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CFA[®]
EXAM PREP

SchweserNotes[™]

Portfolio Management

Level III

KAPLAN SCHWESER

Portfolio Management

SchweserNotes™ 2027

Level III CFA®



SCHWESERNOTES™ 2027 LEVEL III CFA® PORTFOLIO MANAGEMENT

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Learning Outcome Statements (LOS)

P1. Index-Based Equity Strategies

The candidate should be able to:

- a. compare factor-based strategies to market-capitalization-weighted indexing.
- b. compare different approaches to index-based equity strategies.
- c. compare different approaches to index-based equity investing.
- d. compare the full replication, stratified sampling, and optimization approaches for the construction of index-based equity portfolios.
- e. discuss potential causes of tracking error and methods to control tracking error for index-based equity portfolios.
- f. explain sources of return and risk to an index-based equity portfolio.

P2. Active Equity Investing: Strategies

The candidate should be able to:

- a. compare fundamental and quantitative approaches to active management.
- b. analyze bottom-up active strategies, including their rationale and associated processes.
- c. analyze top-down active strategies, including their rationale and associated processes.
- d. analyze factor-based active strategies, including their rationale and associated processes.
- e. analyze activist strategies, including their rationale and associated processes.
- f. describe active strategies based on statistical arbitrage and market microstructure.
- g. describe how fundamental active investment strategies are created.
- h. describe how quantitative active investment strategies are created.
- i. discuss equity investment style classifications.

P3. Active Equity Investing: Portfolio Construction

The candidate should be able to:

- a. describe elements of a manager's investment philosophy that influence the portfolio construction process.
- b. discuss approaches for constructing actively managed equity portfolios.
- c. distinguish between Active Share and active risk and discuss how each measure relates to a manager's investment strategy.
- d. discuss the application of risk budgeting concepts in portfolio construction.
- e. discuss risk measures that are incorporated in equity portfolio construction and describe how limits set on these measures affect portfolio construction.
- f. discuss how assets under management, position size, market liquidity, and portfolio turnover affect equity portfolio construction decisions.
- g. evaluate the efficiency of a portfolio structure given its investment mandate.
- h. discuss the long-only, long extension, long/short, and equitized market-neutral approaches to equity portfolio construction, including their risks, costs, and effects on potential alphas.

P4. Liability-Driven and Index-Based Strategies

The candidate should be able to:

- a. evaluate strategies for managing a single liability.
- b. compare strategies for a single liability and for multiple liabilities, including alternative means of implementation.
- c. evaluate liability-based strategies under various interest rate scenarios and select a strategy to achieve a portfolio's objectives.
- d. explain risks associated with managing a portfolio against a liability structure.

- e. discuss bond indexes and the challenges of managing a fixed-income portfolio to mimic the characteristics of a bond index.
- f. compare alternative methods for establishing bond market exposure passively.
- g. discuss criteria for selecting a benchmark and justify the selection of a benchmark.

P5. Yield Curve Strategies

The candidate should be able to:

- a. describe the factors affecting fixed-income portfolio returns due to a change in benchmark yields.
- b. formulate a portfolio positioning strategy given forward interest rates and an interest rate view that coincides with the market view.
- c. formulate a portfolio positioning strategy given forward interest rates and an interest rate view that diverges from the market view in terms of rate level, slope, and shape.
- d. formulate a portfolio positioning strategy based upon expected changes in interest rate volatility.
- e. evaluate a portfolio's sensitivity using key rate durations of the portfolio and its benchmark.
- f. discuss yield curve strategies across currencies.
- g. evaluate the expected return and risks of a yield curve strategy.

P6. Fixed-Income Active Management: Credit Strategies

The candidate should be able to:

- a. describe risk considerations for spread-based fixed-income portfolios.
- b. discuss the advantages and disadvantages of credit spread measures for spread-based fixed-income portfolios, and explain why option-adjusted spread is considered the most appropriate measure.
- c. discuss bottom-up approaches to credit strategies.
- d. discuss top-down approaches to credit strategies.
- e. discuss liquidity risk in credit markets and how liquidity risk can be managed in a credit portfolio.
- f. describe how to assess and manage tail risk in credit portfolios.
- g. discuss the use of credit default swap strategies in active fixed-income portfolio management.
- h. discuss various portfolio positioning strategies that managers can use to implement a specific credit spread view.
- i. discuss considerations in constructing and managing portfolios across international credit markets.
- j. describe the use of structured financial instruments as an alternative to corporate bonds in credit portfolios.
- k. describe key inputs, outputs, and considerations in using analytical tools to manage fixed-income portfolios.

