{j,b}\right)\left(R_{j,b,d}\right) + \sum_j \left(w_{j,p} - w_{j,b}\right) R_{j,b,l} +$$
$$\sum_j \left(w_{j,p} C_{j,p} - w_{j,b} C_{j,b}\right) + \sum_j w_{j,p} \left(R_{j,p,l} - R_{j,b,l}\right) + \sum_j w_{j,p} I_{j,l}$$

2-period return to active management:

$$R_{A,2} = R_{a,1}\left(1 + R_{b,2}\right) + R_{a,2}\left(1 + R_{p,1}\right)$$

$$\text{information ratio} = \frac{SR}{\sigma_{SR}}$$

$$\text{Sharpe ratio} = \frac{\overline{R}_p - \overline{R}_F}{\sigma_p}$$

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# Notes