CHARTA LEARNING · LESSON NOTES

Security market indexes

CFA Level I · Equity Investments

You will learn: List the choices behind a security market index, calculate price-weighted, market-cap and float-adjusted indexes, explain how each weighting rule leans and what it costs to follow, and judge whether a benchmark fits.

Running example: Examples use a tiny made-up market of three shares, Alder ($10), Birch ($20) and Cedar ($60), plus a second three-share set, Oak, Pine and Maple, for the weighting comparison.

1. What an index is: four choices

- A security is a tradable investment such as a share. An index is a basket of securities with one number that tracks how the basket moves. That number rests on choices.
- The provider chooses in order: the target market (the part of the market described, which limits everything after); selection (a fixed rule is predictable, so others can trade ahead of changes; a committee brings discretion).
- Then weighting (how much say each member gets, which drives risk and turnover), and rebalancing (resets the weights) and reconstitution (changes the members), which drive trading cost.
- A price return index tracks only changes in share prices. A total return index also counts dividends, as if reinvested.

PRICE OR TOTAL RETURN (EXAMPLE 1: INDEX STARTS AT 1,000, ENDS AT 1,040)		
Price return	(1,040 − 1,000) ÷ 1,000	**4.0%**
Dividends in the year	2% of the start level	**20 points**
Total return	(40 + 20) ÷ 1,000	**6.0%**

2. Price-weighted indexes and the divisor

- A price-weighted index adds up the prices and divides by a divisor, at the start usually the number of shares. A share's weight is its price ÷ the sum of prices. Company size is never looked at, so a small company with a high price gets a big voice.
- When a share splits, nothing real changes but the price falls. To stop the index falling for no reason, the divisor is reset so the index stays the same. The split still changes the weights.

> **Index = sum of prices ÷ divisor; Weight = price ÷ sum of prices; New divisor = new sum of prices ÷ old index value**

ALDER $10, BIRCH $20, CEDAR $60 (EXAMPLES 3 AND 4)		
Index value	(10 + 20 + 60) ÷ 3 = 90 ÷ 3	**30**
Cedar's weight	60 ÷ 90	**66.7% (Birch 22.2%, Alder 11.1%)**
Cedar splits 2 for 1 ($60 to $30): index on old divisor	60 ÷ 3	**20 (a false fall)**
New divisor	60 ÷ 30	**2**
Index, new divisor	60 ÷ 2	**30**
Cedar's weight now	30 ÷ 60	**50%**

Watch out: Thinking a price-weighted index cares about company size; forgetting to reset the divisor after a split.

3. Market-cap, float-adjusted, equal and fundamental weighting

- Market capitalisation (market cap) is share price × number of shares. A cap-weighted index gives each company its cap ÷ total cap; the index number is the total cap now ÷ total cap at the base date × the base value (often 100).
- A company that has risen gets a bigger weight, so the index leans towards past winners and the largest companies.
- The free float is the part of the shares available to public investors. A float-adjusted index uses price × shares outstanding × free-float factor. Most cap indexes work this way, because an index you cannot buy is a poor yardstick.
- Equal weighting gives every member one vote and leans towards smaller companies. Fundamental weighting uses sales, earnings, dividends or book value, ignores price and tends to lean towards cheaper, value shares. Price weighting leans towards high-priced shares. No rule is neutral.
- Weighting alone changes the answer: the same shares over the same year give very different index returns.

> **Market cap = price × shares; Float-adjusted cap = price × shares outstanding × free-float factor; Weight = cap ÷ total cap**

MARKET CAP AND FLOAT (EXAMPLES 5 AND 7; SHARES IN MILLIONS: ALDER 100, BIRCH 33, CEDAR 5)		
Market caps	10 × 100m; 20 × 33m; 60 × 5m	**$1,000m; $660m; $300m**
Total, and Cedar's weight	1,000 + 660 + 300; 300 ÷ 1,960	**$1,960m; 15.3%**
Alder's weight (Birch 33.7%)	1,000 ÷ 1,960	**51%**
Founder holds 40% of Alder: float cap	1,000 × 0.6	**$600m**
Total float cap	600 + 660 + 300	**$1,560m**
Weights: Alder, Birch, Cedar	600, 660, 300 ÷ 1,560	**38.5%, 42.3%, 19.2%**

Watch out: Calling market cap weights by price; using all shares outstanding when the question says float.

4. One market, three answers

- Same shares, same year, three rules, three answers: the gap comes only from weighting.
- Value weighting is low because Maple is almost half the index by value and fell. Equal weighting averages the returns. Price weighting is high because Pine had the biggest price move and price weighting gives price moves the most influence.