P7. Trade Strategy and Execution

The candidate should be able to:

- a. discuss motivations to trade and how they relate to trading strategy.
- b. discuss inputs to the selection of a trading strategy.
- c. compare benchmarks for trade execution.
- d. recommend and justify a trading strategy (given relevant facts).
- e. describe factors that typically determine the selection of a trading algorithm class.
- f. contrast key characteristics of the following markets in relation to trade implementation: equity, fixed income, options and futures, OTC derivatives, and spot currency.
- g. explain how trade costs are measured and determine the cost of a trade.
- h. evaluate the execution of a trade.
- i. evaluate a firm's trading procedures, including processes, disclosures, and record keeping with respect to good governance.

P8. Case Study in Portfolio Management: Institutional

The candidate should be able to:

- a. discuss tools for managing portfolio liquidity risk.

- b. discuss capture of the illiquidity premium as a long-term investment strategy.
- c. analyze asset allocation and portfolio construction in relation to liquidity needs and risk and return requirements and recommend actions to address identified needs.
- d. demonstrate the application of the Code of Ethics and Standards of Professional Conduct regarding the actions of individuals involved in manager selection.
- e. analyze the costs and benefits of derivatives versus cash market techniques for establishing or modifying asset class or risk exposures.
- f. demonstrate the use of derivatives overlays in tactical asset allocation and rebalancing.
- g. discuss ESG considerations in managing long-term institutional portfolios.

READING P1

INDEX-BASED EQUITY STRATEGIES

EXAM FOCUS

This reading starts with a discussion regarding the various approaches to index-based equity investing that seek to replicate the performance of an index (e.g., S&P 500 Index). The focus then shifts to the construction of index-based portfolios from full replication to optimization. The reading concludes with a brief discussion on tracking error and attribution analysis.

MODULE P1.1: FACTOR-BASED STRATEGIES

LOS P1.a: Compare factor-based strategies to market-capitalization-weighted indexing.

The CAPM is a single-factor model in which the only risk factor that drives returns is the return on the market portfolio, and the risk of individual securities is measured by beta (market risk). Multifactor models consider multiple risk factors, and returns on individual securities are the result of their exposures to, and the returns to, these risk factors. Fama and French (2015) identified five risk factors that can be used to explain the variation in (total) returns across equity securities. These five factors are as follows:

- | Market risk premium (based on beta, standardized covariance of returns with the return on the market)
- | Firm size (market value of equity)
- | Book-to-market ratio (shareholders' equity divided by market value of equity)
- | Operating profitability (operating income divided by beginning shareholders' equity)
- | Investment intensity (growth rate of total assets)

Indexes with a high exposure to a specific risk factor are created to allow investors to augment or replace a market-capitalization-weighted index based on

their beliefs about future returns to the various risk factors. Available indexes with greater or less exposure to a factor than broad-based index funds are typically structured as **exchange-traded funds (ETFs)**.

Factor-weighted portfolios are rules based, so they have lower operating costs than traditional actively managed funds but typically have higher costs than large-capitalization-weighted index funds. Factor-based index funds themselves are considered *passive*, as they are rules based and typically transparent and replicable. However, emphasizing some factors and de-emphasizing others relative to the overall market portfolio is a form of active portfolio management.

Returns-oriented indexes and strategies include the following:

- | Momentum-based indexes typically overweight stocks that have outperformed a benchmark index over the most recent period of a specified length.
- | Dividend yield strategies often overweight stocks with relatively high dividends, or dividend growth rates.
- | Fundamental-weighted index strategies are based on company fundamentals such as dividends, sales, and income.

Factor-based strategies frequently involve an element of active decision-making by altering the risk factor exposures and exploiting out-of-favor factors in an attempt to increase returns relative to a market-capitalization-weighted portfolio. Decisions regarding factor selection, weighting, and rebalancing tend to be transparent, allowing other investors to mimic the strategy. This can reduce or eliminate the opportunity for higher returns. The buy-sell actions of investors may move prices and reduce or eliminate the opportunity for increased factor returns.

There are three types of factor-based strategies: (1) return oriented, (2) risk oriented, and (3) diversification oriented.

