



**Level III
of the
CFA® Program**

Portfolio Management Pathway
INDEX-BASED EQUITY STRATEGIES

*The following slide deck reflects revisions to the CFA Program Learning Outcome Statements (LOSs) effective for the 2027 curriculum.

Learning Outcome Statements

- LOS : Compare **factor-based strategies** to **market-capitalization-weighted** indexing.
- LOS : Compare different approaches to **index-based** equity strategies.
- LOS : Compare different approaches to index-based **equity investing**.
- LOS : Compare **the full replication, stratified sampling, and optimization approaches** for the construction of index-based equity portfolios.
- LOS : Discuss potential causes of **tracking error** and methods to control tracking error for index-based equity portfolios.
- LOS : Explain sources of **return and risk** to an index-based equity portfolio.

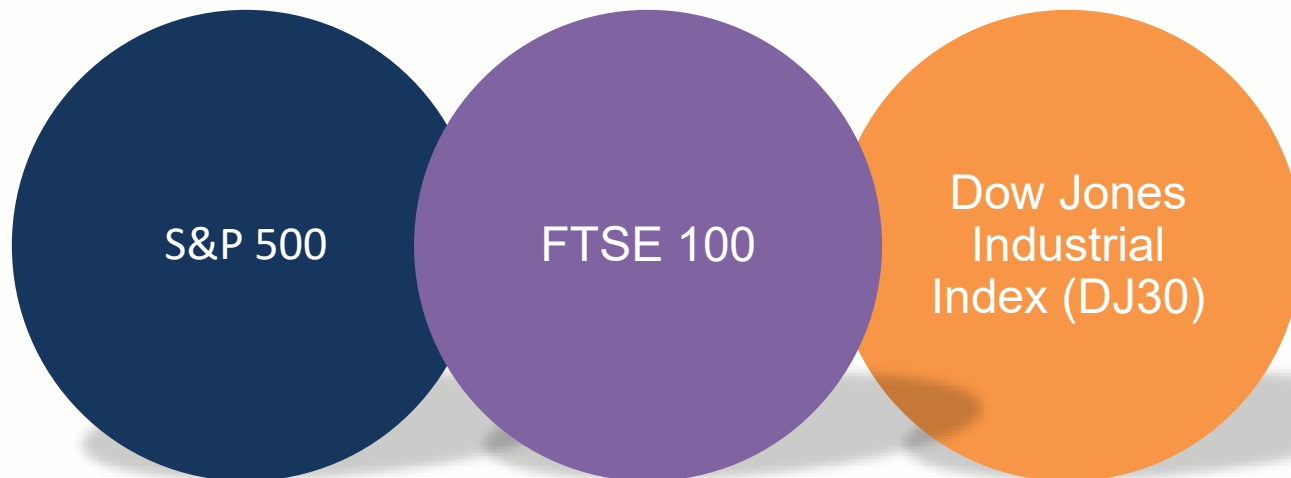
Brief Recap...

What is Indexing?

An **investment strategy** that aims to replicate the performance of a specific **market index**.

Provides **broad market exposure**, **low operating expenses**, and **low portfolio turnover**.

Types of Indexes: Include **broad market indexes** like the **S&P 500** and specialized indexes like the **Russell 2000**.



Brief Recap...

Advantages of Index-Based Investing

Low Costs

Typically have **lower management fees** compared to actively managed funds.

Diversification

Achieves broad market exposure, reducing **unsystematic risk**.

Tax Efficiency

Lower portfolio turnover leads to **fewer taxable events**.



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

Factor-Based Strategies



Seek to exploit **specific risk factors** to generate returns.



Include **value, size, momentum, quality,** and **volatility** factors.



Aim to provide an **expected return** based on exposure to specific factors.



Often marketed as **“smart beta”** strategies.



Can be used to **complement traditional** market-cap-weighted portfolios.

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

Factor-Based Strategies

Common Equity Risk Factors



Growth:
Growth stocks have above-average **net income growth rates** and high **P/E ratios**.



Value: Value stocks often have low **price-to-book** and **price-to-earnings ratios** and high **dividend yields**.



Size: A tilt toward smaller size involves buying stocks with low **market capitalization**.



Yield: High dividend-yielding stocks may provide excess returns in low **interest rate environments**



Momentum: Momentum strategies aim to capture returns from stocks with above-average **price increases**.

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

Factor-Based Strategies

Common Equity Risk Factors



Quality:

Quality stocks include those with consistent **earnings growth**, high **cash flow to earnings**, and low **debt-to-equity ratios**.



