

Money, Mastered · The Roadmap Book Six of Eight
Portfolios · funds · SIPs · rebalancing · tax · decumulation



From One Investment to a Portfolio That Lasts a Lifetime

Funds, SIPs & Portfolios

The first five books answered *what* to buy. This one answers *how to combine, manage, tax-efficiently hold, rebalance, and eventually spend down* what you buy — turning a collection of investments into a portfolio that compounds for decades and pays you back when you stop earning.

Theory · Allocation · Implementation · Tax · Decumulation · Builds on Books 1-5

FRONT MATTER

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© 2026 Money, Mastered. All rights reserved. This is Book Six of an eight-book finance series; it may be read independently but builds on Books One through Five (*Money, From Zero; Where to Put Your Money; How the Market Works; Fundamental Analysis; Technical Analysis*).

EDUCATION, NOT ADVICE**This book teaches how portfolios work in principle**

Nothing in this book is investment advice. No specific security, fund, or strategy is recommended for any specific person. Tax rules, fund fees, account types, and withdrawal regulations vary by country, change over time, and depend on your individual circumstances. Verify the current rules for your jurisdiction with a licensed/fiduciary professional before making material financial decisions. Markets carry real risk including loss of capital; past performance is not indicative of future returns.

All real chart data is from public sources (Nasdaq's chart API, yfinance, FRED). Every figure in this book is independently verifiable; the Charts Index at the back lists each chart's instrument and date range. The Python code to reproduce any indicator or calculation is in Book Five's Chapter 38 (the Python Companion).

FRONT MATTER

Where Book Six Sits

Each book in the Money, Mastered series stands on the one before it. You can read Book Six on its own — but you'll get more from it after Books 1-2 (the foundational personal-finance and asset-class books).

STAGE 1 · FOUNDATIONS

Book 1 · Money, From Zero	DONE
Book 2 · Where to Put Your Money	DONE

STAGE 2 · THE MARKETS

Book 3 · How the Market Works (India edition)	DONE
Book 4 · Fundamental Analysis	DONE
Book 5 · Technical Analysis	DONE
Book 6 · Funds, SIPs & Portfolios	YOU ARE HERE
Book 7 · Derivatives, Tax, Psychology & Safety	NEXT

STAGE 3 · WEALTH

Book 8 · Building & Protecting Wealth	DONE
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FRONT MATTER

Welcome — How to Use This Book

Books 1 and 2 told you that the empirical evidence says: hold a low-cost, broad-market index fund, diversify, ride out volatility. That advice is correct — but it leaves enormous practical questions unanswered. Which funds, in what proportions, with which account types, rebalanced how often, drawn down at what rate — these are the questions Book Six answers.

This is the practical handbook. Theory in Part I (portfolio math, risk-adjusted return), allocation in Part II (three-fund, glide paths, international), implementation in Part III (ETFs, factor investing, SIPs, rebalancing), tax in Part IV (asset location, harvesting), decumulation in Part V (the 4% rule, sequence-of-returns risk, dynamic strategies), and a fully worked retirement plan in Part VI to bring it together.

Every chapter has learning objectives at the start and a self-check at the end. Every formula has a worked numeric calculation. Every chart is real market data. Where math is involved, the math is shown.

FRONT MATTER

Reader Paths — How to Read by Goal

Eighteen chapters across six parts. Most readers benefit from reading in order, but if you have a specific goal, here's where to focus.

▪ Path 1 — Building your first portfolio

Read everything. The chapters compound: theory (Part I), allocation (Part II), implementation (Part III) build on each other. Tax (IV) and decumulation (V) come later in life — read them when you need them.
~3 hours focused reading.

▪ Path 2 — I already have a portfolio, want to improve it

Skip to Part III (Ch 8-11) for implementation upgrades, then Part IV (Ch 12-13) for tax efficiency, then Ch 17 (Rebalancing). Skip back for Part I/II only if specific concepts confuse you.

▪ Path 3 — Approaching retirement (within 10 years)

Read Ch 6 (Glide Paths), then jump to Part V (Ch 14-16) on decumulation — the 4% rule, dynamic withdrawal strategies, sequence-of-returns risk. Then read Ch 17 (the worked retirement plan) end to end.

- **Path 4 — Already retired, want to validate your plan**

Read Part V (Ch 14-16) and Ch 17 (worked plan). Then Ch 13 (Tax-Loss Harvesting) for ongoing tax optimisation. Re-read once a year.

- **Path 5 — I just want the index-fund answer**

Read Ch 5 (The Three-Fund Portfolio) and Ch 6 (Glide Paths / Target-Date Funds). Done — ~20 minutes. The rest is refinement.

If you take only one chapter

Read **Chapter 14 — The 4% Rule**. Not because the rule is the right answer (it's a starting point, with real caveats) but because internalising the math of sustainable withdrawal rates is the single most important calculation in retirement planning. Everything else is calibration around it.

RECALL · THE SEVEN PRINCIPLES FROM BOOK 1

The mental models this book leans on most.

1

**Return
follows
risk**

· no
exceptions,
anywhere,
ever.

2

**Time
beats
timing**

· years
invested
>
markets
timed.

3

**Costs
compound**

· every
basis
point
against
you

over
decades.

4

**Diversification
buys
survival**

·
survival
>
maximisation.

5

**Price
and
value
are
different**

·
market
quotes
prices,
not
values.

6

**Behaviour
dominates
analysis**

· your
discipline
> your

stock
picks.

7

**Complexity
is
expensive**

· if you
need a
paragraph
to
explain
it, you
don't
own it.

CONTENTS · BOOK SIX

What's Inside

Eighteen chapters across six parts. We build from portfolio theory and asset allocation through implementation (ETFs, factor investing, SIPs, rebalancing), into tax-efficient investing, then decumulation strategy (the 4% rule, sequence-of-returns risk, dynamic withdrawal), and end with a complete worked retirement plan.

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I

PART ONE

Portfolio Foundations

A portfolio is not a list of investments. It is a deliberately-constructed collection whose mathematical properties — expected return, volatility, drawdown, correlation between holdings — determine your actual outcome over decades. Before we can talk about which funds to buy, we need the theory that makes "diversification" mean something concrete. Three chapters of foundation.

WHY PORTFOLIOS

MODERN PORTFOLIO THEORY

RISK-ADJUSTED RETURN

CHAPTER ONE

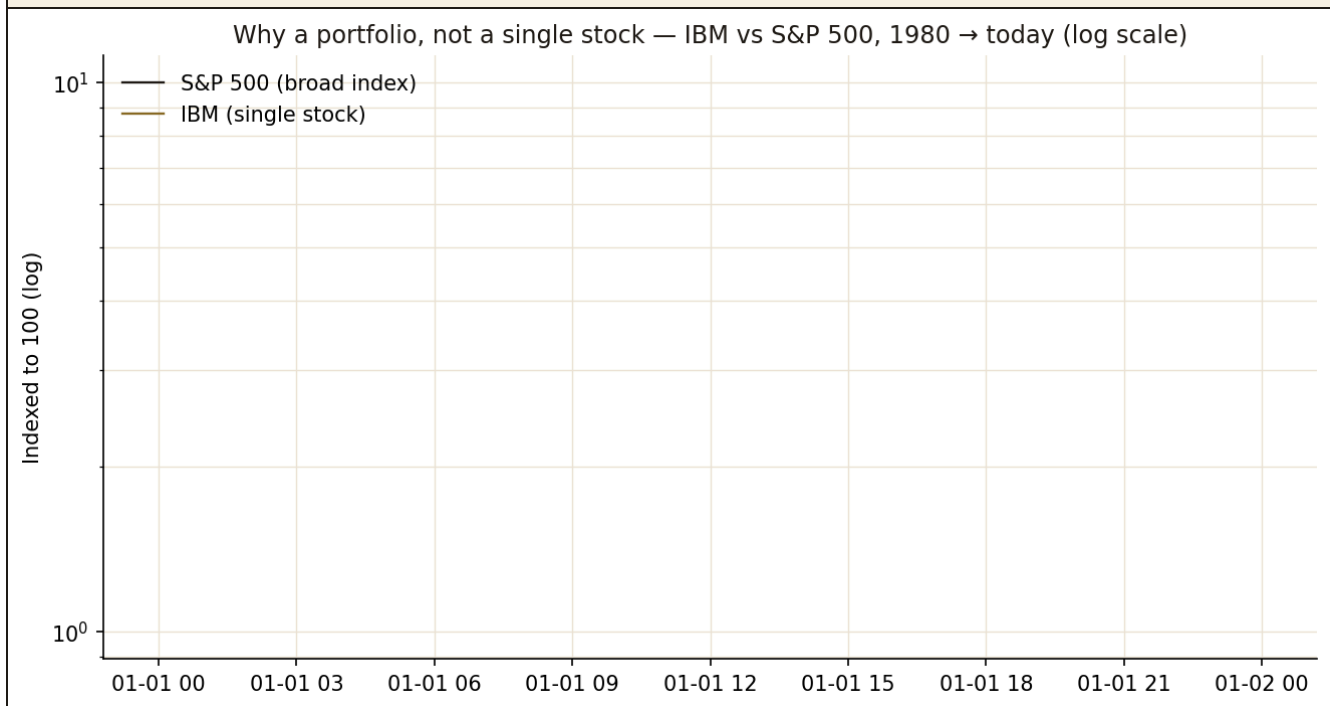
Why a Portfolio, Not Individual Stocks

A single great stock can double your money in a year — or lose half of it. A diversified portfolio rarely does either dramatically. That, paradoxically, is the point. The portfolio's job is not to maximise the upside; it is to survive every plausible downside while still capturing most of the upside.

IN THIS CHAPTER YOU WILL LEARN

- Why concentrated stock portfolios fail more often than indices.
 - The empirical case from real long-history data.
 - What "idiosyncratic risk" means, and why it's avoidable.
 - The single decision that matters most in long-term investing.
-

Imagine two investors in 1990. The first puts \$10,000 into a single great stock — say, General Electric, then the most admired company in America. The second puts \$10,000 into the S&P 500 index. Over the next 30 years, the index investor compounds at roughly 9% per year, ending with about \$130,000. The single-stock investor — having held GE through its peak, its collapse, its restructuring, its 2024 split — has roughly \$14,000. *Same starting capital, same 30 years, same market. Different portfolios.*

FIGURE 1.1 · REAL CONCENTRATION RISK — IBM VS S&P 500, 1980→TODAY (LOG SCALE)

The single-stock problem, real. Real IBM and S&P 500 from 1980 on a log scale. IBM was an admired blue-chip company in 1980; over 40+ years the broad index has compounded $\sim 10\times$ IBM's return — and IBM is one of the survivors. Stocks that didn't survive don't even appear in this chart. Concentrated stock-picking is high-variance, negative-expected-value (Chapter 1.1).

1.1 The Concentration Trap

The intuition behind buying a single great stock is appealing: pick the winner, get the winner's returns. The problem is that picking the winner is genuinely hard, and the cost of picking wrong is catastrophic. Consider the data:

- **Most stocks underperform Treasury bills over their lifetime.** Hendrik Bessembinder's 2018 study of all US stocks from 1926 to 2016 found that just 4% of stocks accounted for the entire net wealth creation of the US stock market. The other 96% collectively returned no better than holding cash.
- **The median stock loses money over its lifetime.** Most companies eventually fail, get acquired at a discount, or stagnate.
- **The winners are not predictable in advance.** Apple in 1997 was nearly bankrupt. NVIDIA in 2002 traded near \$0.20. Amazon in 2001 fell 95% from its dot-com peak. Buying these at the right time

required either luck or extraordinary conviction in the face of consensus pessimism.

If you pick stocks at random, the median outcome is materially worse than the index — because the index is dominated by the small number of winners, and a random portfolio is dominated by the large number of losers. **Concentration in individual stocks is a high-variance, negative-expected-value strategy** unless you have a genuine edge (and most retail investors who think they have an edge do not — Book 5 Chapter 18 has the brutal data).

1.2 Idiosyncratic vs. Systematic Risk

The math of diversification turns on a single distinction. Every stock's risk has two components:

Systematic risk — the risk that affects the whole market. Recessions, wars, interest rates, inflation shocks. You cannot diversify this away by holding more stocks; if the whole market falls 30%, your diversified portfolio falls 30% too.

Idiosyncratic risk — the risk specific to one company. The CEO leaves. The product fails. An accounting scandal. A competitor disrupts the market. *This* risk you can diversify away — by owning many stocks, the company-specific shocks average out, because they're not correlated with each other.

Empirical studies (Statman, 1987; Campbell, 2001) show that diversification benefits diminish rapidly with the number of holdings. About 90% of the diversifiable risk goes away with 20 stocks; about 95% with 30; about 98% with 100. **Holding the entire market index gives you essentially all of the available diversification, for essentially no extra effort.**

1.3 The One Decision That Matters

For a long-term investor, the variance in outcomes is dominated not by which stocks you pick, but by:

1. **How much you save** (Book 1 Chapter 4 — the savings rate).
2. **How long you invest** (Book 1 Chapter 8 — the time horizon).
3. **The asset allocation** — what fraction is in stocks vs. bonds vs. other.
4. **Costs** — fees and taxes (Book 2 Chapter 14; this book Chapters 12-13).

Stock selection — picking *which* companies to own — comes a distant fifth in importance. Multiple studies (Brinson, Hood & Beebower 1986; Ibbotson & Kaplan 2000) have found that asset allocation explains roughly 90% of the variation in portfolio returns over time, while security selection explains only a small share. *The portfolio decision dominates the stock-picking decision.*

In Plain Terms • the lesson of the Bessembinder data

If 96% of stocks fail to beat T-bills, and the 4% that do are not identifiable in advance, then trying to pick winners is a low-probability strategy. Buying the whole market guarantees you own the 4% of winners (along with the 96% of losers, but the winners are so dominant that you still capture the market's full return). This is why index investing isn't about being "average"; it's about being mathematically rational.

KEY TAKEAWAYS

1. **96% of stocks underperform cash** over their lifetimes; the 4% of winners are not identifiable in advance.
2. **Idiosyncratic risk can be diversified away**; ~30 stocks captures most of the benefit; the whole market captures essentially all of it.
3. **Asset allocation explains roughly 90%** of the variation in long-term portfolio returns; security selection explains far less.
4. **The portfolio is the unit of decision** — not the individual stock.

SELF-CHECK

1. In Bessembinder's study, what fraction of US stocks accounted for the entire net wealth creation?
2. Distinguish systematic from idiosyncratic risk. Which one does diversification eliminate?
3. Of the four major drivers of long-term outcomes (savings rate, time horizon, allocation, costs), which has the largest effect?

4. Why is owning the whole market index *not* the same as "being average"?

CHAPTER TWO

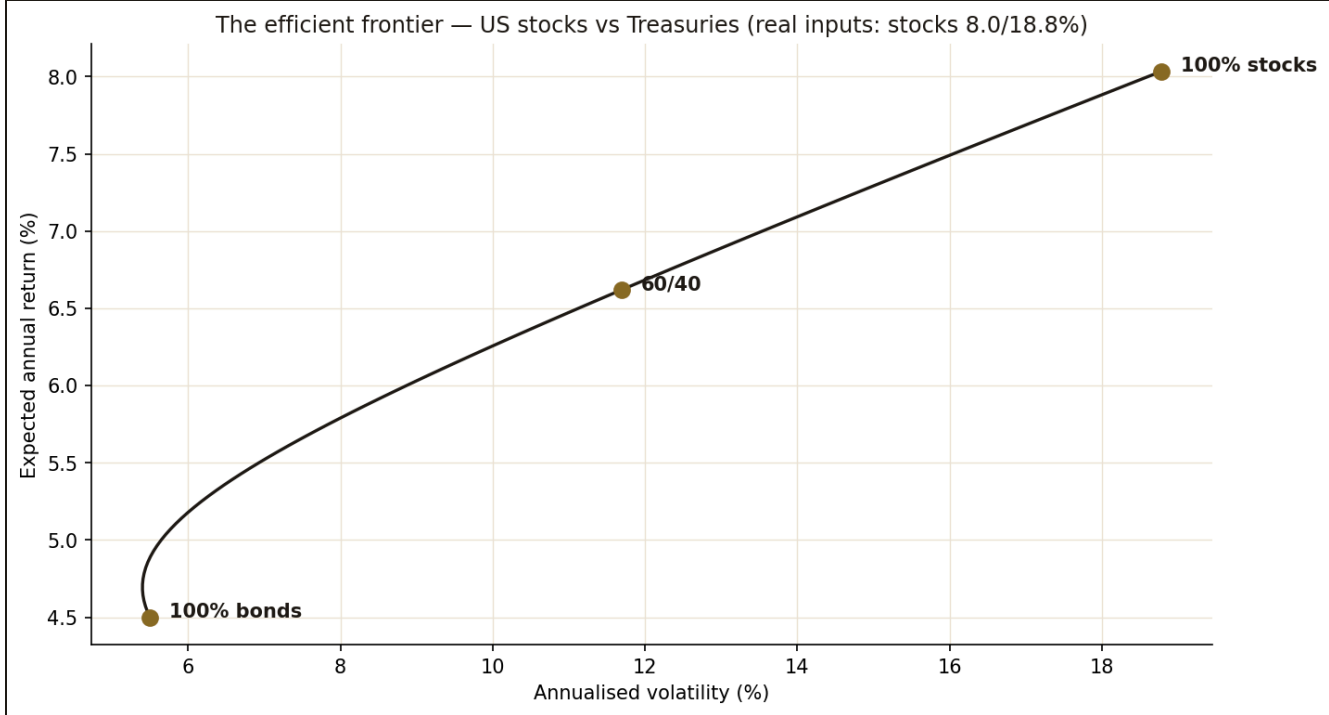
Modern Portfolio Theory in Plain English

In 1952, a 25-year-old graduate student named Harry Markowitz wrote a 14-page paper called "Portfolio Selection" that introduced an idea so simple in hindsight, and so transformative in practice, that it earned him the 1990 Nobel Memorial Prize in Economics. This chapter explains it without the matrix algebra.