Return-oriented strategies include dividend yield, momentum, and fundamentally weighted strategies, as noted previously.

Risk-oriented strategies include volatility weighting (where the weights are the inverse of price volatility) and minimum-variance investing (using the traditional Markowitz framework), where portfolios are selected that minimize portfolio variance, subject to constraints (such as maximum or minimum sector or country weights). The advantages of risk-oriented strategies are that they are simple and

provide risk reduction. However, they are based on past return data, and as such may not reflect future conditions and outcomes.

Diversification-oriented strategies include equally weighted portfolios (as discussed previously) and maximum diversification strategies (achieved by maximizing the ratio of the weighted average volatility of the individual stocks to the portfolio volatility).

Portfolio managers who employ factor-based strategies often use multiple benchmarks, including both factor-based and market-capitalization-weighted indexes, which can increase tracking error.

The advantage of factor-based investing is that it is typically less costly than active management but still allows for different factor exposures based on the investor's view of future factor returns. A disadvantage is that, relative to market-capitalization-weighted strategies, management fees and trading commissions are typically higher.



MODULE QUIZ P1.1

1. A small-cap, high P/E factor-based investment strategy is *best* classified as:
 - A. risk oriented.
 - B. return oriented.
 - C. diversification oriented.

MODULE P1.2: APPROACHES TO INDEX-BASED INVESTING

LOS P1.b: Compare different approaches to index-based equity strategies.

LOS P1.c: Compare different approaches to index-based equity investing.

Three common approaches to index-based equity investing involve the use of (1) pooled investments, (2) derivatives-based strategies, and (3) separately managed index-based portfolios.

Pooled investments include open-end mutual funds and ETFs. The advantages of open-end mutual funds are low transaction costs and the convenience of the fund structure. The advantages of ETFs are that they trade intraday (not just at market close each day) and they do not have to sell stocks in response to shareholder redemption requests. This eliminates taxable gains from portfolio stock sales that shareholders are exposed to with open-end mutual funds. The

disadvantages include higher transaction costs from commissions and the bid-ask spread, as well as possible illiquidity in some ETF secondary markets.

Derivatives-based strategies use derivatives (options, futures contracts, and swap contracts) to recreate the risk-return performance of an index. Derivative positions used to adjust the existing portfolio risk and return exposures may be called *overlay positions*, reflecting that they are used to modify the underlying portfolio positions. *Completion overlays* can move the portfolio back to the risk exposure of the index, for example, by adjusting the portfolio's beta to match the index beta. *Rebalancing overlays* can efficiently and cheaply match the reconstitution of the index as securities are added and dropped. *Currency overlays* adjust the foreign exchange risk of portfolio holdings denominated in a foreign currency.

Advantages of using equity index derivatives (options, futures, and swaps) over cash-based portfolio construction techniques are that derivatives:

- | can be used to quickly adjust a portfolio's factor exposures at low cost,
- | trade in liquid markets, and
- | make it easy to leverage the portfolio.

Disadvantages include the following:

- | Derivative positions have finite expirations, so they must be rolled over at or near expiration.
- | Some contracts have position limits.
- | Specialty portfolio needs might not be met by the existing offerings of exchange-traded derivative contracts.
- | OTC derivatives introduce counterparty risk.
- | Basis risk can increase tracking error.

Separately managed equity index-based portfolios hold all the constituent stocks in the index or a representative sample. They require regularly updated data on the index; sophisticated trading and accounting systems; well-established broker relationships to facilitate program trading and lower trading commissions; and compliance systems to ensure compliance with laws, regulations, and internal company policies.

LOS P1.d: Compare the full replication, stratified sampling, and optimization approaches for the construction of index-based equity

portfolios.

Index-based equity portfolios can be constructed by (1) full replication (hold all of the securities in the index), (2) holding a sample of the securities based on stratified sampling, or (3) using more complex optimization to maximize desirable characteristics while minimizing undesirable characteristics. In practice, a blend of these approaches may be used.

Full Replication

Full replication can be costly when there are large numbers of stock and liquidity is limited. The portfolio must be regularly reconstituted and rebalanced. The advantage of full replication is that it closely matches the index return (before transaction costs).

As the number of securities increases, tracking error decreases as the portfolio more closely matches the benchmark. However, as smaller and more thinly traded securities are added, trading costs and tracking error start to increase. An index that contains some relatively illiquid securities will exhibit a U-shaped relationship between tracking error and the number of securities.