Volatility: Low

volatility stocks aim to reduce **downside risk** and are often measured by the **standard deviation** of returns.



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

Factor-Based Strategies

Advantages

- Potential for **higher returns** by targeting specific factors
- Can **reduce downside risk** through **low-volatility** strategies.
- Provide a **systematic approach** to achieving **diversification**.
- Transparency in factor selection and rebalancing.

Disadvantages

- **Concentrated risk** exposures can lead to **underperformance** when factors are out of favor.
- Involve **active decision-making** in factor selection and timing.
- **Replication** by other investors can reduce **realized advantages**.
- Often associated with **higher management fees** and **trading costs**.

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

Market-Capitalization-Weighted Indexing



Aims to replicate market performance by **weighting** securities according to their **market value**.



Reflects the **collective market** opinion of a company's worth.



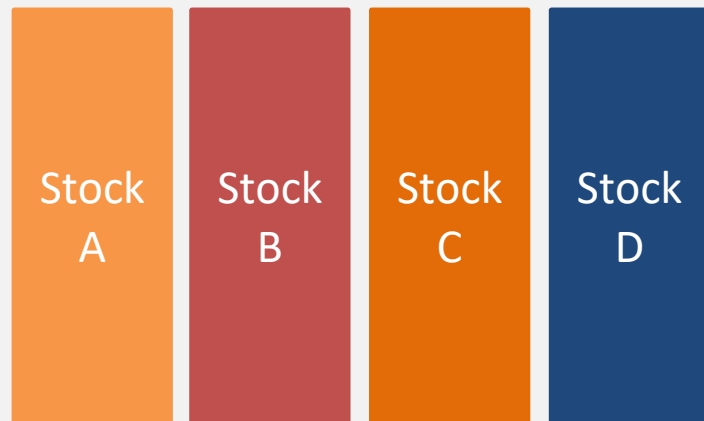
Common examples include **S&P 500** and **FTSE 100**.



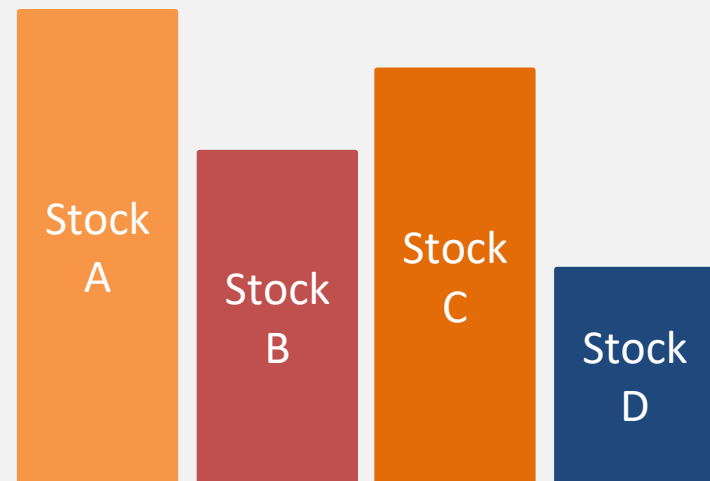
Offers **broad market exposure** and low costs.

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

Equally Weighted



Market Cap Weighted



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

Market-Capitalization-Weighted Indexing

Example

Consider a market-capitalization-weighted index with three stocks: **Stock A**, **Stock B**, and **Stock C**.

Market Capitalizations:

- **Stock A**: \$10 million
- **Stock B**: \$20 million
- **Stock C**: \$30 million

Total Market Cap = \$10 million + \$20 million + \$30 million = **\$60 million**

Weight Calculations

- Weight of Stock A = $10/60 = 16.67\%$
- Weight of Stock B = $20/60 = 33.33\%$
- Weight of Stock C = $30/60 = 50\%$

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

Market-Capitalization-Weighted Indexing

Example

Index Value Calculation:

- Assume the base value of the index is 1000 points.
- **Initial Price Levels:**
 - **Stock A:** \$100 per share
 - **Stock B:** \$200 per share
 - **Stock C:** \$300 per share

Weighted Contribution to Index:

- **Stock A:** $1000 \times 0.1667 = 166.7$ points
- **Stock B:** $1000 \times 0.3333 = 333.3$ points
- **Stock C:** $1000 \times 0.50 = 500$ points

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Market-Capitalization-Weighted Indexing

Advantages

- **Broad market exposure** with a single investment.
- **Low-cost structure** due to **economies of scale**.
- **Diversification** across all market sectors.
- Reflects the **market consensus** on the value of companies.