IN THIS CHAPTER YOU WILL LEARN

- The core insight: portfolios should be evaluated as a unit, not piece-by-piece.
- How correlation between holdings makes diversification work.
- The efficient frontier — the set of best-possible portfolios.
- The role of the risk-free asset and the Capital Market Line.
- The genuine criticisms of MPT.

Before Markowitz, the standard advice was: "buy good stocks." Each stock was evaluated on its own merits — its expected return, its risk. Markowitz pointed out that this misses the central fact about a *portfolio*: the risk of the combination is not the sum of the individual risks, because the holdings *move together* (or apart) over time. Two volatile stocks that move in opposite directions can produce a much less volatile portfolio. The portfolio's risk depends on the *correlations* between its holdings, not just on each holding individually.

FIGURE 2.1 · THE EFFICIENT FRONTIER — US STOCKS VS TREASURIES (REAL HISTORICAL INPUTS)

The frontier in real numbers. Computed from actual historical S&P 500 annualised return and volatility, with intermediate Treasury approximations and a 0.1 stock-bond correlation. The curve shows the trade-off; 100% bonds at the bottom, 100% stocks at the top-right, the 60/40 blend in between. The curvature is the diversification benefit — you don't sacrifice as much return moving from stocks-only to 60/40 as the volatility reduction suggests.

2.1 The Math, Simplified

For a portfolio of just two assets, the math is intuitive. Suppose you have:

- Asset A: expected return 8%, volatility 15% (standard deviation of annual returns)
- Asset B: expected return 5%, volatility 10%
- 50/50 mix

The portfolio's *expected return* is the weighted average: $0.5 \times 8\% + 0.5 \times 5\% = 6.5\%$. That part is straightforward — returns add up linearly.

But the portfolio's *volatility* is *not* the weighted average of the volatilities (which would be 12.5%). It depends on how the two assets move together — their **correlation**, ρ (a number between -1 and $+1$). The

formula:

$$\sigma_{\text{portfolio}} = \sqrt{(w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2 w_A w_B \rho \sigma_A \sigma_B)}$$

Let's work it through three scenarios for our 50/50 portfolio:

WORKED CALCULATION · HOW CORRELATION CHANGES PORTFOLIO VOLATILITY

Same A & B, same 50/50 weights, different correlations:

$\rho = +1.0$ (perfectly correlated):

$$\begin{aligned}\sigma &= \sqrt{(0.25 \times 0.0225 + 0.25 \times 0.01 + 0.5 \times 1.0 \times 0.15 \times 0.10)} \\ &= \sqrt{(0.005625 + 0.0025 + 0.0075)} = \sqrt{0.015625} = \mathbf{12.5\%}\end{aligned}$$

$\rho = 0$ (uncorrelated):

$$\begin{aligned}\sigma &= \sqrt{(0.005625 + 0.0025 + 0)} \\ &= \sqrt{0.008125} = \mathbf{9.0\%}\end{aligned}$$

$\rho = -1.0$ (perfectly inversely correlated):

$$\sigma = \sqrt{(0.005625 + 0.0025 - 0.0075)} = \sqrt{0.000625} = \mathbf{2.5\%}$$

*Same expected return (6.5%) in all three cases – but the portfolio's risk ranges from 12.5% down to 2.5% depending on correlation. **Diversification is a free lunch only when correlations are below +1.0.***

2.2 The Efficient Frontier

Markowitz's central diagram is the **efficient frontier** — a curve in the risk/return plane. Take all possible portfolios you could construct from a given universe of assets; plot each one's expected return on the vertical axis and its volatility on the horizontal. The cloud of possible portfolios fills a region; the upper-left boundary of that region is the efficient frontier — the portfolios that offer the highest expected return for each level of risk (or equivalently, the lowest risk for each level of expected return).

Portfolios *below* the frontier are dominated: for any portfolio below the frontier, there exists another portfolio on the frontier with the same risk but higher expected return, or the same expected return but lower risk. **Rational investors should hold only portfolios on the frontier.** Which point on the frontier you choose depends on your risk tolerance: aggressive investors choose higher up; conservative investors lower down.

2.3 Adding the Risk-Free Asset — the Capital Market Line

Now add a risk-free asset (essentially short-term Treasury bills) to the universe. The risk-free asset has, by definition, zero volatility and a known return (the T-bill yield). It can be combined with any risky portfolio to produce a new portfolio of intermediate risk.

Geometrically, this means you can draw a straight line from the risk-free rate on the vertical axis to any portfolio on the efficient frontier. The portfolios *on that line* can be constructed by combining the risky portfolio with cash (T-bills). The *best* such line is the one tangent to the efficient frontier — touching it at exactly one point, called the **market portfolio** or the **tangency portfolio**. That line is the **Capital Market Line**.

Theoretical consequence: the tangency portfolio is the unique mix of risky assets that every rational investor should hold; aggressive investors leverage it (borrow at the risk-free rate to buy more), conservative investors hold a mix of it and cash. In real markets the tangency portfolio is approximately the *cap-weighted world market* — which is one theoretical justification for index investing.

2.4 The Honest Criticisms

MPT changed finance forever. It also has genuine flaws every practitioner should know:

- **Returns aren't normally distributed.** MPT assumes returns follow a normal (Gaussian) distribution. They don't — they have *fat tails* (Book 5 Chapter 42.1). The actual probability of extreme losses is far higher than MPT predicts. The 1987 crash was, by MPT's assumptions, a "once in the lifetime of the universe" event. It happened.
- **Correlations are not stable.** Correlations between assets that look uncorrelated in normal times often go to +1 during crises (everything falls together). The diversification you thought you had disappears

precisely when you need it most.

- **Volatility isn't the only risk.** MPT defines risk as volatility (standard deviation). For long-term investors, volatility you ride out is not really risk; permanent loss of capital is. Drawdown matters more than volatility, but MPT doesn't model drawdown well.
- **Expected returns are unknown.** Computing the efficient frontier requires inputs (expected returns, volatilities, correlations). All three are estimated from past data and are noisy. Small input changes produce dramatically different "optimal" portfolios — a problem known as *estimation error sensitivity*.
- **Real investors aren't rational** in the MPT sense. They care about specific goals, have liquidity needs, have tax considerations, have psychological constraints. None of these enter the MPT framework.

The honest position: MPT is the foundational framework for thinking about portfolios, but its specific quantitative recommendations should be taken with humility. The *qualitative* insights — diversification works because of correlation, not just count; portfolios should be evaluated as a unit; risk-adjusted return matters — are the durable contributions.

KEY TAKEAWAYS

1. **Portfolio risk depends on correlations between holdings**, not just on individual asset risks.
2. **The efficient frontier** is the curve of best portfolios; rational investors should hold only portfolios on it.
3. **The Capital Market Line** emerges when you add a risk-free asset; the tangency portfolio is theoretically optimal for everyone.
4. **Real-world flaws of MPT:** fat-tailed returns, unstable correlations in crises, volatility $\neq$ risk, estimation error, irrational investors. Take the qualitative insights, treat the quantitative outputs with humility.

SELF-CHECK

1. Two assets each have volatility 10%, 50/50 weights, correlation 0. What is the portfolio volatility? (Answer: ~7.1%.)
2. What is the efficient frontier, and why should rational investors hold portfolios on it?
3. State two genuine criticisms of MPT.

4. Why does diversification often disappoint during crises?

CHAPTER THREE

Risk-Adjusted Return — Sharpe, Sortino, Calmar

A 10% annual return sounds great. A 10% annual return with a 50% drawdown sounds different. Comparing investments by return alone is misleading; you need to compare return per unit of risk. This chapter teaches the three standard measures and what each one captures.

IN THIS CHAPTER YOU WILL LEARN

- The Sharpe ratio — return per unit of volatility.
- The Sortino ratio — return per unit of *downside* volatility.
- The Calmar ratio — return per unit of maximum drawdown.
- How to compute each one on real data.
- Which measure is right for which investor.

3.1 The Sharpe Ratio

The standard measure, introduced by William Sharpe in 1966 (he later won the 1990 Nobel alongside Markowitz). The Sharpe ratio measures excess return per unit of volatility:

$$\text{Sharpe} = (R_{\text{portfolio}} - R_{\text{risk-free}}) \div \sigma_{\text{portfolio}}$$

where $R_{\text{portfolio}}$ is the portfolio's annualised return, $R_{\text{risk-free}}$ is the risk-free rate (T-bills), and σ is the annualised volatility (standard deviation of monthly or daily returns, scaled).

WORKED CALCULATION · SHARPE RATIO OF THE S&P 500

Long-run S&P 500 annualised return: ~10%

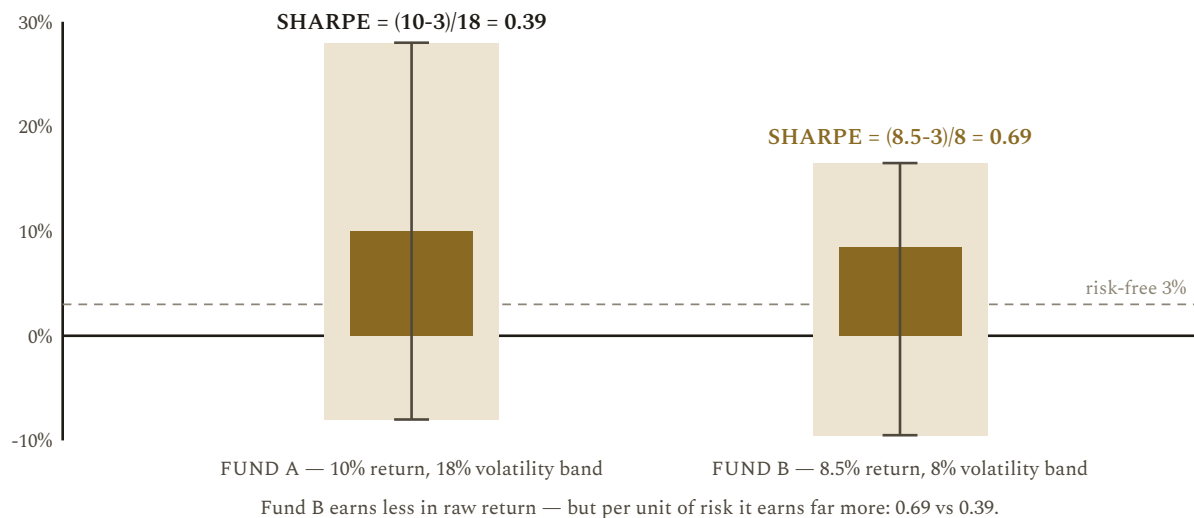
Long-run T-bill rate: ~3.5%

Long-run S&P 500 annualised volatility: ~16%

$$\text{Sharpe} = (10\% - 3.5\%) \div 16\% = \mathbf{0.41}$$

The long-run Sharpe ratio of US equities is roughly 0.4. This is the benchmark every active strategy is implicitly compared against. Sharpe above 1.0 is excellent; above 2.0 is rare and often suspect (Book 5 Ch 36.4). 0.4 is the long-run cost-of-capital reward for taking equity risk.

A Sharpe ratio is *only meaningful* when computed over a meaningful sample (typically 10+ years) and compared like-for-like. A fund with a Sharpe of 2.0 over a 3-year period of unusually low volatility is not necessarily better than an index with a Sharpe of 0.5 over 30 years.

FIGURE 3.1 · THE LOWER RETURN CAN BE THE BETTER FUND

Return per unit of risk. The gold bars are each fund's return; the shaded columns are the $\pm 1\sigma$ volatility band around it — the range a typical year can land in. Fund A's 10% comes with an 18-point wobble; Fund B's 8.5% comes with an 8-point one. Divide each excess return over the 3% risk-free rate by its volatility and the ranking flips — B's Sharpe of 0.69 beats A's 0.39 decisively. The louder fund is not the better fund.

3.2 The Sortino Ratio

The Sharpe ratio has a conceptual problem: it penalises *upside* volatility just as much as downside. A portfolio that occasionally surges 20% in a month has higher volatility — and therefore a lower Sharpe — than one that grinds steadily. But upside is good; only downside hurts.

The Sortino ratio (Frank Sortino, 1991) fixes this by using only *downside* volatility — the standard deviation of returns below some target (often zero, or the risk-free rate):

$$\text{Sortino} = (R_{\text{portfolio}} - R_{\text{target}}) \div \sigma_{\text{downside}}$$

Sortino ratios are typically *higher* than Sharpe ratios for the same portfolio (because downside volatility is less than total volatility). For trend-following strategies — which give up some "lumpiness" on the upside in exchange for downside protection — Sortino tells the story Sharpe hides.

3.3 The Calmar Ratio

Both Sharpe and Sortino measure risk in standard-deviation terms — fine in theory, but for real investors what often matters most is *the worst loss you experienced*, not the average wiggle. The Calmar ratio (Terry Young, 1991) uses maximum drawdown as the risk measure:

$$\text{Calmar} = \text{annualised return} \div |\text{maximum drawdown}|$$

The Calmar ratio is the simplest gut-check for a strategy's livability: *if it earned 15% a year but had a 60% drawdown, would you have held it through the drawdown?* Most retail investors say yes in theory and no in practice. A high Sharpe ratio doesn't matter if the drawdown forces you out.

WORKED CALCULATION · ALL THREE FOR THE S&P 500, LONG-RUN

Annualised return: ~10%

Annualised volatility: ~16%

Annualised downside volatility: ~11%

Worst drawdown (1929-32): ~86%

Sharpe = $(10\% - 3.5\%) \div 16\% = 0.41$

Sortino = $(10\% - 3.5\%) \div 11\% = 0.59$

Calmar = $10\% \div 86\% = 0.12$

Three different stories of the same investment. By Sharpe, US equities are "OK." By Sortino (downside-aware), modestly better. By Calmar (worst-case-aware), they look modest – a reminder that historical maximum drawdowns are eye-watering and need to be respected even when the long-run return looks generous.

3.4 Which Measure for Which Investor

COMPARE & UNDERSTAND · RISK-ADJUSTED RETURN MEASURES

INVESTOR TYPE	RISK THAT MATTERS MOST	BEST MEASURE
Young accumulator	Long-run drag from poor risk-adjusted returns	Sharpe / Sortino
Mid-career investor	Volatility that triggers behavioural mistakes	Sortino
Near-retiree	Drawdown that forces a delay of retirement	Calmar (heavily)
Retiree drawing income	Sequence-of-returns risk (Chapter 16)	Calmar + the actual return-sequence path

The Sharpe ratio is the academic standard and the right starting point. As you approach the age where drawdowns can permanently damage your goals (the years either side of retirement), pay more attention

to Calmar. *The right measure depends on what you actually care about — and that changes over your life.*

KEY TAKEAWAYS

1. **Compare investments by return per unit of risk**, not by raw return.
2. **Sharpe** uses total volatility. Long-run US equity Sharpe is roughly 0.4.
3. **Sortino** uses only downside volatility — more relevant for strategies that give up upside lumpiness for downside protection.
4. **Calmar** uses maximum drawdown — the most relevant measure when drawdown could damage real goals (late-career, retirees).
5. **Use the measure that matches what you actually care about** — and recognise that what you care about changes over your life.

