Cost-Basis Methods

FIFO, LIFO and Average — the problem they solve and how they differ

1. The problem they all try to solve

When you buy the same security (or commodity, or inventory unit) several times at different prices and then sell *part* of your holding, accounting must answer a single, unavoidable question: **which units did you actually sell?** The physical units are interchangeable, but the purchase prices are not. The choice directly determines:

- the **realised gain or loss** reported on the sale,
- the **cost basis of the units that remain** in the portfolio,
- and therefore the **taxes due today** versus those deferred to later sales.

Because there is no natural answer (one share of AAPL is identical to every other share), accounting standards define *conventions*. FIFO, LIFO and Average are the three main ones.

2. A worked example

Consider the following lots and a single partial sale. The same trades will be valued three different ways — one per method — so you can compare side by side.

Date	Action	Qty	Unit price	Cost
Jan 01	Buy	10	$10	$100
Feb 01	Buy	10	$15	$150
Mar 01	Buy	10	$20	$200
Apr 01	Sell 15	—	$25	revenue $375

After the sale, 15 units remain on the books. The question is: **how much did the 15 sold units cost, and how much do the 15 remaining units cost?**

3. The three methods

FIFO — First In, First Out

The **oldest** lots are considered sold first. In our example the 15 units sold are taken from the January lot (all 10 units at $10) and then 5 units from the February lot (at $15), giving a cost of $175. Remaining: 5 Feb units + 10 Mar units. In a *rising* market FIFO produces the **largest realised gain** — and therefore the largest tax bill today — because the cheapest units are always the first to leave the book.

LIFO — Last In, First Out

The **newest** lots are considered sold first. The 15 units sold are taken from the March lot (10 at $20) and then 5 from the February lot (at $15), giving a cost of $275. Remaining: the original 10 Jan units + 5 Feb units. In a *rising* market LIFO produces the **smallest realised gain** — a deferral

of tax — because the most expensive units leave the book first. The price of that deferral is that very old, very low-cost lots stay on the book indefinitely, so a future full liquidation can trigger a very large gain.

Average (Weighted Average Cost)

Every sale is matched against a **single running average** of all outstanding purchase costs. With 30 units bought for a total of $450, the average is $15. Every one of the 15 units sold is valued at $15, and each of the 15 that remain is also valued at $15. The method is attractively simple — there are no lots to track — but it loses the link between specific purchases and specific sales. After a sale the portfolio looks as if every unit had been bought on the same day at the same price.

4. Side-by-side result

Same trades, three conventions, three different realised gains:

Method	Cost of 15 sold	Realised gain	Basis of 15 remaining
FIFO	10×$10 + 5×$15 = $175	$375 – $175 = $200	5×$15 + 10×$20 = $275
LIFO	10×$20 + 5×$15 = $275	$375 – $275 = $100	10×$10 + 5×$15 = $175
Average	15 × $15 = $225	$375 – $225 = $150	15 × $15 = $225

Red = highest gain (most tax now). Green = lowest gain (tax deferred).

Notice that the **total** economic result is identical across methods — $150 of unrealised value on the remaining 15 units plus the realised gain always sums to the same $350 of lifetime profit. The methods only change **when** that profit is recognised, not whether.

5. Comparison at a glance

Aspect	FIFO	LIFO	Average
Which lot sold first	Oldest (earliest buy)	Newest (latest buy)	Weighted mean of all lots
Gain in a rising market	Higher realised gain	Lower realised gain	Between FIFO and LIFO
Effect on remaining basis	Remaining lots are newest (high)	Remaining lots are oldest (low)	All remaining units share one basis
Record-keeping	Must track each lot	Must track each lot	Only one running average
Tax (typical rising market)	Pays more tax now	Defers tax	Smooths tax over time
Allowed in equity markets?	Yes — default in most jurisdictions	Often restricted (e.g. not for EU/IFRS, not for US stocks IRS-default)	Allowed for mutual funds in the US; common in many EU contexts

6. Which method should a portfolio tool use?

• **FIFO** is the safest default for an equity portfolio app — it is the legal default in most jurisdictions (IRS for US stocks, most EU regulators) and requires the least explanation to the end user.

• **Average** is the natural fit for pooled instruments — mutual funds, ETFs with DRIP, broker cash-equivalent accounts — where tracking individual lots is impractical.

• **LIFO** is rarely appropriate for a personal investing app: it is disallowed for US equities at the IRS level and forbidden under IFRS for inventory accounting. Support it only if the product targets a jurisdiction that permits it (e.g. some US commodity or inventory contexts).

• Whichever you pick, the **method must be disclosed and consistent**. Switching method mid-life without a re-statement is the single biggest source of reconciliation bugs.

7. Implementation notes for this project

• FIFO and LIFO require a **lot ledger**: every buy creates a row with qty + unit cost, and every sell consumes rows in order (oldest or newest). Partial consumption of a lot must leave a residual row.

• Average only needs **two running numbers per holding**: total qty and total cost. After each buy: new_avg = (old_qty·old_avg + buy_qty·buy_price) / (old_qty + buy_qty). A sell reduces qty only — the average is unchanged.

• Corporate actions (splits, spin-offs, dividends-in-kind) have to be reflected in every lot under FIFO/LIFO, but only in the two running totals under Average — another reason Average is popular for retail apps.

• Whatever you store, the **cost basis of the remaining position** must always equal the running total of cost on the lot ledger (FIFO/LIFO) or qty × avg (Average). A unit test that asserts this invariant after every transaction catches 90% of bugs.

Financial Analysis — internal reference document on cost-basis conventions.