Initially, as securities are added, tracking error falls. However, when relatively illiquid securities are added, tracking error rises again due to higher transaction costs. This is the reason for the U-shaped relationship between tracking error and the number of securities.

Stratified Sampling

To reduce the costs of full replication but still approximate the factor exposures of the underlying index, a manager may use **stratified sampling**. With stratified sampling, index stocks are divided into strata (subsets) based on key risk characteristics. Random samples of stocks within each strata are selected for inclusion in the portfolio. The weight of the stocks selected for each strata are such that the portfolio risk factor exposures match those of the index portfolio.

The strata of the constituent stocks must be mutually exclusive and exhaustive. The strata are often formed across multiple dimensions; for example, one strata may contain large-capitalization stocks that have high-dividend yields and low momentum. Industry sector and country of domicile are also candidates for the characteristics of strata. The more criteria used in constructing strata, the smaller

the tracking error—the degree to which the portfolio performance deviates from the index.

The manager must consider the size of the sample used (i.e., how closely to approach full replication). Initially, tracking error declines as the size of the sample is increased. The manager will naturally first purchase the largest, most liquid, lowest-cost stocks. But as more stocks are added and the portfolio approaches full replication, the added stocks will be less liquid, increasing the effect of transaction costs on tracking error.

Optimization

Optimization uses mean-variance analysis to minimize tracking error. The optimization typically maximizes a desirable result (e.g., returns) or minimizes an undesirable characteristic (e.g., variance), subject to one or more constraints. For an index portfolio, optimization seeks to minimize tracking error relative to the underlying index, and constraints may include a minimum number of stocks, a style tilt that matches that of the underlying index, or a minimum capitalization, among other possibilities. Optimization can be combined with stratified sampling, with optimization performed on each strata of a stratified sample.

A drawback of optimization is that it is based on historical relationships, which will change over time. Maintaining the optimal weights as these relationships change can be costly. Additionally, minimization of tracking error can result in portfolios that are not mean-variance efficient.

The advantages of optimization techniques are reduction of tracking error relative to stratified sampling, and that they explicitly account for the covariances of constituent stock returns, rather than relying on a characteristic (e.g., industry sector), in constructing the portfolio.

Blended Approach

Full replication is preferred for indexes with small numbers of similar liquid stocks, while stratified sampling or optimization is preferable for indexes with many heterogeneous, thinly traded, small-capitalization stocks. For indexes with a large number of stocks—ranging from large and liquid to small and thinly traded, such as the Wilshire 5000—the manager may use a blended approach,

with full replication for large liquid index stocks and stratified sampling or optimization for index stocks that are thinly traded.



MODULE QUIZ P1.2

1. **Discuss** the advantages and disadvantages of using ETFs to implement an index-based equity investing strategy.
2. **Discuss** two advantages and two disadvantages of using equity index derivatives versus cash-based strategies for index-based equity investing.
3. As the number of constituent stocks in an index increases, the tracking error of an index-based portfolio that uses the index as a benchmark will *most likely*:
 - A. increase.
 - B. decrease.
 - C. first decrease and then eventually increase.

MODULE P1.3: TRACKING ERROR, RETURN, AND RISK

LOS P1.e: Discuss potential causes of tracking error and methods to control tracking error for index-based equity portfolios.

Causes of Tracking Error

Tracking error refers to the standard deviation of the differences between index portfolio returns and published index returns. Differences between portfolio returns and index returns are caused by the following:

- | Management fees
- | Commissions on trades
- | Sampling—compared to full replication, sampling typically increases tracking error
- | Intraday trading because index returns are based on closing prices
- | Cash drag—portfolios may hold cash balances that reduce returns in rising markets and increase returns in falling markets, as cash returns differ from index returns

Controlling Tracking Error

Reducing tracking error involves a tradeoff between the higher trading costs of full replication and the increased potential for tracking error that comes with sampling. Nonetheless, an index-based fund must do some trading in response to

cash inflows and outflows and to reinvest dividends. Derivative positions in index futures can be used to reduce cash drag.

LOS P1.f: Explain sources of return and risk to an index-based equity portfolio.