SELF-CHECK

1. State the Sharpe ratio formula and compute it for a portfolio earning 12% with 20% volatility and a 4% risk-free rate. (Answer: 0.4.)
2. What's the conceptual problem with the Sharpe ratio that Sortino fixes?
3. What is the Calmar ratio and which kind of investor should pay most attention to it?
4. The long-run Sharpe of US equities is ~0.4. Why is a fund advertising a 5-year Sharpe of 3.0 suspect?

II

PART TWO

Asset Allocation

Allocation is the single biggest decision in long-term investing — explaining roughly 90% of the variation in outcomes (Chapter 1). Four chapters: choosing a strategic allocation by age and goal, the three-fund portfolio and its variants, glide paths and target-date funds, and how much to put outside your home country.

BY AGE & GOAL

THREE-FUND

GLIDE PATHS

INTERNATIONAL

CHAPTER FOUR

Strategic Allocation by Age and Goal

An asset allocation is just the percentage of your portfolio in each major category — typically stocks, bonds, and "other" (cash, real estate, alternatives). The right allocation depends on two questions: how long until you need the money, and how much volatility can you actually tolerate without abandoning the plan.

IN THIS CHAPTER YOU WILL LEARN

- The classic age-based heuristic and why it fails for some investors.
- The role of time horizon vs. risk tolerance.
- Sample allocations for different life stages.
- The multi-goal approach (separate buckets per goal).

4.1 The "Age in Bonds" Rule

The oldest age-based heuristic: hold a percentage of your portfolio in bonds equal to your age. A 30-year-old holds 30% bonds / 70% stocks; a 60-year-old, 60% / 40%. The logic is intuitive — younger investors have more time horizon, so they can absorb stock-market volatility; older investors have less time and need stability.

Variants in the modern era push toward more stocks: "age minus 20" (a 40-year-old holds 20% bonds), "age minus 30" (more aggressive still), or "100 minus age in bonds." The shift toward more equity is partly because of low bond yields (a 2% yield doesn't reward holding bonds) and partly because of longer life expectancies (a 65-year-old in 2025 has 20+ years of likely remaining life — still effectively a long horizon).

The heuristic is a starting point, not a verdict. A 35-year-old who freezes at every market correction and might panic-sell at a bottom should probably hold *more* bonds than the formula suggests; a 60-year-old with a generous pension covering basic needs can probably hold more stocks.

4.2 Time Horizon Beats Risk Tolerance

Two factors compete: *time horizon* (how long until you need this money) and *risk tolerance* (how much volatility you'll actually accept). For long-term investors, time horizon dominates: an investor with 30+ years of horizon should be heavily in stocks regardless of their stated risk tolerance, because (a) the historical worst-case 30-year real return on a stock-heavy portfolio is still positive, (b) the inflation drag on cash-heavy portfolios is brutal over long horizons, and (c) the upside difference between stocks and bonds compounds enormously over 30 years.

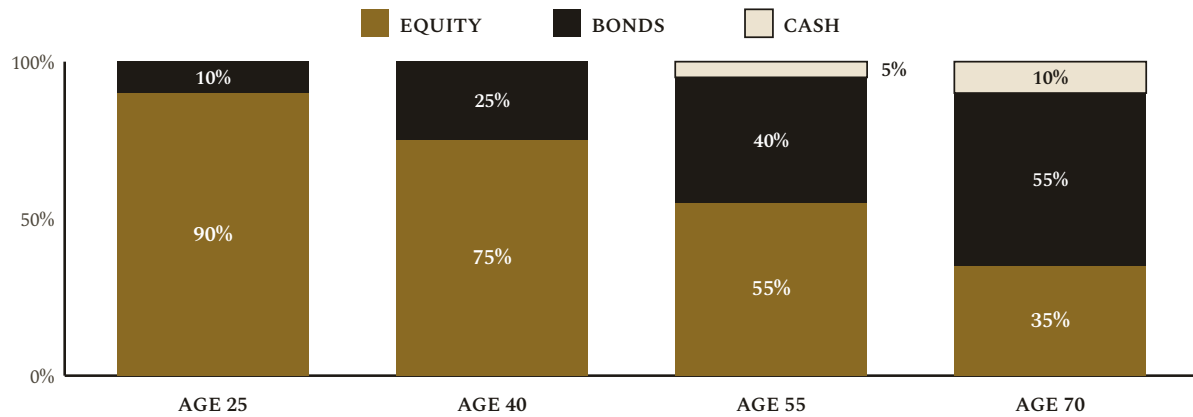
The catch: an investor's *stated* risk tolerance and their *actual* behaviour during a bear market often diverge. The portfolio you hold during the 2009 bottom is the portfolio that determines your real outcome. If 70% stocks would force you to sell at the worst moment, then 70% is wrong for you, even if the math says you can afford it.

4.3 Sample Allocations by Life Stage

COMPARE & UNDERSTAND · SAMPLE STRATEGIC ALLOCATIONS (ILLUSTRATIVE)

LIFE STAGE	STOCKS	BONDS	OTHER	NOTES
20-30s (accumulating)	80-90%	5-15%	0-5%	Time horizon long; can absorb volatility
40s (mid-career)	65-80%	15-25%	5%	Tilt slightly bonds as goals approach
50s (pre-retirement)	50-70%	25-40%	5-10%	Glide path begins; sequence-risk matters
60s (just retired)	40-60%	30-50%	10-15%	Capital preservation matters; income begins
70+ (decumulating)	30-50%	40-55%	10-15%	Lower volatility; still some stocks for longevity

These are starting points; adjust for your actual circumstances. An investor with a guaranteed pension covering basic expenses can hold more stocks at 70+ than someone fully dependent on portfolio income. An investor with a short-horizon goal (house in 3 years) should hold the money for that goal in cash or short bonds regardless of overall portfolio allocation.

FIGURE 4.1 · THE ALLOCATION GLIDE, FOUR SNAPSHOTS

Equity shrinks from 90% to 35% as the horizon shortens; bonds and cash absorb what equity gives up.

Same investor, four decades. Each bar is 100% of the portfolio at one life stage — 90/10/0 at 25, 75/25/0 at 40, 55/40/5 at 55, 35/55/10 at 70. The gold equity block funds the long-run growth while there is time to recover from crashes; as retirement approaches, bonds (dark) and a small cash sleeve (pale) take over the job of keeping next decade's spending safe. The bars are snapshots of the glide path Chapter 6 draws as a continuous curve.

4.4 The Multi-Goal Approach

Most real investors have multiple goals on different timelines: retirement (30 years away), a house deposit (5 years), a child's education (10 years), a wedding (2 years). Treating these as one undifferentiated pile of "savings" with one allocation is suboptimal. Better: **match each goal's money to its own time horizon**:

- **Money needed within 1-2 years:** cash or short Treasury bills. Don't risk it.
- **3-5 years out:** short-to-intermediate bonds (1-5 year Treasuries or a short-bond fund). Some growth, minimal volatility.
- **5-10 years out:** a balanced portfolio (40-60% stocks). Some equity exposure for growth; bonds for stability.
- **10+ years out:** heavily stocks (70-90%). The full benefit of long horizons.

Each "bucket" has its own appropriate allocation. Adding the buckets together gives you a blended overall allocation, but the structure is more meaningful than any single number.

KEY TAKEAWAYS

1. **Age-based heuristics** ("age in bonds") are a starting point, not a verdict.
2. **Time horizon dominates risk tolerance** for long-term investors — but only if you can actually hold through a bear market.
3. **Sample allocations:** 80-90% stocks in your 20s-30s, gliding to 30-50% in retirement.
4. **The multi-goal approach:** match each goal's money to its own time horizon.

SELF-CHECK

1. Apply the "age in bonds" rule to a 45-year-old. What bond/stock split?
2. Why might a 30-year-old who panicked in 2008 want a less aggressive allocation than the heuristic suggests?
3. You're saving for a house in 3 years. What allocation is appropriate for that specific money?
4. Explain the multi-goal bucket approach.

CHAPTER FIVE

The Three-Fund Portfolio and Its Variants

The Bogleheads community — followers of Vanguard founder Jack Bogle — distilled decades of academic finance into a portfolio so simple it fits in three lines and so robust it has beaten the vast majority of professional portfolios over every 30-year window. Here it is.

IN THIS CHAPTER YOU WILL LEARN

- The three funds and what each one represents.
- Sample weightings by age.
- The international debate — how much non-US?
- Variants: two-fund, four-fund, target-date alternatives.
- What this portfolio quietly does for you.

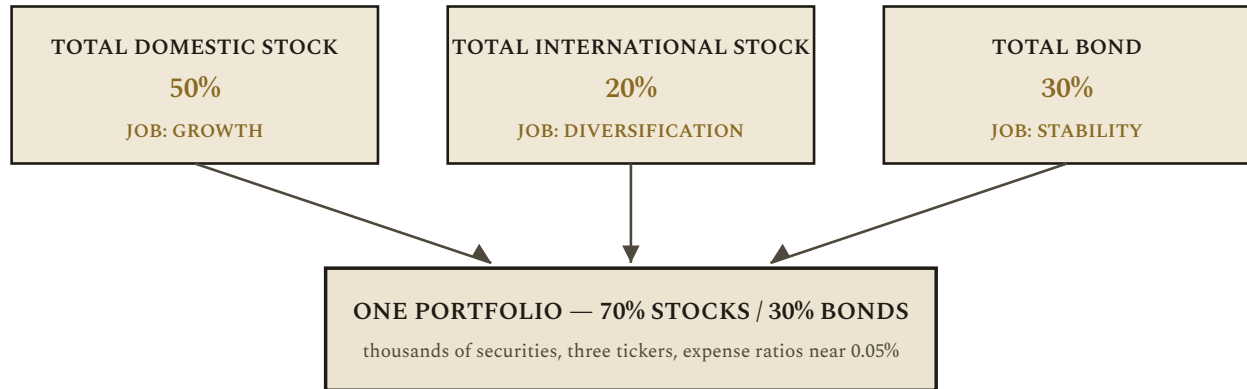
5.1 The Three Funds

The portfolio holds exactly three index funds, each representing a major asset class:

1. **Total US Stock Market** — every US-listed stock, weighted by market capitalisation. Examples: VTI (Vanguard), SCHB (Schwab), ITOT (iShares). Expense ratio typically 0.03%.
2. **Total International Stock Market** — every developed and emerging-market non-US stock, market-cap weighted. Examples: VXUS, IXUS, SCHF + SCHE. Expense ratio typically 0.05-0.08%.
3. **Total US Bond Market** — investment-grade US Treasury, agency, and corporate bonds across maturities. Examples: BND, AGG, SCHZ. Expense ratio typically 0.03-0.05%.

That's it. No individual stocks, no sector bets, no factor tilts, no commodities, no gold, no alternatives. *You own everything in proportion to its size in each market.*

FIGURE 5.1 · THREE FUNDS, THREE JOBS, ONE PORTFOLIO



The whole machine on one page. Domestic stocks (50%) do the compounding, international stocks (20%) protect you from the possibility that your home market has a lost decade, and bonds (30%) keep the ride survivable and fund the rebalancing. Add the pieces and you get a 70/30 portfolio holding essentially every investable security on earth — a structure most professional portfolios fail to beat over 30-year windows.

5.2 Sample Weightings

A common starting point — and what's used inside many target-date funds — is to weight by life stage:

COMPARE & UNDERSTAND · THE THREE-FUND PORTFOLIO BY AGE

AGE	TOTAL US STOCK	TOTAL INTERNATIONAL STOCK	TOTAL BOND
25	54%	36%	10%
35	48%	32%	20%
45	42%	28%	30%
55	36%	24%	40%
65	30%	20%	50%
75	24%	16%	60%

The pattern: a 60/40 stocks/bonds split at age 65, gliding from a 90/10 split at age 25. Within stocks, roughly 60% US / 40% international — though this ratio is debated (next section).

5.3 The International Debate

How much of your equity should be outside your home country? The case for "global market-cap weighting" — about 60% US / 40% non-US for a US investor in 2025 — is theoretically clean: you own each company in proportion to its global market value, with no home bias.

The case for more home bias: you spend in your home currency, so an asset that earns in your home currency is less risky *in real terms*. Also, US investors have historically benefited from a strong dollar; non-US returns translated to dollars have lagged.

The case for *less* home bias (more international): historically, the country with the best stock-market returns over the next decade is rarely the country with the best returns over the previous decade. Diversifying internationally hedges that uncertainty. The 1990s saw US dominance; the 2000s saw emerging markets lead; the 2010s and 2020s saw US dominance again. The next decade?

The honest answer is that 30-50% international equity is reasonable; lower than 20% is probably too concentrated, higher than 60% probably overreaches given currency and tax friction. Vanguard's target-date funds use roughly 40% international within equity.

5.4 Variants — Two, Four, Five Funds

Two-fund: skip international stocks (or skip bonds if young enough). Defensible if you accept the concentration cost.

Four-fund: add a REIT fund (e.g., VNQ), giving real-estate exposure. Modest allocation (5-10%).

Five-fund "factor tilt": add small-cap value (e.g., AVUV) and emerging markets (e.g., VWO) as overweight bets relative to market-cap weighting. The factor-investing case (Chapter 9) supports this; the empirical evidence in recent decades has been mixed.

Bond duration variants: split the bond allocation into short and intermediate (e.g., BSV + BIV instead of BND) to control duration risk more precisely.

None of these dramatically outperforms the simple three-fund. The marginal benefit of each addition is small; the marginal complexity is real.

RAVI — THE SIMPLEST POSSIBLE PORTFOLIO

Ravi, now 28, has saved \$14,000. He's read this chapter and feels overwhelmed by allocation theory, glide paths, factor tilts. His decision, after thinking it over: a Vanguard Target-Date 2065 fund, 100% of new contributions, automated monthly. One fund. Done. The fund handles US/international split, the bond allocation, the glide path to retirement, the rebalancing — all of it. Expense ratio: 0.08%. Time required from Ravi each year: roughly five minutes to check the contribution rate.

Could he construct his own three-fund portfolio and save 0.05% per year? Yes. Would that 0.05% over 40 years compound to a meaningful sum? About \$11,000 on his projected portfolio — not trivial. But Ravi has already saved 0.05% per year by *actually contributing*, which is the harder behavioural feat. Optimal beats simple only when you'll actually execute. For Ravi at 28, the simplest possible portfolio is the right portfolio.

5.5 What the Three-Fund Portfolio Quietly Does for You

- Diversifies you across ~10,000 stocks and ~10,000 bonds — essentially the entire investable world.
- Costs you about 0.04% per year in expense ratios — almost nothing.
- Requires about two hours per year (a once-yearly rebalance).
- Removes individual stock-picking risk — no single company can ruin you.
- Self-rebalances within funds — as company X grows and Y shrinks, the index fund automatically tracks the change. You don't have to decide.
- Has beaten the majority of professionally-managed portfolios over every 30-year window in modern history.

The most boring portfolio also wins

The three-fund portfolio is the financial equivalent of compound interest itself: dull, slow, mathematically inevitable. There is no story to tell about it at a dinner party. The fund company is not asking for your attention; nobody is paid to recommend it. And yet over 30 years, it has beaten the vast majority of professionals who are paid to do better. The boring answer is the correct answer.

KEY TAKEAWAYS

1. **Three funds:** total US stock, total international stock, total US bond. ~0.04% combined fees.
2. **Weight by age:** glide from 90/10 stocks/bonds at 25 to 40/60 at 75.
3. **International equity:** 30-50% of the stock sleeve is reasonable; the empirical case for any specific number is weak.
4. **Variants add complexity for marginal benefit;** the three-fund baseline is hard to beat.
5. **This portfolio wins by being unsexy** — by removing the opportunities to make mistakes.

CHAPTER SIX

Glide Paths and Target-Date Funds

A "glide path" is the prescribed change in your portfolio's allocation over time — typically reducing stocks and adding bonds as you approach the year you'll need the money. A target-date fund automates that glide path inside a single fund. For investors who don't want to think about allocation at all, target-date funds may be the best invention in personal finance history.

IN THIS CHAPTER YOU WILL LEARN

- What a glide path is and why it exists.
- How target-date funds work.
- The "to retirement" vs. "through retirement" debate.
- How to choose between target-date and DIY allocation.

6.1 What a Glide Path Is

A glide path is just the time-series of allocation percentages over a multi-decade plan. At age 30, hold 90% stocks. At age 40, 80%. At age 50, 65%. At retirement (age 65), 50%. At age 80, 35%. Plot these on a chart and you get a downward-sloping line — the path glides from aggressive to conservative as the goal approaches.