Disadvantages

- **Overweighting overpriced stocks** due to their higher market value.
- **Underweighting** potentially **undervalued stocks**.
- May lead to **market bubbles** if large-cap stocks are **overvalued**.
- Less exposure to **smaller companies** that may have higher growth potential.

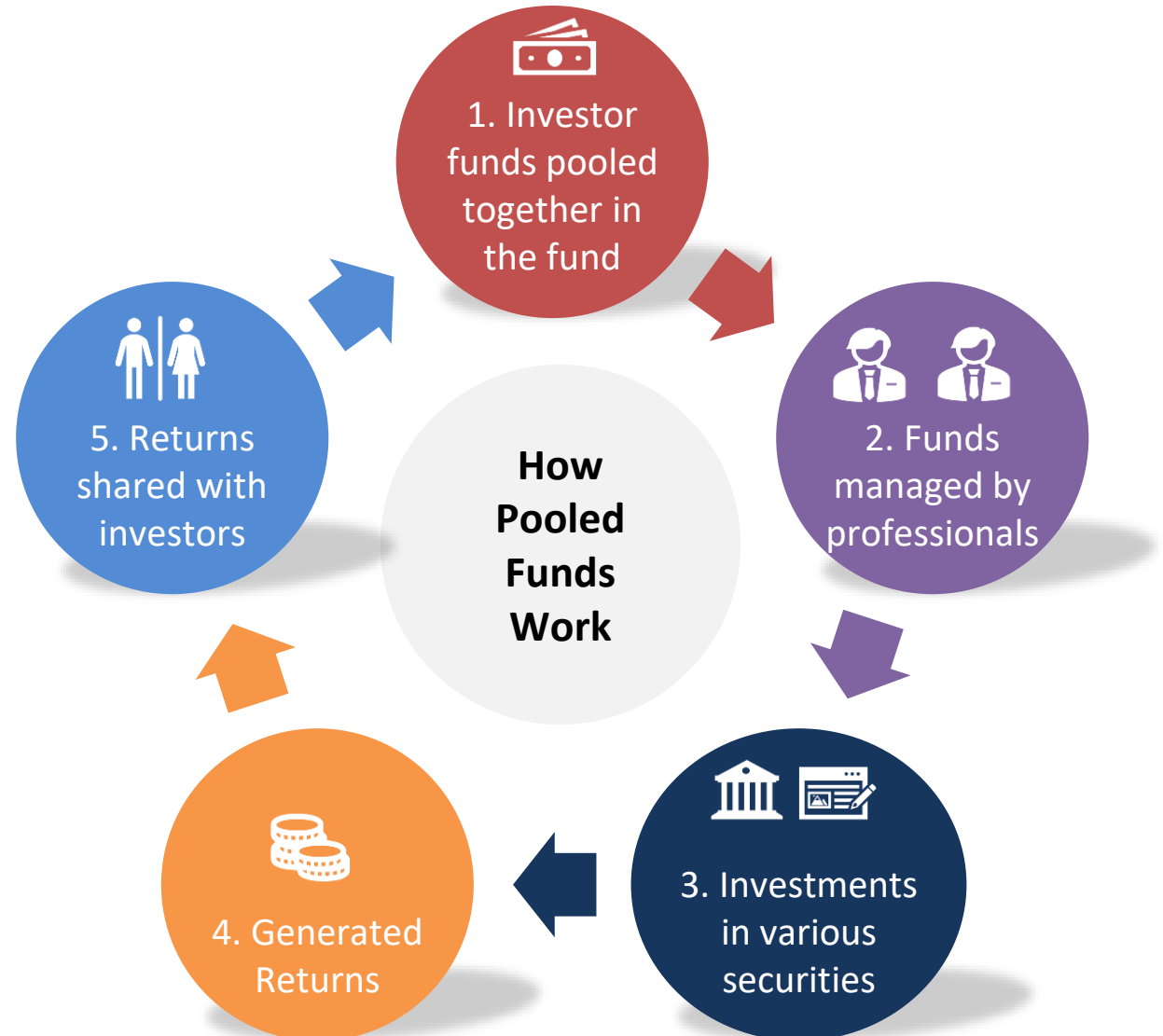
LOS : Compare different approaches to index-based equity strategies.

Pooled Investments

Involve combining funds from multiple investors to invest in a diversified portfolio.

Types: Includes **mutual funds** and **exchange-traded funds (ETFs)**.