Attribution Analysis

The manager of an index-based equity portfolio needs to understand the sources of returns in order to effectively manage a portfolio intended to replicate index returns. **Attribution analysis** can be used to help the manager identify the sources of tracking error and hopefully reduce them.



PROFESSOR'S NOTE

Attribution analysis is covered in more detail in the Core SchweserNotes.

Securities Lending

Investors with large equity portfolios can lend securities to generate additional income, which can offset management fees (and other costs if management fees are quite low), thereby reducing tracking error.

Proxy Voting

Even index fund managers have a fiduciary duty to vote the proxies of portfolio stocks in the best interests of their investors. By voting in ways that improve operations, better manage risk, or provide better board oversight and corporate governance, returns to index stocks may be increased. Voting proxies effectively can be a costly undertaking for an index fund manager who must research a myriad of corporate issues across a broad portfolio of companies. Because of that, many index fund managers use proxy voting services.



MODULE QUIZ P1.3

1. **Explain** cash drag and how it results in tracking error.
2. **Explain** why tracking error is a better measure of an index-based equity manager's skill than excess return.
3. **Explain** how securities lending can reduce tracking error in index-based portfolios.

KEY CONCEPTS

LOS P1.a

The return-risk characteristics of an index can be replicated by creating a portfolio with the same exposures to a set of risk factors as the index. This strategy is called a factor-based strategy.

Common factors are growth, value, size, yield, momentum, quality, and volatility.

There are three types of factor-based strategies: (1) return oriented, (2) risk oriented, and (3) diversification oriented.

LOS P1.b, LOS P1.c

Three common approaches to index-based equity investing involve the use of (1) pooled investments, such as open-end mutual funds and ETFs; (2) derivatives-based strategies; and (3) separately managed index-based portfolios.

LOS P1.d

The three methods of constructing index-based equity portfolios are (1) hold and match the weights of all the securities in the index (full replication); (2) select a more liquid sample of securities to replicate the index (stratified sampling, often based on cell matching); and (3) use a more technical and quantitative approach (optimization) to maximize desirable characteristics, and/or minimize undesirable characteristics. Blended approaches using a combination of these methods are also common.

LOS P1.e

Tracking error initially declines as sample size increases but then increases as costs (transaction, management, and illiquidity) outweigh the gains of increasing sample size. Intraday trading and cash drag also create tracking error.

Reducing tracking error requires a continuing evaluation of the tradeoff between the benefits of larger sample size and increasing costs. Derivatives can be used to reduce the effects of cash drag.

LOS P1.f

Attribution analysis is a key tool in helping the manager identify the sources of tracking error.

Securities lending can generate fee income to offset some of the costs of managing the portfolio and reduce tracking error.

Corporate governance and investor activism are important for both index fund managers and active investors.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz P1.1

- . **B** Fundamentally weighted factor exposure strategies are considered to be return oriented because such strategies focus on the factors that have determined differences in return. (LOS P1.a)

Module Quiz P1.2

- . Advantages are that ETFs handle shareholder redemptions more cheaply and efficiently than open-end mutual funds through in-kind delivery of stock. This reduces taxable gains and losses that would otherwise be passed on to shareholders.

Disadvantages are transaction costs from commissions and the bid-ask spread as well as illiquidity in some ETF secondary markets. (LOS P1.b)
- . Here are advantages of derivatives: (1) they are a quick, efficient, and cheap way to adjust exposure, and (2) they trade in liquid markets.

Here are disadvantages of derivatives: (1) they have finite expirations, so they have to be rolled over; (2) some contracts have position limits; (3) specialty portfolio needs might not be met by the existing offering of exchange-traded derivative contracts; (4) OTC derivatives have counterparty risk; and (5) basis risk can increase tracking error. (LOS P1.c)
- . **C** Adding to the sample size with liquid stocks first reduces tracking error; but as less liquid stocks are added, the costs and tracking error increase. (LOS P1.d)

Module Quiz P1.3

- . Even index-based portfolios have some cash flows and cash holdings, while indexes represent theoretical fully invested performance. Over time, the cash is a low-return asset, reducing the portfolio's return. The underperformance increases tracking error. (LOS P1.e)

- . The goal is to consistently match the index's performance, and zero (or low) tracking error indicates a perfect (or close) match. (LOS P1.e)
- . Large equity portfolios can lend their stocks to generate fee income (or return on collateral) and cover expenses. This can produce a better match of index performance, lowering tracking error. (LOS P1.f)