The economic rationale: the longer your remaining time horizon, the more volatility you can absorb (you have time to recover from a downturn). As the horizon shortens, the cost of a bad year becomes harder to recover from. The glide path automates the adjustment, removing the temptation to skip a rebalance.

6.2 Target-Date Funds — Automatic Glide Paths

A target-date fund (TDF) holds a diversified portfolio and automatically shifts the allocation along a predetermined glide path. You buy one fund — say, "Vanguard Target Retirement 2055" — and the fund manager handles everything: the underlying holdings (typically broad index funds), the allocation percentages, and the gradual shift toward bonds as 2055 approaches. The investor's job is simply to keep contributing.

Modern target-date funds typically charge 0.08-0.20% expense ratio — slightly more than the underlying index funds but still remarkably cheap. For investors who would otherwise be paying advisory fees of 1%+ to a financial advisor for the same effective service, TDFs are a massive cost saver.

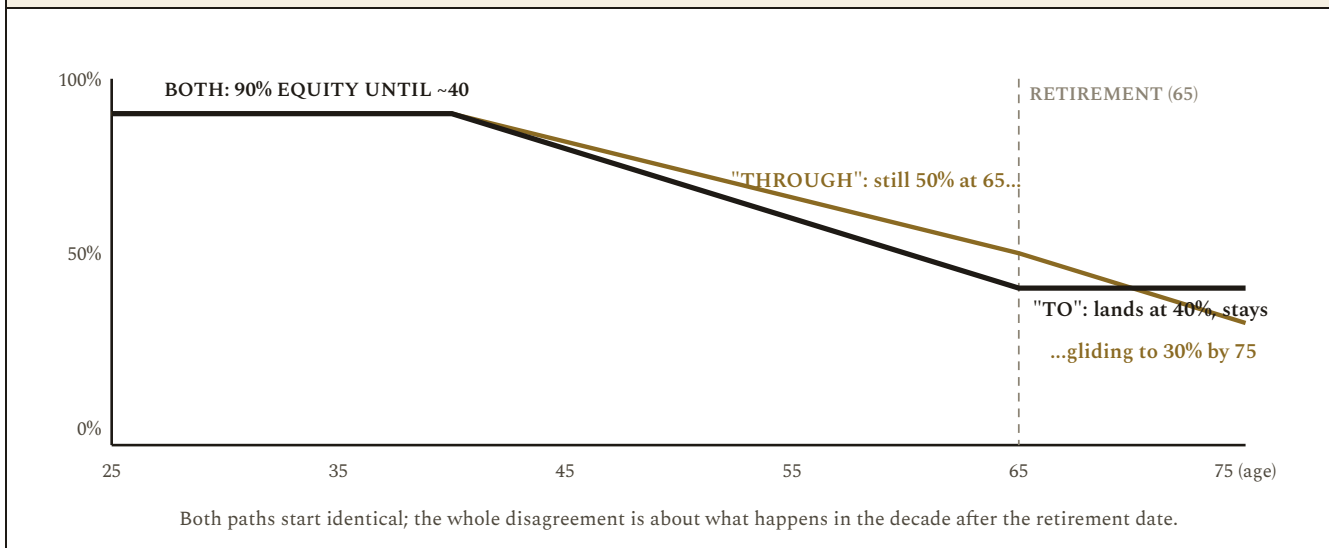
6.3 "To" vs. "Through" Retirement

Target-date funds split into two design philosophies:

"To retirement" glide paths arrive at the target date with their most conservative allocation and stay there. Logic: at retirement, you need stability; you've reached your destination, so the volatility wheels come off. Funds following this approach (e.g., BlackRock's LifePath Index series in some configurations) hit ~40% equity at the target year and stay there.

"Through retirement" glide paths continue to glide down after the target year, ending at a more conservative allocation 10-20 years later. Logic: retirement is a 20-30 year period, not a single year; you need to continue managing risk through it. Vanguard's Target Retirement funds follow this approach, reaching ~30% equity by about age 75.

Neither philosophy is provably right. The "through" approach better captures the reality that retirees aren't done investing the day they retire; the "to" approach better protects against sequence-of-returns risk in the years immediately around retirement (Chapter 16). Most major TDF providers use "through" designs.

FIGURE 6.1 · "TO" VS "THROUGH" — TWO GLIDE PATHS

One date, two philosophies. Both funds hold 90% equity through the accumulation years and glide down as 65 approaches. A "to" fund (dark) treats the retirement date as the destination — it lands at 40% equity and parks there. A "through" fund (gold) treats retirement as the halfway point of a 30-year spending period — still around 50% equity at 65, easing to 30% by 75. The "to" design is kinder in a crash at 66; the "through" design is kinder if you live to 95.

6.4 Should You Use a Target-Date Fund?

The case for:

- One decision, made once. No ongoing portfolio maintenance.
- Automatic rebalancing within the fund.
- Automatic glide-path adjustment over time.
- Lower fees than any human advisor.
- Removes the most common behavioural mistake (failure to rebalance).

The case against:

- One-size-fits-all by target year. Doesn't account for your other assets (pension, real estate, expected inheritance).
- Specific fund's glide path may not match your risk tolerance — you can't fine-tune.
- Slightly higher expense ratio than building it yourself with three index funds.

- In a taxable account, the auto-rebalancing inside the fund can create tax inefficiency (Chapter 12).

The honest recommendation for most retail investors: **use a target-date fund in your tax-advantaged accounts** (401(k), IRA, equivalents) where the tax-inefficiency doesn't matter. In taxable accounts, build the three-fund portfolio yourself for better tax control (Chapter 12).

KEY TAKEAWAYS

1. A **glide path** is the time-series of allocation as you approach a goal — typically dropping equity exposure as the goal nears.
2. **Target-date funds** automate the glide path; one fund, the manager handles the rest.
3. **"To" vs. "through" retirement** — different funds end the glide at the target date or continue past it.
4. **For most investors, target-date funds in tax-advantaged accounts + DIY three-fund in taxable accounts is the right combination.**

CHAPTER SEVEN

International Diversification

The US is roughly 60% of the global stock market by capitalisation. Should US investors hold 60% domestic, 100% domestic, or something else? Should non-US investors hold 60% US? The honest answer involves currency, taxes, governance, and the inability to know which country will outperform next.

IN THIS CHAPTER YOU WILL LEARN

- The global market-cap baseline.
- Why the home-country bias is empirically universal.
- Currency risk and how it interacts with equity returns.
- Developed vs. emerging markets — the case for each.
- A reasonable international weighting framework.

7.1 The Global Cap-Weighted Baseline

If you had no home bias and just owned the world in proportion to market value, you'd hold roughly: 60% US, 13% other developed Europe (UK, Switzerland, Germany, France, Netherlands), 7% Japan, 6% emerging markets, and the rest scattered across Canada, Australia, smaller European, and frontier markets. This is the "VT" (Vanguard Total World) portfolio.

The theoretical case is clean: by holding the global market-cap-weighted portfolio, you make no active bet on any country. You'll capture the global return; you won't outperform any specific country, but you won't dramatically underperform either.

7.2 Home Bias — Why Everyone Has It

Almost every country's investors overweight their domestic market relative to its global share. US investors hold ~80% US (vs. 60% baseline). Japanese investors hold ~70% Japan (vs. 6%). UK investors hold ~50% UK (vs. ~4%). This is "home bias" and it has at least four real justifications:

- **Currency.** You spend in your home currency. Holdings in your currency don't carry currency risk; holdings in other currencies do.
- **Tax.** Foreign withholding taxes on dividends often can't be fully recovered. Domestic dividends have simpler tax treatment.
- **Information.** You understand your own country's companies, regulations, and economy better than foreign ones. (This is partly an illusion — but the comfort is real.)
- **Behaviour.** Foreign holdings often look "different" and produce behavioural urges to sell. Home holdings feel familiar.

For these reasons, most well-known portfolio frameworks (Bogle, Buffett's "90/10," most target-date funds) recommend home bias modestly above the cap-weighted baseline. Vanguard's TDFs hold ~60% domestic equity for US investors.

7.3 Currency Risk

When a US investor buys a Japanese stock, two things can happen: the Japanese stock can rise or fall in yen, and the yen can rise or fall against the dollar. The US investor's return is the combination. Over short periods, currency moves can dominate underlying equity moves. Over long periods, currency tends to be roughly mean-reverting (purchasing-power-parity), so the equity return dominates.

For long-horizon investors, currency risk is real but generally not worth hedging — hedging costs (typically 0.2-0.5% per year) eat into returns, and over decades the unhedged exposure often produces similar end results. For short-horizon investors or retirees with currency-specific liabilities, hedged international funds may be appropriate.

7.4 Developed vs. Emerging

International equity splits into two broad camps: **developed markets** (Europe ex-UK, Japan, UK, Canada, Australia, Switzerland — relatively stable, lower expected return) and **emerging markets** (China, India, Brazil, Mexico, South Africa, Korea, Taiwan, dozens more — faster growth, higher volatility, governance risk).

Cap-weighting gives roughly 90% developed / 10% emerging. The case for overweighting EM: faster GDP growth, demographic tailwinds, lower starting valuations. The case against: governance risk (the Chinese government's regulatory crackdowns on private tech in 2021-22 was a textbook example), currency volatility, occasional severe drawdowns. The honest position: a small EM tilt (10-20% of the international sleeve) is defensible; a major EM bet is high-conviction speculation.

7.5 A Reasonable Framework

For a US investor with no special circumstances:

- **Total equity:** per your age-based glide path (Chapter 4).
- **Within equity, US/international split:** 60-70% US / 30-40% international. Slightly more US than cap-weight, for home-bias reasons.
- **Within international, developed/emerging split:** ~80/20 to ~70/30. Higher EM if you're aggressive.
- **Currency hedging:** typically unhedged for long-horizon investors.

For investors in other countries, the analogous framework — modest home bias, mostly developed-world international, some EM — generally applies. Indian investors might hold 70% India / 30% global; UK investors might hold 50% UK / 50% global. Each case requires judgement; none is provably optimal.

KEY TAKEAWAYS

1. **Global cap-weighting baseline:** ~60% US, ~30% other developed, ~6% EM.
2. **Home bias is universal;** modest home bias (10-20pp over cap-weight) is defensible.
3. **Currency risk** is real short-term, generally mean-reverts long-term; usually not worth hedging for long-horizon investors.
4. **EM tilt** of 10-30% of international sleeve is reasonable; bigger is speculation.
5. **Sample US investor allocation:** 65% US / 25% int'l developed / 10% EM within the equity sleeve.

III

PART THREE

Implementation

Allocation is the strategic decision; implementation is the tactical layer. Which specific funds to buy. Whether to tilt toward factors. How to dollar-cost-average without ruining your tax situation. When and how to rebalance. Four chapters of practical machinery.

ETF VS MF | FACTOR INVESTING | SIPS / DCA | REBALANCING

CHAPTER EIGHT

ETFs, Mutual Funds and Index Funds — What to Actually Buy

The terminology can confuse beginners: "ETF" and "mutual fund" are structures; "index fund" and "active fund" are strategies. The same total-stock-market exposure can be bought as an index ETF or an index mutual fund. This chapter clarifies the choices.

IN THIS CHAPTER YOU WILL LEARN

- The structural differences between ETFs and mutual funds.
 - When ETFs are better; when mutual funds are.
 - The fund-selection checklist.
 - Region-specific notes for US, India, UK.
-

8.1 ETF vs. Mutual Fund — the Structural Differences

COMPARE & UNDERSTAND · ETFS VS MUTUAL FUNDS

FEATURE	ETF	MUTUAL FUND
Trades	Like a stock — intraday on exchanges	End-of-day NAV; one price per day
Minimum investment	Price of 1 share (often \$50-\$500)	Often higher (\$1,000-\$3,000)
Tax efficiency (US taxable)	Generally more efficient (in-kind creation/redemption avoids realised gains)	Can distribute capital gains annually, taxable to all holders
Expense ratios	Usually slightly lower	Usually slightly higher (a few bps)
Automatic investing	Sometimes hard to do auto-invest of fixed dollar amounts	Easy — most brokers support automatic contributions of any amount
Trading costs	Spread (typically 1-3 bps on liquid ETFs); no commission at most retail brokers	None at most brokers; some have transaction fees

8.2 Which to Choose

For US taxable accounts: prefer ETFs. The tax efficiency from in-kind creation/redemption is a real, ongoing benefit — often saving 0.2-0.5% per year in realised capital-gains taxes.

For **US tax-advantaged accounts (401(k), IRA)**: either works. The tax-efficiency benefit disappears in tax-sheltered accounts. Choose based on convenience — many 401(k)s only offer mutual funds, in which case use those.

For **dollar-cost averaging (small regular contributions)**: mutual funds are typically more convenient — you can contribute any dollar amount automatically, including fractional shares. Some brokers now offer fractional-share ETF purchases (Fidelity, Schwab, Robinhood), which removes the gap.

8.3 The Fund Selection Checklist

For any fund you're considering, check:

1. **Expense ratio**: should be under 0.10% for broad index funds. Above 0.20% is questionable for an index fund; above 0.50% is overpriced for any fund.
 2. **Tracking error**: how closely the fund follows its index. For broad index funds this should be tiny (a few bps per year). Larger tracking error suggests sloppy management.
 3. **Fund age and assets under management**: prefer funds with at least 3 years of history and \$1B+ in AUM. Small or new funds carry closure risk.
 4. **The index it tracks**: total-market indices (CRSP US Total Market, FTSE Global All Cap) are better than narrow indices (S&P 500, Dow). Total-market gives you the small/mid-cap exposure that narrower indices miss.
 5. **Securities lending revenue**: well-run funds offset some of their expense ratio with securities-lending income. Check the fund's annual report.
-

8.4 Region-Specific Notes

US investors: Vanguard, Fidelity, Schwab, BlackRock/iShares all offer competing total-market index funds. Fidelity has the "ZERO" series with 0% expense ratio (FZROX, FZILX) — only available in Fidelity accounts. Vanguard and Schwab options work across any broker.

Indian investors: index investing has grown rapidly. Nifty 50 index funds and ETFs are widely available (UTI Nifty 50 Index, ICICI Prudential Nifty 50, Nippon India Nifty 50 BeES). Nifty Next 50 adds mid-cap

exposure. International equity exposure typically goes through fund-of-funds investing in US ETFs (Motilal Oswal Nasdaq 100, ICICI Prudential US Bluechip).

UK investors: Vanguard FTSE All-World (VWRL/VWRP) is the standard global equity fund. Domestic-currency-hedged variants exist. Bond ETFs are available but with smaller market than the US.

KEY TAKEAWAYS

1. **ETF vs. mutual fund:** structures, not strategies. The same index can be bought as either.
2. **ETFs in US taxable accounts;** mutual funds where convenient and tax-equivalent (tax-advantaged accounts, DCA via auto-contributions).
3. **Fund selection checklist:** expense ratio < 0.10%, tracking error tiny, AUM > \$1B, total-market index, watch for securities-lending offset.
4. **Specific funds vary by country;** the principles are universal.

CHAPTER NINE

Factor Investing in Plain English

Academic research has identified specific portfolio characteristics — value, size, momentum, quality, low-volatility — that have historically delivered modest excess returns over the market. The "factor investing" movement turns these findings into investable products. The evidence is real but the recent record is mixed; this chapter teaches the framework honestly.

IN THIS CHAPTER YOU WILL LEARN

- The five major factors and the academic evidence for each.
- How to access factor exposure via ETFs.
- The "factor zoo" critique.
- Whether factor tilts make sense for retail investors.

9.1 The Five Major Factors

Value: stocks with low prices relative to fundamentals (low P/E, low P/B). Eugene Fama and Kenneth French documented in 1992 that value stocks have outperformed growth stocks over long periods. The premium has weakened in the 2010s but the historical record (1927-present) shows roughly 3-4% per year of value-premium return.

Size: small-cap stocks have outperformed large-cap stocks over long periods. The premium is smaller and noisier than value but historically real.

Momentum: stocks that have outperformed in the past 6-12 months tend to continue outperforming over the next 6-12 months. Documented across global markets going back over a century (Jegadeesh and

Titman, 1993). Mark Carhart added it as a fourth factor (1997).

Quality / Profitability: companies with high return on equity and stable earnings have outperformed their lower-quality peers. Robert Novy-Marx (2013) showed gross-profitability-to-assets is a powerful predictor.