Benefits: **Diversification, professional management, and convenience** for individual investors.



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Mutual Funds

Open-end funds where shares are bought **directly** from the fund and can be **redeemed** at any time.

Structure: Managed by professional fund managers who oversee the portfolio to match a specific index.

Example: Vanguard 500 Index Fund

- **Objective:** To track the performance of the S&P 500 Index.
- **Advantages:** Low expense ratio, broad diversification, and strong historical performance.
- **Performance:** Consistent returns that closely match the S&P 500.



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Mutual Funds

Advantages

- **Ease of Investment:** Simple to purchase and manage through a financial adviser or fund marketplace.
- **Professional Management:** Experienced managers handle the portfolio.
- **Record-Keeping:** Simplifies tracking and reporting of investments.

Disadvantages

- **Fees:** Higher management fees compared to ETFs.
- **Liquidity:** Can only be traded at the end of the trading day

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

Exchange-Traded Funds, ETFs

Traded like stocks on an exchange, typically tracking an index.

History: First ETF was launched in 1990 in Canada, tracking the Toronto Stock Exchange.

Structure: Involves authorized participants who create and redeem shares to maintain liquidity.

Example: SPDR S&P 500 Trust ETF (SPY)

Tracks performance of the S&P 500 Index.

Advantages: High liquidity, low expense ratio, and broad market exposure.

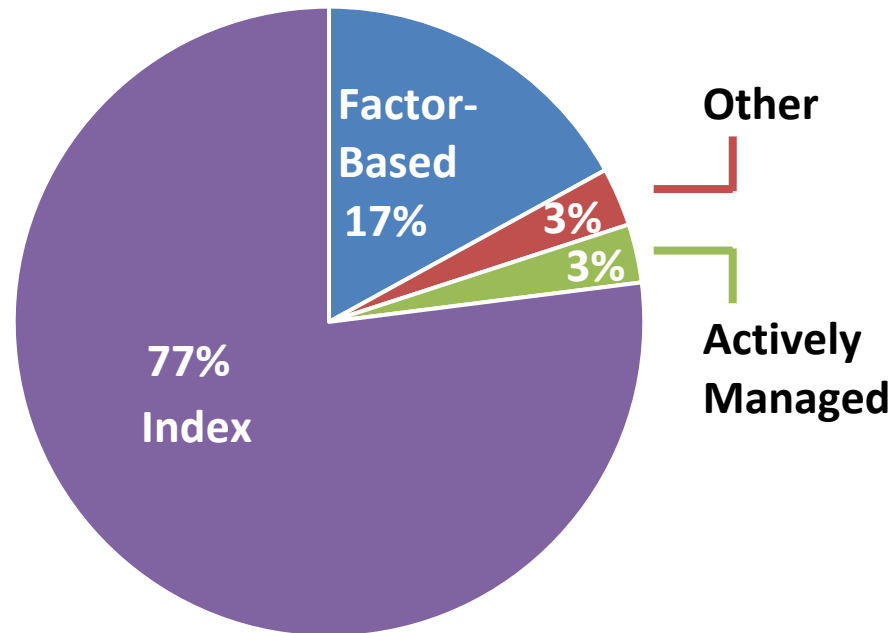
Performance: Minimal tracking error.



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

Exchange-Traded Funds, ETFs

Globally Listed Equity ETFs by Investment Approach and AuM



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

Exchange-Traded Funds, ETFs

Advantages

- **Low Management Fees:** Generally lower than mutual funds.
- **Tax Efficiency:** More tax-efficient due to in-kind redemptions.
- **Flexibility:** Can be bought and sold throughout the trading day, used for margin buying, and short selling.

Disadvantages

- **Trading Costs:** Brokerage fees for buying and selling shares.
- **Market Price Fluctuations:** Prices can deviate from net asset value.

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

Feature	Mutual Funds	ETFs
Cost	Generally higher expense ratios.	Lower expense ratios.
Trading	Bought and sold at end-of-day NAV .	Traded throughout the day on exchanges.
Flexibility	No margin buying or short selling.	Margin buying and short selling allowed.
Tax Efficiency	Less tax-efficient due to frequent trading.	More tax-efficient with in-kind redemptions.
Liquidity	Less liquid , trades once a day.	Highly liquid, trades like stocks.
Management	Actively or passively managed.	Typically passively managed.
Purchase Method	Through fund adviser, marketplace, or adviser .	Through brokerage accounts .