OAK $100 TO $110 (1,000 SHARES), PINE $50 TO $65 (400), MAPLE $20 TO $18 (5,000) (EXAMPLE 2)		
Value-weighted	220,000 → 226,000	**+2.73%**
Equal-weighted	(10 + 30 − 10) ÷ 3	**+10.00%**
Price-weighted	170 → 193	**+13.53%**
Gap, highest to lowest	13.53 − 2.73	**10.80 points**
A year later: Alder 10 to 11, Birch 20 to 22, Cedar 60 to 54, price-weighted	87 ÷ 3 = 29, from 30	**−3.33%**
Same year, equal-weighted / cap-weighted	(10 + 10 − 10) ÷ 3; 2,096 ÷ 1,960 × 100	**+3.33% / index 106.94**

5. Rebalancing, reconstitution and the cost of following

- Rebalancing resets each member's weight to what the rule says. Reconstitution changes which securities are members. They are different jobs and followers of the index pay for both. Turnover is the share of a portfolio bought or sold in a year.
- A cap-weighted index largely looks after itself: prices move, weights drift in step, so a fund needs no trade, only when share counts change. It has the lowest turnover. Equal and fundamental weighting need regular rebalancing, selling what has risen and buying what has fallen.
- The index pays no costs, so its published return hides them; the investor pays.
- Reconstitution dates are public. An addition is announced ahead, other traders buy first and push the price up, and the index fund buys on the day at the higher price. A forced and announced trade tends to be expensive.

COSTS OF FOLLOWING (EXAMPLES 8 AND 9; ROUND TRIP COSTS 0.30%)

Equal-weighted fund of $300: holdings after a year (+10%, +10%, −10%)	110 + 110 + 90	**$310; target $103.33 each**
Sell Alder and Birch; buy Cedar	2 × (110 − 103.33); 103.33 − 90	**$13.33 each way**
Turnover	13.33 ÷ 310	**4.3%**
Equal-weighted (turnover 24%) / cap-weighted (4%) yearly cost	24% × 0.30%; 4% × 0.30%	**0.072% / 0.012%**
On a $500m equal-weighted fund	500m × 0.072%	**$360,000**
New share, 2% of a $1,000m fund, price runs up 4%	$20m × 4%	**$800,000 extra**

6. Uses of indexes and what makes a good benchmark

- Indexes do six jobs: gauge market sentiment; proxy for market returns; proxy for systematic risk in asset pricing models; benchmark for active managers; guide for asset allocation; and base for index funds and derivatives.
- Each job needs something different: sentiment, broad and familiar; returns and risk, breadth; allocation, one asset class; funds and derivatives, cheap to copy; benchmark, match to the mandate.
- A good benchmark is investable (you could have held it), unambiguous (members and weights are clear), specified in advance (not picked after the results) and matches the manager's mandate. The test is fit, not fame.

A SMALL-CAP VALUE MANAGER RETURNS 11% (EXAMPLE 10)

Versus a broad large-cap index (18%)	11 − 18	**−7 points**
Versus the small-cap value index (6%)	11 − 6	**+5 points**
Swing from the wrong yardstick	5 − (−7)	**12 points**

Watch out: When told a manager beat or lagged an index, ask which index and whether it fits the job.

Key takeaways

- An index is a set of choices: target market, selection, weighting, rebalancing and reconstitution.
- Price-weighted: sum of prices ÷ divisor, ignores size; reset the divisor after a split (new sum ÷ old index value).
- Cap-weighted uses price × shares, and most indexes count only the free float; it has the lowest turnover.
- Every weighting rule leans (price: high-priced shares; cap: past winners; equal: smaller firms; fundamental: value).
- Equal and fundamental weighting cost more to follow, and public reconstitution dates push up the price funds pay.
- A benchmark must be investable, unambiguous, specified in advance and fit the mandate.

Quick check

1. Prices 20, 30, 50, 100; divisor 4. The 100 share splits 2 for 1. New divisor?
   Answer: Sum 150 ÷ old index 50 = 3.
2. Price $40, 50m shares, free float 70%. Float-adjusted market cap?
   Answer: 40 × 50m × 0.7 = $1,400m.
3. Name three tests of a good benchmark.
   Answer: Investable, unambiguous, specified in advance.

Summary notes for the Charta whiteboard lesson. Examples use made-up figures. Watch the full lesson at charta-learning.com.