Low Volatility / Low Beta: less volatile stocks have produced higher risk-adjusted returns than more volatile ones — contrary to the CAPM prediction that higher beta should mean higher return.

9.2 Accessing Factors via ETFs

Specific ETFs target each factor:

- **Value:** VTV (Vanguard Value), IUSV, AVUV (Avantis Small-Cap Value — combines size + value).
- **Small-cap:** VB, IJR.
- **Momentum:** MTUM (iShares MSCI USA Momentum), VFMO.
- **Quality:** QUAL (iShares MSCI USA Quality).
- **Low Volatility:** USMV (iShares MSCI USA Min Vol), SPLV.
- **Multi-factor:** VFMF, AVUS (Avantis multi-factor).

Expense ratios for factor ETFs are typically 0.15-0.30% — meaningfully higher than total-market ETFs (0.03%) but still much lower than active funds. Whether the extra cost is worth the factor exposure is the question.

9.3 The "Factor Zoo" Critique

The academic literature has expanded from the original 3-5 factors to hundreds of claimed factors — a phenomenon Campbell Harvey called "the factor zoo." Many of these factors don't replicate out of sample or in non-US markets. The honest view, supported by careful researchers (Hou, Xue, and Zhang 2020; Harvey, Liu, and Zhu 2016), is that **perhaps a handful of factors are genuinely real and the rest are statistical artifacts** of mining historical data.

Even within the "real" factors, the premiums have varied dramatically over time. The value premium was very strong from 1927-2007, then disappeared for nearly a decade (2008-2020) while growth stocks dominated, then partially reasserted itself in 2022-23. Anyone who tilted heavily to value in 2010 and held through to 2020 underperformed the market substantially. The factor premiums are noisy enough that a single decade of underperformance is entirely consistent with the historical record.

9.4 Should Retail Investors Tilt?

The honest answer depends on three considerations:

1. **Do you have the patience to hold through a decade of underperformance?** If not, factor tilting will hurt you more than help.
2. **Can you keep the extra cost (expense ratio + slightly worse tax treatment) below the expected factor premium?** If the factor premium is, say, 1% net of costs, the costs need to be well under 1%.
3. **Does the tilt match your other beliefs?** Value tilting feels different in a bull market for tech than in a bear market for tech.

For most retail investors, a small tilt (10-20% of the equity sleeve allocated to a factor or multi-factor ETF) is defensible. A large tilt (50%+) is high-conviction and requires real commitment to ride out decade-long underperformance. The default of *no tilt* — just buying the total market — remains the safest choice.

KEY TAKEAWAYS

1. **Five major factors:** value, size, momentum, quality, low-vol. Academic evidence is real but the premiums are noisy.
2. **Factor ETFs** exist for each (~0.15-0.30% expense ratio).
3. **The "factor zoo" critique:** many claimed factors don't replicate. Maybe 3-5 are real.
4. **Tilt only with patience:** factor premiums can disappear for a decade. Default to total market for most investors.

CHAPTER TEN

SIPs & Dollar-Cost Averaging in Depth

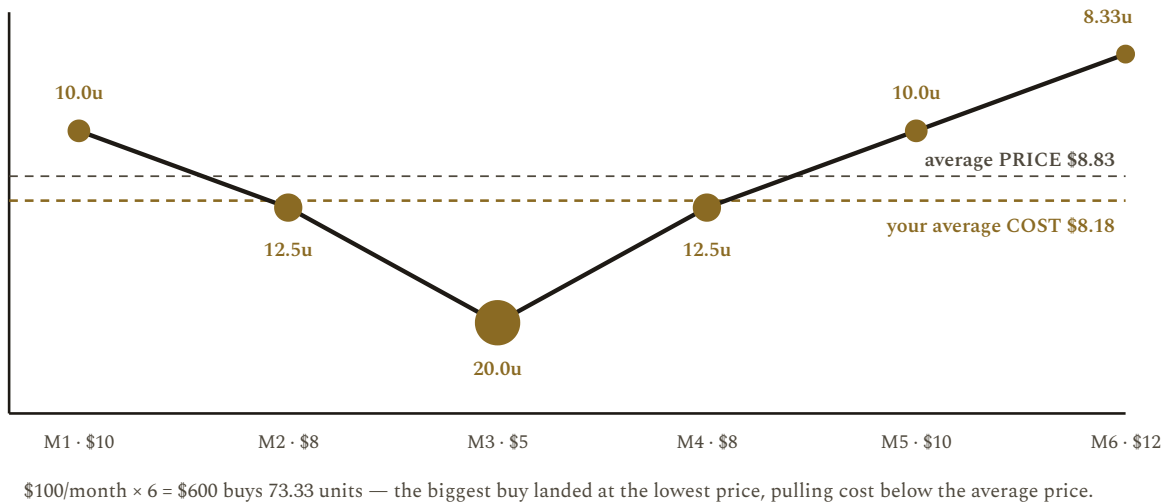
Book 2 introduced dollar-cost averaging (DCA) — the practice of investing a fixed amount on a fixed schedule, regardless of price. This chapter goes deeper: when DCA beats lump-sum, when it doesn't, the behavioural case for DCA even when math says otherwise, and how to set up an automatic SIP that works for decades.

IN THIS CHAPTER YOU WILL LEARN

- What an SIP / DCA actually does.
- The empirical evidence: DCA vs. lump-sum.
- The behavioural case for DCA even when math disagrees.
- How to set up an automatic plan that survives decades.

10.1 What DCA Does, Mechanically

Suppose you invest \$500 every month into the S&P 500. In months where the price is low, \$500 buys more shares; in months where the price is high, it buys fewer. Over time, your average cost per share is mechanically *lower* than the average price during the period — because you bought more shares at the lower prices and fewer at the higher prices. Book 2 Chapter 10 worked the math; the result is that average cost beats average price by typically 5-10%.

FIGURE 10.1 · WHY YOUR AVERAGE COST BEATS THE AVERAGE PRICE

The mechanism, drawn. Each gold dot is one \$100 purchase, sized by the units it bought — 10 at \$10, 12.5 at \$8, a fat 20 units at the \$5 bottom, then 12.5, 10 and 8.33 as the price recovered. The fixed dollar amount automatically buys most when prices are lowest, so your average cost ($\$600 \div 73.33 = \8.18) sits below the simple average price (\$8.83) without a single timing decision being made. That gap is the whole magic of DCA — and it's arithmetic, not luck.

10.2 DCA vs. Lump-Sum — the Empirical Evidence

Here's the uncomfortable truth: if you have a lump sum to invest, investing it all immediately ("lump-sum") has historically beaten DCA roughly two-thirds of the time. Vanguard's 2012 study of US, UK, and Australian markets back to 1926 found lump-sum produced higher returns in about 66% of all rolling periods. The intuition is simple: markets go up most of the time, so deploying capital sooner captures more of that upside.

So why does anyone DCA? Two reasons that survive even the empirical evidence:

1. **Most people don't have a lump sum.** They have an income that arrives monthly. DCA isn't a "strategy" they chose; it's the only available option given their cash flow. The relevant comparison isn't "DCA vs. lump-sum"; it's "DCA vs. not investing at all," and DCA wins that one easily.
2. **The behavioural case is real.** Lump-sum investing has higher *expected* return but also higher *regret* if the timing turns out badly. An investor who lump-summed a year's savings in late 2007 and lived

through 2008 may never invest again. An investor who DCA'd through 2008 — buying every month, including March 2009 — captured the entire recovery. The math favours lump-sum on average; the behavioural durability of DCA may favour the actual investor.

10.3 The Hybrid — DCA Over 6-12 Months

If you have a lump sum to deploy and want to mitigate the worst-case timing risk without giving up too much expected return, a middle ground is to DCA it over 6-12 months — investing roughly equal amounts each month. This captures most of the lump-sum advantage (because most of the deployment happens early in a still-mostly-rising market) while reducing the worst-case scenario of deploying everything just before a 30% drawdown.

10.4 Setting Up an Automatic SIP

The practical mechanics that make SIPs work:

1. **Pick a fixed monthly amount** you can sustain. Start with whatever you can afford; you can increase it later.
2. **Pick a specific date** — typically 1-2 days after your salary arrives, before bills.
3. **Set up auto-transfer** from your bank to your brokerage, and auto-investment from cash to your chosen fund(s). Most brokers support this; check yours.
4. **Automate everything:** contribution, investment, and (where possible) the choice of fund. The fewer decisions you make each month, the more reliably the plan runs.
5. **Don't pause during downturns.** The temptation will be enormous; the historical record is that pausing usually means missing the recovery.
6. **Increase the contribution with your income.** A common rule: bump the SIP by 5-10% every year, or by your raise percentage.

The hardest part isn't starting

Anyone can start a SIP. The challenge is not stopping when markets crash. The 2008 crash and the 2020 crash both produced massive declines in SIP balances mid-stream; the investors who kept contributing through those drawdowns captured the entire recovery and emerged ahead. Those who paused or sold missed it. The single most important behavioural rule in retail investing is: **once your SIP is set, don't stop it during bear markets.** The bear market is when the SIP is doing its best work.

KEY TAKEAWAYS

1. DCA mechanically lowers your average cost by buying more shares at lower prices.
2. Lump-sum beats DCA historically ~66% of the time because markets rise most of the time.
3. Most investors DCA because they must (income arrives monthly); the relevant comparison is DCA vs. not investing.
4. For lump sums, a 6-12-month DCA is a behavioural compromise that limits worst-case regret.
5. The hardest discipline: keep contributing through bear markets. They are when SIPs work best.

CHAPTER ELEVEN

Rebalancing — When, How, How Often

Over time, the asset classes in your portfolio grow at different rates — stocks fast and volatile, bonds slow and steady. The portfolio drifts away from your target allocation. Rebalancing is the discipline of bringing it back. Done right, it captures a small but real "rebalancing bonus" and keeps your risk in check. Done wrong, it costs you in taxes and fees.

IN THIS CHAPTER YOU WILL LEARN

- Why portfolios drift, and what damage drift causes.
- Calendar rebalancing — annually, semi-annually, etc.
- Threshold rebalancing — when the drift exceeds a band.
- Hybrid approaches and tax-aware rebalancing.
- The "rebalancing bonus" — real or illusory?

11.1 Why Drift Matters

Start with a 60% stock / 40% bond portfolio. After a strong year for stocks (+25%) and an average year for bonds (+3%), the allocation drifts to roughly 67% stocks / 33% bonds. After several such years, you might be 75/25 or higher — meaning you're taking more risk than you originally chose, just because of compounding asymmetry.

Drift creates two problems. First, your actual risk profile no longer matches your target — if you intended 60/40 risk, you're now holding 75/25 risk. Second, the drift toward whichever asset class has done best recently means you're *increasing* exposure to the asset that's already had a great run — a form of momentum chasing.

11.2 Calendar Rebalancing

The simplest discipline: rebalance on a fixed schedule, regardless of how much drift has occurred.

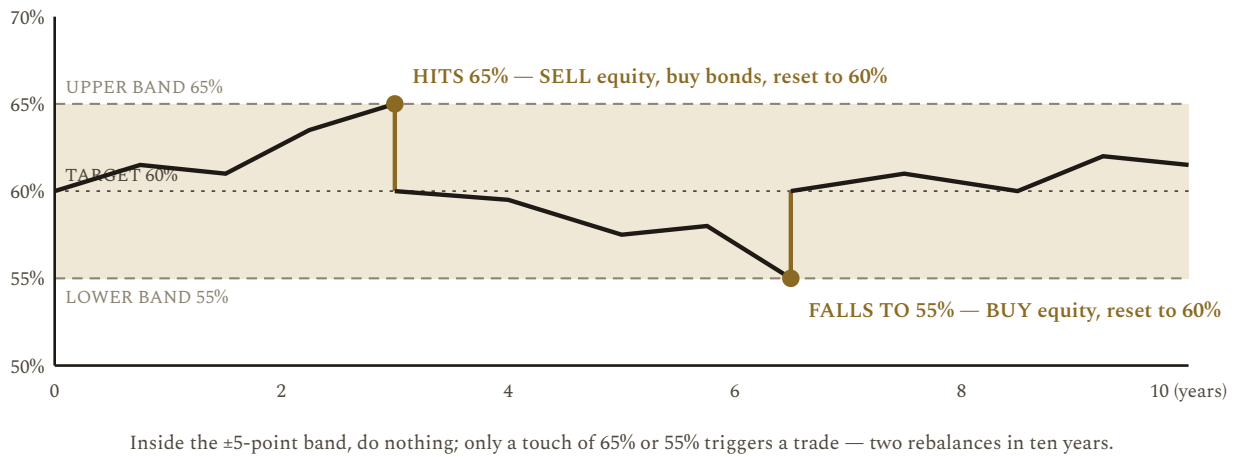
Annual rebalancing (each January, or each tax-year-end) is the most popular for retail investors. **Semi-annual** (June + December) is a more active version. **Quarterly** is more frequent still but adds little benefit.

The advantage of calendar rebalancing: you don't need to monitor. Set a date, do the rebalancing, repeat. The disadvantage: you might rebalance when the drift is tiny (no benefit, but you pay tax/transaction costs), or fail to rebalance when the drift is enormous (you should have caught it but it's not your scheduled date).

11.3 Threshold Rebalancing

The alternative: rebalance only when an asset class drifts by more than a specific threshold from its target. A common rule: rebalance whenever any allocation is more than 5 percentage points (or 25% relative) away from its target. A 60/40 portfolio gets rebalanced when stocks exceed 65% or fall below 55%; nothing happens between those bands.

Advantage: rebalance only when it matters. Disadvantage: you have to monitor regularly to know when to act. The monitoring is usually quick (a glance at your portfolio percentages) but it's still a discipline to maintain over decades.

FIGURE 11.1 · BAND REBALANCING ON A 60% TARGET

Rules, not feelings. *The equity share drifts with markets inside the shaded ± 5 -point band around the 60% target, and nothing happens — no monitoring anxiety, no tinkering. When strong markets push it to 65%, the rule sells equity back to 60% (locking in gains); when a downturn drags it to 55%, the rule buys equity back to 60% (buying low). Notice the direction: the band forces you to trade against your instincts, which is precisely why it works.*

11.4 The Hybrid Approach

Most practitioners use a hybrid: **check on a calendar schedule (annually); only rebalance if a threshold has been breached.** This combines the predictability of calendar rebalancing with the cost-efficiency of threshold rebalancing. Set a reminder for early January each year; check whether any asset is more than 5 percentage points from target; rebalance if so, don't bother if not.

11.5 Tax-Aware Rebalancing

In a taxable account, selling appreciated assets to rebalance generates capital-gains tax — a real cost. Three strategies reduce this:

1. **Rebalance with new contributions.** When you make your monthly SIP contribution, allocate the new money to whichever asset class is below target. Over months and years, this brings the portfolio back without selling anything.

2. **Rebalance in tax-advantaged accounts first.** If you have both a 401(k) and a taxable account, do all your rebalancing inside the 401(k) — no tax consequences. This works best when your accounts hold the same asset classes.
3. **Combine rebalancing with tax-loss harvesting** (Chapter 13). If a position is at a loss, selling for tax purposes also rebalances away from that asset; if at a small gain, defer the rebalance.

11.6 The Rebalancing Bonus — Real or Illusory?

Some academics (William Bernstein, others) have claimed a "rebalancing bonus" — a small extra return from systematically buying low and selling high through the rebalancing process. The empirical evidence is mixed. The bonus exists in some periods (especially when asset classes mean-revert) and disappears in others (especially when one asset class has a long run of outperformance).

The honest assessment: don't rebalance *for the return bonus*. Rebalance *for the risk control*. The bonus, if it exists, is a few basis points; the risk-control discipline is worth far more. Stop expecting rebalancing to make you richer; expect it to keep your portfolio from drifting into a risk profile you didn't choose.

KEY TAKEAWAYS

1. **Portfolios drift** because asset classes compound at different rates; drift changes your real risk profile.
2. **Calendar rebalancing:** fixed schedule, simple discipline. Annual is most common.
3. **Threshold rebalancing:** act only on meaningful drift (e.g., 5 percentage points). More efficient, more monitoring.
4. **Hybrid:** calendar check, threshold trigger — the practical default.
5. **Tax-aware techniques:** use new contributions, use tax-advantaged accounts, combine with tax-loss harvesting.
6. **Rebalance for risk control, not for a return bonus** — the bonus is small and noisy; the risk discipline is the real value.