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

Separately Managed Equity Index Based Portfolios

- ▶ Involves holding **all** the component stocks in the index or a representative
- ▶ sample.

Hard to

Requirement of **up-to-date data** on the index at any given point in time.

Solid **broker relationships** to enable program trading* and lower trading commissions.

Complex **trading and accounting systems**.

Compliance systems to meet applicable laws and regulations.

*Program trading involves buying/selling many stocks at the same the same time.

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

Index-Based Equity Portfolio Construction

Full replication

- Involves holding **all** the constituent securities in the index.
- Suitable for indexes with **small numbers** of similar liquid stocks.



Advantage

- ▶ **Closely replicates** the index return (before transaction costs).



Disadvantages

- ▶ Costly when the constituent securities of the index are many and liquidity is limited.
- ▶ Portfolio must be **regularly reconstituted** and **rebalanced**.

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

Stratified Sampling

- Involves holding a **subset** of the constituents of the index.
- Generates results that **closely-track** the index return and risk characteristics.
- The population into **mutually exclusive** and **exhaustive subgroups (strata)** based on key risk characteristics.
- Suitable for indexes with:
 - Many **heterogeneous, thinly traded** small cap stocks.

Advantages

- **Lower cost** relative to full replication.
- Suitable in cases of relatively low level of assets under management.
- Relatively **straight forward** and simple.

Disadvantages

- Higher **tracking error**.
- **Size of the sample** to use is of importance.

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

Optimization

- Involves **maximizing** a **desirable** characteristic or **minimizing** an **undesirable** characteristic, subject to **constraints**.
- **Example of constraints**
 - Choosing stocks that **minimize rebalancing costs**.
 - A specified **market capitalization level** for the constituent stocks of the portfolio.



Advantages

- ▶ Characterized by **lower tracking error** compared to stratified sampling.
- ▶ Explains the **covariance** among constituent stocks explicitly.



Disadvantages

- ▶ **Costly** to maintain optimization with changing data.
- ▶ Pegged on **historical relationships** which vary with time.
- ▶ May generate mean-variance **inefficient portfolios**.

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

Tracking Error Management

Tracking error vs. Excess return

▶ Excess return

- ▶ Measures the **difference** between **portfolio returns** and **benchmark index returns**.

$$\text{Excess return} = R_P - R_B$$

Where:

R_P = Portfolio return

R_B = Benchmark index return

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

► **Tracking error (TE)**

- Determined as the standard deviation of the **excess return**.
- It gauges the **manager's ability to replicate the return** of the benchmark.
- **Low tracking error** is good.

$$TE_P = \sqrt{\text{Variance}_{(R_P - R_B)}}$$

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Causes of Tracking Error

Fees charged

- Includes **trading commissions** paid to brokers.
- These are negative costs – Hence **drive down excess return**.
- Higher fees lower excess returns which leads to a **higher tracking error**.

Number of constituent securities of the portfolio vs. those in the benchmark index

- Liquid and investible stock indexes can be **fully replicated**.
- Stratified sampling** is suitable for stock indexes whose **constituent securities are hard to find**.
- Fully replicated** portfolios have **lower tracking error** compared to sampled portfolios.

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

Intraday trading of constituent securities

- Price levels for reporting index returns are normally determined at the **end of the trading day**.
- Tracking error might be as a result of buying or selling securities at a different price other than that determined at the end of the trading day.

Cash holdings

- Cash drag is the tracking error caused by cash that is **temporarily uninvested**.

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

Controlling Tracking Error



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

Sources of Return and Risk

Attribution analysis

- ◆ Involves analyzing the sources of return of the portfolio and the benchmark index.
- ◆ Used for **identifying** and **reducing** the sources of tracking risk.
- ◆ Covered in **further detail** in other sections of the curriculum.

Sources of return for an equity index replication portfolio:

01

Company specific returns

02

Sector returns

03

Country returns

04

Currency returns

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

Security lending

- ◆ Involves lending the constituent stocks held in a portfolio to **short sellers** and other market participants.
 - Generates **passive income**, which **offsets portfolio expenses**.
 - Results in **lower net fees** to investors.
 - Thus **reduces tracking error**.
- ◆ Associated with **credit risk** and **market risk**.

Investor activism and engagement

- ◆ Investors can express their views on:
 - Executive compensation.
 - Operational risk.
 - Board governance.

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

- ◆ Returns to index stocks can be increased by expressing views in ways that:
 - Better manages risk.
 - Improves **better** operations.
 - Provides better **board oversight** and **corporate governance**.
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