IV

PART FOUR

Tax-Efficient Investing

Investment returns net of tax are what you actually keep. Two specific techniques — putting the right assets in the right accounts (asset location), and selectively realising losses (tax-loss harvesting) — can add 30-100 basis points per year to your after-tax return at zero marginal effort, compounded over decades. Two chapters of free lunch.

ASSET LOCATION

TAX-LOSS HARVESTING

CHAPTER TWELVE

Asset Location — Putting Each Asset Where It Belongs

Most retail investors think about asset allocation: how much of which thing to own. Fewer think about asset location: which account each thing goes in. Doing this right can add roughly 0.2-0.5% per year to after-tax returns — a small number that compounds into a substantial pile over a working lifetime.

IN THIS CHAPTER YOU WILL LEARN

- The three account types and their tax treatment.
- Which assets generate "tax drag" and which don't.
- The standard asset-location playbook.
- How to adapt when you only have one type of account.

12.1 The Three Account Types

In most countries the tax-advantaged retirement account universe comes in three flavours (names differ — US 401(k)/IRA, UK SIPP/ISA, India PPF/NPS — but the underlying tax treatment generalises):

1. **Taxable accounts.** Money you've already paid income tax on. Subsequent gains and dividends are taxed each year (or on sale, for capital gains). No tax shield.
2. **Tax-deferred accounts** (US traditional 401(k)/IRA, UK SIPP, India NPS). Contributions reduce current-year taxable income; growth is untaxed; withdrawals are taxed as ordinary income.
3. **Tax-free accounts** (US Roth IRA / Roth 401(k), UK ISA, India PPF). Contributions are made with after-tax money; growth and withdrawals are completely tax-free.

Every asset you own sits in one of these three buckets. Where it sits determines whether its returns get taxed annually, deferred to retirement, or never.

12.2 Tax Drag — Which Assets Bleed

Assets differ enormously in how "tax-efficient" they are. Some throw off taxable income every year regardless of whether you sell; others sit quietly until you choose to sell:

COMPARE & UNDERSTAND · TAX EFFICIENCY BY ASSET CLASS

ASSET	TAX BEHAVIOUR IN TAXABLE ACCOUNT	APPROXIMATE ANNUAL TAX DRAG
Total US stock index ETF	Small qualified dividends + minimal cap-gain distributions	~0.3% (very tax-efficient)
Total international stock ETF	Foreign withholding tax + qualified dividends	~0.5-0.7%
REITs / REIT ETFs	High ordinary-income dividends; no preferential rate	~1.0-1.5% (tax-inefficient)
Bond ETF	Interest income, taxed at ordinary rates	~0.8-1.2% (tax-inefficient)
Actively managed equity fund	Frequent realised cap-gains distributed annually	~1.0-1.5%
Index mutual fund (vs ETF)	Some realised gains from in-kind redemption being unavailable	+0.1-0.3% vs equivalent ETF

12.3 The Asset-Location Playbook

The simple rule: put tax-inefficient assets in tax-advantaged accounts; put tax-efficient assets in taxable accounts. Specifically:

- **Bonds** → **tax-deferred accounts** (401(k), traditional IRA). Bonds throw off ordinary-income interest that gets taxed at your top marginal rate in a taxable account. Sheltering them in a tax-deferred account avoids that annual drag.
- **REITs** → **tax-deferred or tax-free accounts**. REIT dividends are ordinary income (no qualified-dividend rate). Always shelter them.
- **Actively managed funds** → **tax-advantaged**. The high turnover creates capital-gain distributions; the tax shelter avoids them.
- **Total stock market index ETFs** → **taxable accounts**. They're already tax-efficient (low dividends, minimal cap-gain distributions). Their highest-and-best-use is in taxable accounts, where their efficiency reduces drag and you preserve flexibility.
- **High-growth stocks / EM funds** → **tax-free accounts** (Roth IRA, ISA). If you have a Roth or ISA, the highest-expected-return assets benefit most from never being taxed. Big upside potential = big tax sheltered.

12.4 A Worked Example

WORKED CALCULATION · HOW MUCH ASSET LOCATION MATTERS

Investor holds 60% stocks / 40% bonds total: \$300k in 401(k), \$100k in Roth IRA, \$200k in taxable. Total \$600k.

Bad location: each account 60/40.

401(k): \$180k stocks + \$120k bonds

Roth: \$60k stocks + \$40k bonds

Taxable: \$120k stocks + \$80k bonds

Annual tax drag on taxable bonds $\approx \$80k \times 1.0\% = \$800/\text{yr lost to tax}$

Smart location: bonds in 401(k); stocks in Roth; stocks in taxable.

401(k): \$60k stocks + \$240k bonds

Roth: \$100k stocks

Taxable: \$200k stocks

Annual tax drag on taxable: minimal (stocks are tax-efficient) — **\$0-200/yr**

*Savings of ~\$600-800/year, compounding indefinitely. Over 30 years at 7% growth, that's roughly **\$60,000-80,000** of extra wealth at retirement — for the same investments, just in different accounts.*

PRIYA — ASSET LOCATION ACROSS THREE ACCOUNTS

Priya now has three account types: a \$250k employer-sponsored retirement account (tax-deferred), a \$40k Roth IRA she opened five years ago (tax-free), and \$80k in a regular brokerage account (taxable). Until now she's held the same 70/30 stock/bond mix in all three. After reading Chapter 12, she moves the bonds entirely into the retirement account (where their interest income is sheltered), puts the highest-growth equity holdings into the Roth (where the gains will never be taxed), and keeps tax-efficient broad index ETFs in the taxable account. Total dollar amounts and overall 70/30 stay the same. Estimated annual tax savings: roughly \$1,200. Compounded over 25 years to her retirement: about \$80,000 in extra wealth, for moving the same money between accounts.

12.5 When You Only Have One Account Type

Many young investors have only a 401(k) or only a Roth IRA — asset location doesn't apply because there's no choice. In that case, just hold your target allocation in that one account. As your wealth grows and you accumulate multiple account types, asset location becomes available as an optimisation. Re-allocate at that point.

KEY TAKEAWAYS

1. **Three account types:** taxable, tax-deferred, tax-free. Their treatment differs.
2. **Bonds and REITs** are tax-inefficient — shelter them.
3. **Total stock index ETFs** are tax-efficient — keep them in taxable accounts.
4. **Highest-growth assets in tax-free accounts** (Roth, ISA) — the tax shelter matters most where return is highest.
5. **Asset location adds 0.2-0.5%/yr** at zero marginal effort. Compound it over 30 years.

CHAPTER THIRTEEN

Tax-Loss Harvesting

When an investment in your taxable account is at a loss, you can sell it, realise the loss for tax purposes, and immediately buy a similar (but not "substantially identical") fund to maintain your market exposure. The realised loss offsets capital gains elsewhere (or up to \$3,000 of ordinary income in the US). Done systematically over decades, this can add 0.5-1% per year to after-tax returns.

IN THIS CHAPTER YOU WILL LEARN

- What tax-loss harvesting (TLH) is, mechanically.
- The "wash sale" rule and how to avoid violating it.
- When TLH adds real value vs. mostly tax-deferral.
- The "direct indexing" extension that maximises TLH.

13.1 The Mechanic

Suppose you bought \$50,000 of VTI in your taxable account; it's now worth \$45,000. You're sitting on a \$5,000 unrealised loss.

Tax-loss harvesting:

1. Sell the VTI, realising the \$5,000 capital loss.
2. Immediately buy \$45,000 of SCHB (Schwab US Broad Market) — same total-market exposure, different fund.
3. The \$5,000 capital loss offsets \$5,000 of capital gains elsewhere this year. Or, if you have no offsetting gains, \$3,000 offsets ordinary income this year and the remaining \$2,000 carries forward indefinitely.

The result: you've captured a tax benefit from the loss, and your market exposure is unchanged. The cost was a small bid-ask spread and the SCHB's expense ratio may differ from VTI's by a fraction of a basis point.

13.2 The Wash-Sale Rule

The US "wash sale" rule (IRS Section 1091) disallows the realised loss if you buy "substantially identical" securities within 30 days before or after the sale. Equivalent rules exist in many countries (UK's "bed-and-breakfast" rule, similar in India).

What counts as "substantially identical" is not perfectly defined, but the safe interpretation is:

- **Safe to swap:** VTI ↔ SCHB, VTI ↔ ITOT, VOO ↔ SPY. These track different specific indices (CRSP, S&P 500) but provide similar exposure.
- **Unsafe:** VTI ↔ VTI in a different account, VOO ↔ IVV (both track S&P 500).
- **Grey area:** VOO ↔ VTI (S&P 500 vs total market — different indices, but enormous overlap). Most practitioners treat this as safe, but the IRS has never given clear guidance.

Maintain a list of paired "TLH partners" — one fund and its substitute — and rotate between them as needed.

13.3 Real Value vs. Tax Deferral

An important nuance: TLH doesn't *eliminate* tax; it *defers* tax to a later year. When you eventually sell the replacement fund, your cost basis is lower (because you replaced at a low price), so the eventual gain is bigger. The net tax saved depends on:

- **Time-value:** tax deferred for years is worth more than tax paid today (the deferred amount can compound).
- **Rate arbitrage:** if you'll be in a lower tax bracket later (e.g., retired with lower income), the deferred tax is paid at a lower rate than the offset you got today.

- **Step-up at death:** in the US, holdings get a stepped-up basis at death, meaning the deferred gain is never taxed at all. For investors who hold to death, TLH gains become permanent.

In practice, the empirical research (Khang & Bergstresser, 2021; others) suggests realistic TLH adds 0.5-1.0% per year to after-tax returns for investors in higher brackets with sufficient gains to absorb. The benefit is smaller for low-bracket investors (less to save) and for investors without gains to offset.

13.4 Direct Indexing — TLH at the Individual-Stock Level

The "direct indexing" extension: instead of holding a total-market index *fund*, you own the individual underlying stocks. At any moment some are at gains and some at losses; you can harvest the losses without affecting your overall market exposure (just like fund-level TLH, but at the stock level).

The benefit: many more TLH opportunities, since individual stocks fluctuate independently. The cost: significantly more complexity. Direct indexing was prohibitive for retail investors until brokers like Fidelity, Schwab, and Vanguard began offering automated direct-indexing services in 2022-23. Minimums vary (\$100k+ typical); fees are 0.20-0.40% — higher than a regular index ETF but justified by additional TLH if you're in a high bracket.

For the typical retail investor, fund-level TLH (described in 13.1-13.2) captures most of the benefit at zero extra cost. Direct indexing is for high-net-worth investors with large taxable portfolios who can afford the additional fee and complexity.

KEY TAKEAWAYS

1. **TLH** = sell at a loss, immediately buy a similar fund. Realise the loss for tax purposes; market exposure unchanged.
2. **The wash-sale rule:** don't buy "substantially identical" securities within 30 days. Keep a list of paired TLH partners.
3. **TLH defers rather than eliminates tax** — but the deferral + lower future rate + step-up at death often makes the benefit real.
4. **Realistic value:** 0.5-1.0% per year for higher-bracket investors with gains to absorb.
5. **Direct indexing** extends TLH to individual stocks; high-net-worth investors only.

V

PART FIVE

Decumulation

For decades you accumulated. Now you stop earning and the portfolio has to pay you. The decumulation problem is harder than accumulation in important ways: you can't average back into a down market (you're selling), sequence-of-returns risk emerges (when losses happen matters), and the time horizon shortens with each year. Three chapters of strategy.

4% RULE

| DYNAMIC WITHDRAWAL

| SEQUENCE RISK

CHAPTER FOURTEEN

The 4% Rule — Origin, Math, Criticisms

In 1994, financial planner William Bengen published research showing that a retiree with a balanced portfolio could safely withdraw 4% of the starting balance — adjusted annually for inflation — and the portfolio would last at least 30 years through every historical period studied. The "4% rule" became the cornerstone of retirement planning. It's also more nuanced than the headline suggests.

IN THIS CHAPTER YOU WILL LEARN

- Bengen's original research and the "SAFEMAX" finding.
 - The math: how 4% interacts with a 60/40 portfolio.
 - What the rule does and doesn't account for.
 - The honest verdict — closer to a 3-3.5% rule today?
-

14.1 Bengen's Original Finding

William Bengen ran historical simulations: take every 30-year period in US market history (1926-1976 was his original data), apply various initial withdrawal rates to a 50/50 stock/bond portfolio with the withdrawal increasing annually with CPI, and ask: what's the highest initial withdrawal rate that survived every period without running out of money? His answer: 4.15%, rounded to 4%. This was the "SAFEMAX" — the safe maximum starting withdrawal rate that survived the worst 30-year period (which turned out to be retirees who started in 1966, just before the 1970s stagflation).

The Trinity Study (Cooley, Hubbard, Walz 1998) extended Bengen's work to multiple portfolio mixes and time horizons. Their finding: a 60/40 stocks/bonds portfolio with a 4% initial withdrawal had a 95-98% success rate over 30-year periods.

14.2 The Mechanics

To apply the 4% rule:

1. At retirement, withdraw 4% of the portfolio balance for the first year's expenses.
2. Each subsequent year, withdraw the previous year's amount adjusted for actual inflation.
3. The portfolio's invested balance fluctuates with markets, but the withdrawal continues at the inflation-adjusted dollar amount until either you've taken 30 years of withdrawals or you die.

WORKED CALCULATION · 4% RULE IN PRACTICE

Retirement portfolio: \$1,000,000 in a 60/40 stocks/bonds mix.

Year 1 withdrawal: **\$40,000** ($4\% \times \1M).

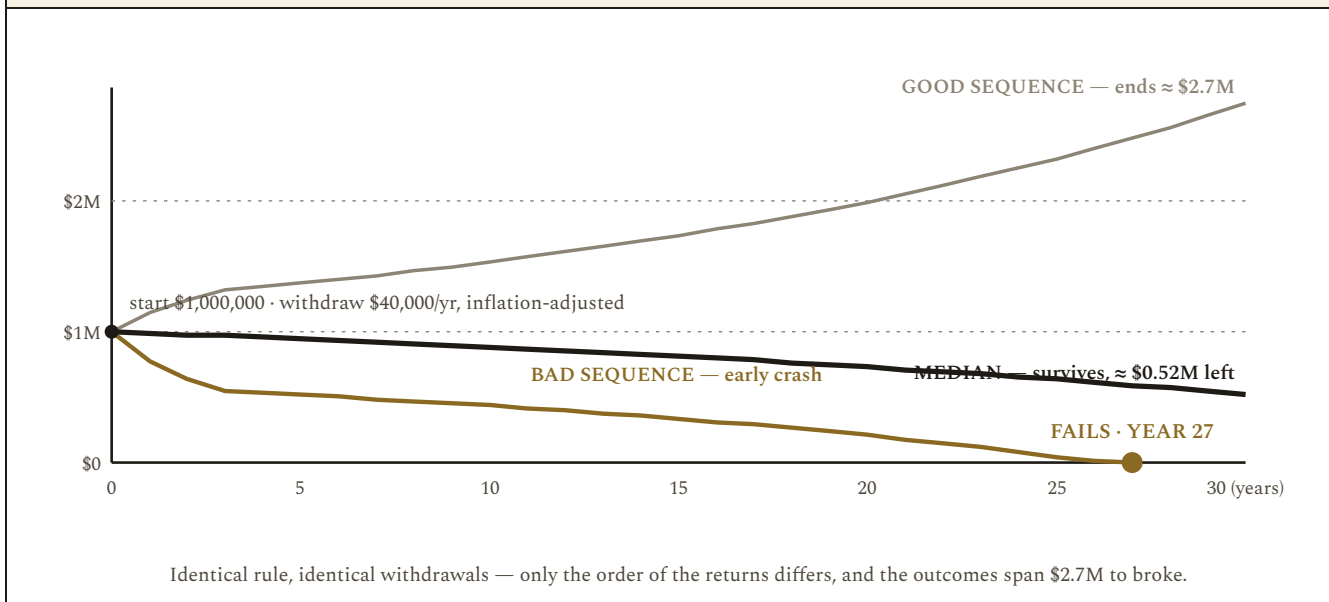
CPI in year 1: +3%.

Year 2 withdrawal: $\$40,000 \times 1.03 = \textbf{\$41,200}$.

CPI in year 2: +2%.

Year 3 withdrawal: $\$41,200 \times 1.02 = \textbf{\$42,024}$.

The withdrawals continue, mechanically adjusted for inflation, regardless of how the portfolio performs. In good market years, the portfolio grows even as you withdraw; in bad years, it shrinks. The mathematical question is: does it shrink to zero before year 30?

FIGURE 14.1 · SAME RULE, THREE FATES

The order of returns decides. Three retirees follow the 4% rule exactly — \$1,000,000 in, \$40,000 out in year one, inflation-adjusted thereafter. Strong early markets (grey) let the portfolio outrun its withdrawals and finish near \$2.7M; steady modest returns (dark) grind down slowly but survive the full 30 years with about \$520k to spare; a crash in the first three years (gold) forces every withdrawal to come out of a shrunken base, and the money runs out in year 27. This is sequence-of-returns risk — Chapter 16 treats it in full.

14.3 What the Rule Captures — and What It Doesn't

What the 4% rule captures:

- Long-run portfolio survival across historical market sequences.
- Inflation adjustment so your real spending power stays constant.
- The interaction of returns and withdrawals over multi-decade periods.

What it doesn't:

- **Variable spending needs.** Real retirees don't spend exactly inflation-adjusted amounts every year. Health costs spike late in life; travel spending peaks early.
- **Investment fees.** Bengen used index-like returns. Each 0.5% in fees roughly subtracts 0.4% from the safe rate.
- **Taxes.** 4% gross of a tax-deferred account is much less net than 4% of a Roth.

- **Sequence risk.** The rule survives the *worst* historical sequence — but only barely. A worse-than-historical sequence (which is possible) might bust it.
- **Longer than 30 years.** The rule is calibrated to 30 years. For someone retiring at 55 with a possible 40-year horizon, a lower rate is appropriate.

CAUTIONARY TALE — MEERA

Meera retired at 62 with \$850,000. Her financial advisor, paid 1.2% per year on assets under management, suggested 5.5% as a sustainable starting withdrawal — "above average because we'll manage actively." Meera withdrew \$47,000 in year one. Markets fell 22% in year two (a real, recent historical scenario); her portfolio dropped to about \$650,000 even after withdrawing. Her advisor's response: increase exposure to high-yield bonds and emerging-market equity to "catch up."

Meera withdrew her inflation-adjusted \$49,000 in year three. The portfolio kept slipping. By year six, with markets recovering but Meera's withdrawal rate now running at 8-9% of remaining principal, her financial position was no longer fixable. She returned to part-time work at 68 to bridge the gap; her grand-parenthood plans were postponed indefinitely.

What Meera got wrong: trusted a "5.5% with active management" pitch over the 4% rule's safety margin (Chapter 14); didn't push back when the advisor's response to drawdown was to add more risk; paid 1.2% AUM that compounded to over \$80,000 in her first six years. **The lesson:** the 4% rule has a margin of safety built in for a reason. The 5%+ withdrawal rate often advertised is "average" — meaning roughly half the historical outcomes were worse. Starting retirement at the "average" rate is a coin-flip with your remaining decades.

14.4 Is 4% Still Right Today?

Recent research has questioned whether 4% remains the right number. The arguments for a *lower* rate (often 3% to 3.5%):

- **Lower expected returns.** Bengen's data spanned periods with higher real bond yields than the post-2008 era. Lower bond yields mean lower portfolio returns going forward, which means lower sustainable withdrawal.

- **Higher equity valuations.** The Shiller CAPE ratio in 2025 is high by historical standards; mean reversion (if it occurs) implies lower forward returns.
- **Longer retirements.** A retiree at 60 in 2025 may live to 95 — a 35-year horizon, not 30.

The arguments for keeping 4% (or higher):

- **Social Security / pensions** cover a meaningful share of retirement income for many; the portfolio doesn't have to do all the work.
- **Real-world flexibility:** real retirees spend less when markets are down (the "flexibility premium"); the 4% rule's mechanical inflation adjustment is conservative.
- **Bequest motivation:** many retirees prefer leaving something behind, which means they're already spending less than the portfolio could sustain.

The honest synthesis: **4% remains a reasonable starting point for planning; 3.5% is a more conservative anchor; 3% is for the very long horizons or very risk-averse.** I will tell you what I have come to believe after looking at the data for years: *the right starting withdrawal rate is whichever one lets you sleep through the worst year of your retirement without selling stocks at the bottom.* For most people that is closer to 3.5% than 4%. The difference between 4% and 3.5% is about \$500,000 of starting capital on a \$2M-target lifestyle — meaningful, but not catastrophic to delay 12-18 months of work to accumulate. The difference between 4% in a bad sequence and 3.5% in the same sequence is the difference between running out of money at 80 and dying with money still in the account. The decision is irreversible the moment you retire. Make it conservatively. Adjust based on your specific situation — particularly the presence of Social Security, pensions, or other guaranteed income that reduces your portfolio's required workload.

KEY TAKEAWAYS

1. **Bengen's SAFEMAX:** 4% initial withdrawal, inflation-adjusted, on a balanced portfolio survived every 30-year period in US history.
2. **The Trinity Study** extended this: 60/40 with 4% withdrawal had 95-98% success rate over 30 years.
3. **What the rule misses:** fees, taxes, sequence risk beyond historical worst-case, longer horizons.
4. **Current consensus:** 4% is reasonable; 3.5% more conservative; 3% for very long horizons. Adjust for guaranteed-income sources.

CHAPTER FIFTEEN

Dynamic Withdrawal Strategies

The 4% rule's mechanical inflation adjustment is the conservative path. Dynamic strategies — adjusting your withdrawal up or down based on portfolio performance and remaining life expectancy — can sustainably support higher average withdrawals at the cost of some year-to-year variability. This chapter teaches the major approaches.

IN THIS CHAPTER YOU WILL LEARN

- Why static rules over-prepare for worst cases.
- Guyton-Klinger guardrails — the most-studied dynamic approach.
- The bucket strategy.
- RMD-style age-based withdrawal.
- The flexibility-vs-stability trade-off.

15.1 Why Static Rules Are Conservative

The 4% rule survives the *worst* historical sequence. But the worst sequence is rare; in the median historical sequence, the 4% rule leaves *more than the original portfolio* at the end of 30 years. The static rule wastes the difference — leaving the retiree under-spending in good outcomes to protect against bad ones that mostly don't happen.

Dynamic strategies aim to capture this median surplus: spend more when the portfolio does well, less when it doesn't. The cost is variability in the year-to-year withdrawal; the benefit is higher average spending.

15.2 Guyton-Klinger Guardrails

Jonathan Guyton and William Klinger (2006) proposed a guardrails approach: start at a base withdrawal rate (typically 5-5.5%, higher than 4%), then adjust annually based on the portfolio's *current* withdrawal rate (the dollar withdrawal divided by current portfolio value):

- **If current withdrawal rate exceeds upper guardrail** (typically 20% above starting rate, e.g., 6.6% from a 5.5% start): cut the next year's withdrawal by 10%.
- **If current withdrawal rate falls below lower guardrail** (typically 20% below, e.g., 4.4%): increase the next year's withdrawal by 10%.
- **Within the guardrails:** apply normal inflation adjustment.

The mechanism: in market downturns, the portfolio shrinks, the current rate exceeds the upper guardrail, and the retiree cuts spending — preserving capital. In strong markets, the current rate falls below the lower guardrail and the retiree spends more. Historical backtests (Pfau 2011; Bengen 2024) suggest the approach can support starting rates near 5.5% with similar survival rates as 4% rules with mechanical inflation adjustment.

15.3 The Bucket Strategy

Originated by Harold Evensky, the bucket strategy partitions the retirement portfolio into time-segmented "buckets":

- **Bucket 1 (years 0-2):** cash and short-term bonds. Covers immediate expenses without exposure to market volatility.
- **Bucket 2 (years 3-7):** bonds and conservative balanced holdings. Refills Bucket 1 as it depletes.
- **Bucket 3 (years 8+):** stocks and other long-term investments. Provides growth over decades; refills Bucket 2 over time.

The psychological benefit is huge: knowing that two-plus years of expenses are in cash equivalents lets the retiree ride out market downturns without panicking and without selling stocks at the worst time. The cash drag is real — cash earns less than bonds, which earns less than stocks — but for many retirees the behavioural durability is worth the cost.

15.4 RMD-Style Withdrawal

The US Required Minimum Distribution (RMD) rules — which mandate minimum withdrawals from tax-deferred accounts starting at age 73 — implicitly define an age-based withdrawal schedule. The IRS divisors are calibrated so the portfolio is expected to fully deplete around age 95.

Some researchers (Sun & Webb 2012) have proposed using an RMD-style schedule as a withdrawal strategy: each year, withdraw a percentage of the current portfolio determined by remaining life expectancy. Earlier years see smaller withdrawal percentages; later years larger. The advantage is mathematical optimality (Sun & Webb prove it's the optimal strategy under certain utility assumptions); the disadvantage is variable nominal-dollar amounts year-to-year.

15.5 The Trade-Off

COMPARE & UNDERSTAND · WITHDRAWAL STRATEGY TRADE-OFFS

STRATEGY	YEAR-TO-YEAR STABILITY	AVERAGE WITHDRAWAL	TAIL RISK
4% fixed (Bengen)	Highest (only inflation adjustment)	Lower (over-prepared for worst case)	Very low
Guyton-Klinger	Moderate (occasional $\pm 10\%$ adjustments)	Higher (5-5.5% start)	Low
Bucket strategy	High (cash bucket absorbs volatility)	~4% (similar to fixed)	Low; depends on bucket refilling
RMD-style	Lower (varies with portfolio value)	Higher in good markets, lower in bad	Very low (depletes optimally)

The right choice depends on personal circumstances. Retirees with stable other income (pensions, Social Security) covering basic needs can afford variability and might use Guyton-Klinger or RMD-style.

Retirees fully dependent on portfolio income for essential expenses need stability and should prefer 4% or the bucket strategy.

KEY TAKEAWAYS

1. **Static rules over-prepare** for worst-case sequences; dynamic strategies can sustain higher average withdrawal.
2. **Guyton-Klinger guardrails**: start at 5-5.5%, adjust $\pm 10\%$ when current rate exits guardrails. Can sustain higher base rates.
3. **Bucket strategy**: 2-7 years of expenses in cash/bonds; the rest in stocks. Behavioural durability is the main benefit.
4. **RMD-style**: percentage of current portfolio based on remaining life expectancy. Mathematically optimal but variable.
5. **Match the strategy to your situation**: stable other income $\rightarrow$ dynamic OK; portfolio-only $\rightarrow$ prefer stability.

CHAPTER SIXTEEN

Sequence-of>Returns Risk

Two retirees with the same starting portfolio, the same withdrawal rate, and the same average return over their retirements can end up with very different outcomes — depending on when the bad years happen. This is sequence-of-returns risk, and it's the single most distinctive risk in decumulation. Understanding it changes how you approach the years immediately before and after retirement.

IN THIS CHAPTER YOU WILL LEARN

- Why sequence matters in decumulation but not in accumulation.
- The classic two-retiree comparison.
- The "fragility window" — five years either side of retirement.
- How to defend against sequence risk.

16.1 Why Sequence Matters

During *accumulation*, sequence of returns doesn't matter to the long-term outcome. If you're going to deposit \$5,000 a year for 30 years and earn an average 8%, the order in which the 8% arrives is irrelevant to the final balance — the math is identical whether the bad years come early or late.

During *decumulation*, sequence is everything. Withdrawals turn losses into permanent reductions of capital. If a 30% market loss happens in year 2 of retirement when you're also withdrawing 4%, your portfolio drops to about 66% of its starting value, then has to recover from there while you keep drawing down. The same 30% loss in year 25 of retirement, when most of the withdrawals are already done, barely matters.

16.2 The Classic Two-Retiree Comparison

WORKED CALCULATION · SEQUENCE RISK IN ACTION

Two retirees, each with \$1,000,000 starting balance and 4% inflation-adjusted withdrawal (\$40k/year). Both experience the same set of returns over 25 years – the same average, the same volatility – just in different order.

Retiree A: bad returns early. Years 1-5 average -5% per year; years 6-25 average +9%.

Year 5 balance: roughly **\$500,000** (down 50%, while still withdrawing).

Recovery requires 9% returns on a halved base – the portfolio struggles to catch up.

Outcome at year 25: portfolio may have run out around year 18-20.

Catastrophic.

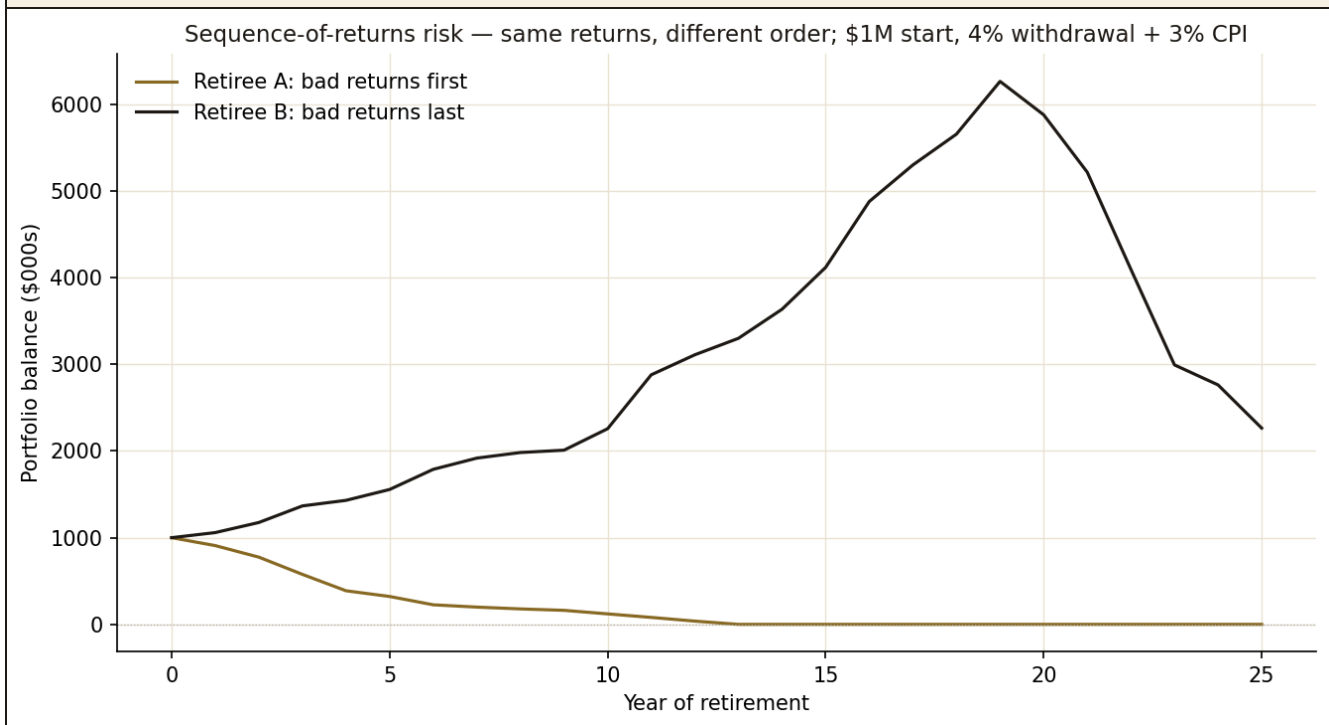
Retiree B: good returns early. Years 1-5 average +9%; years 6-25 mixed.

Year 5 balance: roughly **\$1,300,000** (up despite withdrawals).

The portfolio has grown so much it can absorb subsequent bad years.

Outcome at year 25: portfolio may have grown to **\$2,000,000+**.

*Same total returns. Same withdrawals. Different sequence. Retiree A runs out of money; Retiree B leaves a legacy. **Sequence is everything in decumulation.***

FIGURE 16.1 · SEQUENCE-OF-RETURNS RISK — SAME RETURNS, DIFFERENT ORDER

Why sequence matters in retirement. Two retirees, \$1M starting capital, the same 25 annual returns, the same 4% inflation-adjusted withdrawal. Retiree A (bad returns first) is broke by year 12. Retiree B (bad returns last) ends with \$2.2M. The arithmetic average of returns is identical. The order is everything.

16.3 The Fragility Window

Sequence risk is concentrated in the years immediately around retirement — roughly five years before and five years after the retirement date. Within this 10-year window:

- **The portfolio is at its largest** (after decades of accumulation), so percentage losses translate to large dollar losses.
- **Withdrawals begin**, locking in any losses by converting paper drawdowns into realised reductions.
- **Recovery time is short** compared to the rest of life — a bad sequence here can't be averaged out by decades of subsequent good returns.

Outside this window — say, 10 years before retirement or 10 years after — sequence matters less. Before, you can still earn and contribute; after, the worst sequence-induced damage has typically resolved.

ARUN — BUILDING THE TWO-BUCKET CASH RESERVE

Arun is 18 months from retirement. His main worry, after reading Chapter 16, is sequence-of-returns risk — a bad market in his first three years could permanently damage his portfolio. He decides to build a deliberate cash reserve: *two years of expected expenses* in short Treasury bills and a money-market fund, separate from the rest of the portfolio. The 'cost' of this is the lower yield on cash vs stocks — roughly \$4,000-6,000 per year of foregone expected return. The 'benefit' is that if a 30% bear market hits in 2027, Arun can fund 2027 and 2028 expenses entirely from cash without selling a single share at the bottom. By 2029 he can rebuild the cash bucket from the recovered portfolio. The peace of mind from having 24 months of guaranteed expenses sets him up to ride out the worst sequence without panicking. The \$5k/year is insurance, paid willingly.

16.4 Defending Against Sequence Risk

Five concrete defences:

1. **Glide path to bonds in the years before retirement.** Drop equity allocation from, say, 70% to 50% in the 5-10 years before retirement. This reduces drawdown risk during the fragile window. (Note: some research, e.g. Kitces & Pfau 2014, argues for a *rising* equity glide path after retirement — start more conservative, then gradually add stocks back — to capture upside while sequence risk has passed. The evidence on this is interesting but not yet consensus.)
2. **The bucket strategy** (Chapter 15.3). Two years of cash means you can ride out a 2-year market downturn without selling stocks at the low.
3. **Dynamic withdrawal** (Chapter 15.2). Cut spending when markets are down to preserve principal.
4. **Annuitisation of a portion of the portfolio.** Buying an immediate annuity converts some portfolio value into guaranteed income — removing sequence risk for that portion. Modest annuitisation (10-30% of the portfolio) is often defensible.
5. **Working a year or two longer** if markets are bad as retirement approaches. The single most powerful flexibility move; reduces sequence exposure dramatically.

WATCH OUT**The retirement date isn't a magic line**

Many retirees plan as if everything resolves on the retirement date. Reality: the years immediately after retirement are when sequence risk is most acute. If markets crash in your first or second year of retirement, your withdrawal plan may need to be more conservative than the 4% rule for the rest of your life. The honest acknowledgment of this risk is built into Chapter 15's dynamic-withdrawal strategies. Don't assume the bad sequence won't be yours.

KEY TAKEAWAYS

1. **Sequence doesn't matter in accumulation** (order of returns is irrelevant); **it matters enormously in decumulation.**
2. **The fragility window:** roughly 5 years either side of the retirement date.
3. **Two retirees with the same average return** can have radically different outcomes based on sequence.
4. **Defences:** glide path to bonds, bucket strategy, dynamic withdrawal, partial annuitisation, work longer if markets are bad.

VI

PART SIX

Putting It Together

Theory in Part I, allocation in Part II, implementation in Part III, tax in Part IV, decumulation in Part V. Here are two closing chapters: a complete retirement plan walked end-to-end, and a digest of the common mistakes that derail portfolios.

WORKED PLAN

COMMON MISTAKES

CHAPTER SEVENTEEN

A Complete Retirement Plan, Worked

A fictional but realistic case: a 35-year-old US software engineer with no current retirement savings, planning to retire at 65. We work the entire plan — savings rate, account types, allocation, glide path, withdrawal strategy — using the framework of the previous chapters.

17.1 The Situation

- Age: 35
- Current income: \$120,000/year, expected to grow with inflation + 1% per year in real terms
- Current expenses: \$70,000/year
- Current savings rate: 0% (nothing saved yet)
- Account types available: 401(k) at work (with 4% employer match), Roth IRA personally
- Retirement goal: age 65, spend \$80,000/year in today's dollars (anticipating modestly higher expenses in retirement)
- Expected Social Security: ~\$30,000/year starting at 67 (rough estimate)

17.2 Computing the Target

WORKED CALCULATION · WHAT PORTFOLIO IS NEEDED AT 65?

Target retirement spending: \$80,000/year in today's dollars

Expected SS at 67: \$30,000/year

Net needed from portfolio at 65-67 (gap years): \$80,000/year

Net needed from portfolio at 67+: \$80,000 - \$30,000 = \$50,000/year

Approximate weighted average withdrawal need $\approx$ \$52-55k/year for the 25-year retirement.

Using 4% withdrawal rate: portfolio target = \$55,000 / 0.04 = **\$1.375 million** (today's dollars).

For safety we'll round up to \$1.5 million in today's dollars – gives a margin of safety and accounts for some unexpected expenses.

17.3 Computing the Savings Rate

WORKED CALCULATION · WHAT SAVINGS RATE GETS THERE?

Real return assumption: 5% real (8% nominal - 3% inflation)

Years: 30 (age 35 → 65)

Target: \$1.5M in today's dollars

Annuity future-value formula (Book 1 Ch 8): $FV = PMT \times [((1+r)^n - 1) / r]$

$$1,500,000 = PMT \times [(1.05^{30} - 1) / 0.05]$$

$$1,500,000 = PMT \times [(4.322 - 1) / 0.05]$$

$$1,500,000 = PMT \times 66.44$$

$$PMT = 1,500,000 / 66.44 = \text{\textbf{\$22,580/year}}$$

Required real-dollar contribution $\approx$ \$22,580/year – about 19% of gross income, or \$1,882/month.

17.4 Account Strategy

Step 1: Capture the employer 401(k) match. At 4% match, contribute at least 4% of salary (\$4,800) — the match doubles this to \$9,600 effective contribution.

FIGURE 17.1 · THE WORKED PLAN — \$22,580/YR AT 5% REAL, 30 YEARS



The accumulation curve, real-math. The Chapter 17 worked plan: \$22,580/year contributed each year for 30 years, earning 5% real (8% nominal – 3% inflation). At age 65 the portfolio reaches roughly \$1.5M in today's dollars — the target computed from a 4% sustainable withdrawal supporting \$55k/year. The math is identical to Book 1's compounding calculations; this is just compounding applied to a specific retirement goal.

Step 2: Max out Roth IRA (\$7,000 in 2024 limits, adjusted for inflation). Tax-free growth on highest-expected-return assets.

Step 3: Continue contributing to 401(k) up to the contribution limit (\$23,000/yr in 2024) or until total savings rate hits target.

Step 4: If target savings rate is not yet met, contribute to taxable account.

For our investor: \$4,800 to capture the match + \$7,000 to Roth + \$10,780 more to 401(k) = \$22,580/year, which exactly hits target. They use only tax-advantaged accounts and don't need a taxable account.

17.5 Allocation and Glide Path

Age 35 starting allocation, applying the three-fund portfolio:

- Total US Stock Market: 48% (Roth IRA — highest expected growth)
- Total International Stock: 32% (Roth IRA + 401(k))
- Total US Bond: 20% (401(k) — bond interest sheltered from current tax)

Glide path to age 65: drop equity 1 percentage point per year starting at age 50. By 65, allocation becomes 60% equity / 40% bonds.

17.6 Decumulation Plan

At age 65 with \$1.5M:

- Use a Guyton-Klinger guardrails approach (Chapter 15.2): start at 5% (\$75,000 first-year withdrawal); adjust $\pm 10\%$ when guardrails breached.
 - Maintain 2-year cash bucket: ~\$150,000 in short Treasuries / money market. Refilled annually.
 - Delay Social Security to age 70 (benefits grow ~8%/year from age 67). Until then, fund the gap entirely from the portfolio.
 - At 70, Social Security covers \$40,000/year (the 24% boost for delaying from 67 to 70). Portfolio withdrawal can drop to \$35-40k/year.
-

17.7 What Could Derail the Plan

- **Job loss** in the accumulation phase: need 6-12 months of emergency reserves outside the retirement accounts (Book 1 Ch 5).
- **Bad sequence around 65**: market crash in years 60-67 could force delaying retirement or accepting lower withdrawal. Build in flexibility.
- **Behavioural mistakes**: not contributing during bear markets (Ch 10), moving stops or panicking. The plan only works if executed for 30 years without interruption.

- **Health costs:** a major medical event in retirement can dramatically alter the math. Maintain health insurance; consider HSA contributions during accumulation.

17.8 What This Plan Doesn't Cover

It's a starting framework, not a complete financial plan. For a real implementation, also consider:

- Disability insurance (income protection during accumulation)
- Life insurance (if dependents)
- Estate planning (will, beneficiary designations, healthcare directives)
- Tax planning beyond accounts (charitable giving, donor-advised funds for higher-income years)
- Inflation-protected income sources (TIPS, I-Bonds in the US; equivalent inflation-linked instruments elsewhere)

Book 7 (Derivatives, Tax, Psychology & Safety) and Book 8 (Building & Protecting Wealth) cover these.

KEY TAKEAWAYS

1. **Start with the target:** required retirement spending / sustainable withdrawal rate = needed portfolio.
2. **Compute the savings rate** using the annuity formula and a realistic real-return assumption.
3. **Capture employer match, max Roth, fill 401(k)** in that order — exhaust tax-advantaged space first.
4. **Use the three-fund portfolio with a glide path;** lean toward stocks early, bonds later.
5. **Build flexibility:** emergency reserves, dynamic withdrawal, willingness to delay retirement, health-cost contingency.

CHAPTER EIGHTEEN

Common Portfolio Mistakes

Twelve mistakes that systematically destroy portfolio outcomes for retail investors. Most are obvious; all are easily made; some are avoidable only by knowing they exist. Read this list once a year alongside your annual rebalance.

1. **Starting too late.** Compounding rewards time more than amount. The 25-year-old who saves \$200/month finishes ahead of the 35-year-old who saves \$400/month for the same 30-year horizon (Book 1 Ch 8).
2. **Not capturing the employer match.** A 100% return on the matched portion. Anything less than full match capture is leaving free money on the table.
3. **Picking individual stocks.** 96% of stocks underperform Treasury bills over their lifetimes (Bessembinder 2018, Chapter 1). The 4% of winners are not identifiable in advance.
4. **Holding cash for "the next opportunity."** The cost of being out of the market while waiting often exceeds the benefit of buying lower when you do.
5. **High-fee active funds.** The empirical record (Book 2 Ch 14, SPIVA): 80-90% of active funds underperform over 10+ years. A 1% fee compounds to 22% of your final pot over 30 years.
6. **Failing to rebalance.** Drift turns a 60/40 portfolio into 75/25 after a few strong stock years. Risk profile no longer matches intention.
7. **Selling in bear markets.** The most expensive behavioural mistake. The investors who sold in March 2009, March 2020 typically missed massive recoveries within months.
8. **Wrong asset location.** Putting bonds in taxable accounts costs 0.5-1% per year in tax drag for high-bracket investors. Asset location is free; ignoring it is expensive.
9. **Not tax-loss harvesting.** A 0.5-1% annual after-tax improvement at zero effort. Most retail investors don't bother.
10. **Over-tilting to factors or sectors.** Concentrated bets on value, momentum, or tech work — until they don't. A decade of underperformance is entirely within the historical distribution.

11. **Retiring too aggressively.** The 4% rule has a safety margin built in for a reason. Starting at 6-7% withdrawal in the hope that returns will be average has destroyed many portfolios.
12. **Ignoring sequence risk.** A bad sequence in the fragility window (5 years either side of retirement) is far more damaging than the same sequence in another period. Build in defences (Ch 16.4).

The two rules that matter most

If the entire book reduces to two rules, let them be these: (1) **start investing early and never stop — through bull markets, bear markets, recessions, and your own panic.** (2) **keep costs (fees + taxes) as close to zero as possible.** Everything else is calibration. The investor who follows these two and uses a 60/40 three-fund portfolio for forty years will outperform the vast majority of professionals doing far more complicated work.

AUTHOR'S NOTE · THE SINGLE MOST USEFUL SENTENCE IN THIS BOOK

RAVI — FIVE-YEAR PORTFOLIO REVIEW

Ravi is 27 now. Five years of investing. He sits down at the end of the calendar year to do a 30-minute review — the practice this book recommends. His portfolio: \$42,000 across one Target-Date 2065 fund, \$4,000 emergency reserve in money market, \$1,200 in a Roth IRA he opened last year.

His allocation is 87% equity / 13% bonds (his target is 90/10 for his age, so he's slightly bond-heavy due to the Target-Date glide path). His expense ratio across everything is 0.08%. His SIP contribution rate is 24% of gross income (up from 15% three years ago). His total investing time per year: roughly two hours.

What did he get right? Starting at 22. Refusing to pick stocks. Refusing to follow his friend's crypto picks. Increasing the SIP every salary bump. What does he need to improve? Almost nothing. The compounding will do the rest. **P2** Time beats timing — and Ravi has 38 more years of time on his side.

If the four hundred pages of *Money, Mastered* reduce to one sentence, it is this: **save 15-25% of your income from your first paycheque, invest it in low-cost broad-market index funds, and**

don't stop — through bull markets, bear markets, recessions, and your own panic — for thirty years. That sentence, executed, beats the vast majority of professional portfolios, the vast majority of stock-picking strategies, and the vast majority of tactical-allocation programs. It is the strategy I'd give my own children. It is the strategy the index-investing pioneers (Bogle, Buffett's stated advice for the average person, Charles Ellis, William Bernstein) have all converged on independently. Everything else in this six-volume series — bonds, technical analysis, tax-loss harvesting, factor investing, decumulation theory — is calibration around that one sentence. The calibration matters. The sentence matters more.

BACK MATTER

Glossary

The working vocabulary of portfolio construction, in plain language.

4% rule — Bengen's finding that a 4% initial withdrawal, inflation-adjusted, on a balanced portfolio survived every 30-year period in US history.

Asset allocation — the strategic split of a portfolio across asset classes (stocks, bonds, etc).

Asset location — which type of account holds each asset; bonds in tax-deferred, stocks in taxable.

Bessembinder study — 2018 finding that 4% of US stocks accounted for all net wealth creation from 1926-2016.

Bucket strategy — Evensky's decumulation approach using 2-3 time-segmented buckets to absorb volatility.

Calmar ratio — annualised return / max drawdown; the worst-case-aware risk-adjusted measure.

Capital Market Line — the line from the risk-free rate tangent to the efficient frontier; mix of cash + tangency portfolio.

Direct indexing — owning the underlying stocks of an index directly; enables stock-level tax-loss harvesting.

Drift — the change in actual allocation away from target as asset classes compound at different rates.

Efficient frontier — the curve of best-possible portfolios; highest return per unit of risk.

ETF — exchange-traded fund; trades intraday like a stock.

Factor investing — tilting toward characteristics (value, size, momentum, quality, low-vol) that have shown historical excess returns.

Glide path — the planned change in portfolio allocation over time as goals approach.

Guyton-Klinger — dynamic withdrawal strategy using guardrails to adjust spending based on portfolio performance.

Home bias — the universal investor tendency to overweight domestic markets.

Idiosyncratic risk — company-specific risk that diversification eliminates.

Lump sum vs. DCA — investing all-at-once vs. over time; lump-sum has higher expected return ~66% of the time.

Modern Portfolio Theory (MPT) — Markowitz's framework for evaluating portfolios as combinations rather than individual holdings.

Mutual fund — pooled investment fund priced once a day at NAV.

Rebalancing — bringing portfolio allocation back to target after drift.

RMD — Required Minimum Distribution; US-mandated withdrawals from tax-deferred accounts.

Sequence-of-returns risk — the unique decumulation risk that bad early returns can permanently damage a portfolio.

Sharpe ratio — $(\text{return} - \text{risk-free rate}) / \text{volatility}$; the standard risk-adjusted return measure.

Sortino ratio — Sharpe variant using only downside volatility.

Systematic risk — market-wide risk that diversification cannot eliminate.

Tax-loss harvesting (TLH) — selling a holding at a loss for tax benefit, replacing with a similar (not identical) fund.

Three-fund portfolio — total US stock, total international stock, total US bond. The Bogleheads-recommended default.

Time horizon — the years until the money is needed; the single biggest input into allocation.

Total return — income + capital appreciation; the honest scoreboard.

Wash-sale rule — IRS rule disallowing the loss if substantially identical securities are bought within 30 days of sale.

BACK MATTER

Sources & Further Reading

The canonical works behind the ideas in this book, in rough order of accessibility.

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WHERE THIS SITS IN THE SERIES

This is **Book 6** of *Money, Mastered — The Roadmap*. It builds on the personal-finance foundations of **Books 1-2** and complements the markets-and-analysis depth of **Books 3-5**. Next in the roadmap: derivatives, tax, psychology and safety (Book 7); then building and protecting wealth (Book 8). Read in order, the eight books cover the complete journey from "what is money?" to "I've built and protected wealth for myself and my family."
