CHARTA LEARNING · LESSON NOTES

Portfolio management overview

CFA Level I · Portfolio Management

You will learn: How to judge an investment by what it adds to the whole portfolio, say what different investors need, describe the three-stage portfolio management process, compare defined benefit and defined contribution pensions, and tell pooled vehicles apart and compute a net asset value.

Running example: Examples use made-up figures: Maya's portfolio (volatility 14%, expected return 6%), an endowment, a pension plan and a fund.

1. The portfolio perspective

- A portfolio is a collection of investments. The portfolio perspective evaluates an investment by what it contributes to the whole portfolio (its marginal contribution), not by its standalone characteristics.
- Return adds up as a weighted average. Risk does not: the portfolio's standard deviation depends on how the pieces move together. So a wildly swinging asset can lower risk and a calm one can fail to help. Correlation, not volatility alone, drives the effect.
- Correlation runs from −1 (opposite) to +1 (lockstep). Any correlation below +1 helps a little; diversification does not need a negative correlation. The lower the correlation, the smaller the third term and the lower the risk.

$$\sigma_p^2 = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2 \times w_1 \times w_2 \times \rho \times \sigma_1 \times \sigma_2;\ \text{Return} = w_1R_1 + w_2R_2$$

MAYA MOVES 20% OF HER PORTFOLIO (VOLATILITY 14%, RETURN 6%) INTO A OR B

A: volatility 10%, correlation 0.98, return 5%	$0.8^2 \times 14^2 = 125.44$; $0.2^2 \times 10^2 = 4.00$; covariance part 43.90	**variance 173.34, volatility 13.17%**
B: volatility 25%, correlation −0.20, return 8%	$125.44 + 0.2^2 \times 25^2$ (25.00) − 22.40	**variance 128.04, volatility 11.32%**
Return with A / with B	0.8 × 6 + 0.2 × 5; 0.8 × 6 + 0.2 × 8	**5.8% / 6.4%**
Return ÷ risk: today / A / B		**0.43 / 0.44 / 0.57**

Watch out: Judging an asset by its own volatility; the calm look-alike A loses to the wild diversifier B. B stops helping above a correlation of about 0.41.

2. Types of investor and what each needs

- Individuals invest for their own goals; institutions invest for many people or a purpose (pension plans, endowments, foundations, insurers, banks, sovereign wealth funds). Needs differ, so portfolios differ.
- Every investor is described by: return objective; risk (ability to take it is fact, willingness is attitude, and the lower of the two guides the plan); time horizon; liquidity; tax; legal and regulatory limits; and unique circumstances.
- Main needs: individual, goals and tax; defined benefit pension, meeting its liabilities (its benchmark is its liability, not a market index); endowment, a real return above its spending rate.
- Insurer, claims and regulation; bank, liquidity (it earns a spread); sovereign wealth fund, a very long horizon and few cash needs.
- Typical horizon from short to long: bank, property insurer, individual near retirement, life insurer or pension, endowment, sovereign fund. The longer the horizon and the lower the cash needs, the more illiquid, risky assets it can hold.

ENDOWMENT ($100M, SPENDS 4.5%, INFLATION 3%) AND A PENSION PLAN (ASSETS 90, LIABILITIES 100, $M)

Required return	approximately 4.5% + 3.0%; exactly 1.045 × 1.03 − 1	**7.5%; 7.6%**
If it earns 6% and spends	100 × 1.06 − 4.5; needed 100 × 1.03	**101.5 vs 103.0, real shortfall 1.5**
Pension funded ratio at start	90 ÷ 100	**90.0%**
After assets +12%, liabilities +15%	90 × 1.12 = 100.8; 100 × 1.15 = 115.0	**100.8 ÷ 115 = 87.7%**

Watch out: Forgetting inflation for an endowment; giving a pension an index as its natural benchmark.

3. The portfolio management process

- Three stages that repeat as a loop: planning, execution, feedback. Findings and changes in the investor's life return to planning.
- Planning: understand the investor (objectives and constraints) and write the investment policy statement (IPS), which records objectives, constraints and the benchmark. Capital market expectations (forecasts of returns, risks and correlations) together with the IPS lead to the strategic asset allocation, the long-run target mix.
- Execution: set the allocation, select securities and trade, keeping costs low.
- Feedback: monitor the portfolio and the investor; rebalance toward target weights; evaluate performance against the benchmark named in the IPS (whether the result was skill or luck is a later question).

REBALANCING TO A 60% SHARES, 40% BONDS TARGET; SHARES +20%, BONDS FLAT

Start	600 shares + 400 bonds	**1,000**
After the year	720 + 400	**1,120**
Share weight now	720 ÷ 1,120	**64.3%**
Target in shares	60% × 1,120	**672**
Sell shares, buy bonds	720 − 672	**48**

4. Pensions: defined benefit and defined contribution

- Defined benefit (DB): the employer (plan sponsor) promises a retirement benefit, usually based on salary and years of service, and must fund it. The sponsor bears investment risk and longevity risk (retirees living longer than expected). Funded status compares assets with the present value of what is owed.
- Defined contribution (DC): the employer promises only to pay in contributions. The employee usually chooses the investments and bears investment risk and the risk of running out of money. A DC account is portable to a new job.
- A DB plan's policy depends on its liabilities, shaped by its members. Young members: long-duration liabilities (very sensitive to interest rates), low cash needs, more risk possible. Many retirees: shorter liabilities, more cash needed, less ability to take risk. A strong sponsor can afford a bigger shortfall.

A DB PROMISE (1.5% OF FINAL SALARY PER YEAR, 30 YEARS, $80,000) AND A DC ACCOUNT ($6,000 A YEAR FOR 30 YEARS)

Annual pension per retiree	1.5% × 30 × 80,000	**$36,000**
Funded ratio (assets $800m, benefits PV $1,000m)	800 ÷ 1,000	**80%, shortfall $200m is the sponsor's**
DC total paid in	6,000 × 30	**$180,000**
DC account at 3% / 5% / 7%	6,000 × 47.575 / 66.439 / 94.461	**$285,452 / $398,633 / $566,765**
Gap, best to worst	566,765 − 285,452	**$281,313, the employee's risk**

5. Pooled investment vehicles

- A mutual fund pools money, is run by a professional and gives diversification, professional management and low minimums. Vehicles differ in how shares are bought and priced.
- Open-end fund: you deal with the fund itself, which creates and redeems shares at net asset value (NAV), struck once a day. NAV is worked out from the holdings, not from what anyone will pay.
- Closed-end fund: fixed number of shares traded on an exchange between investors at a market price, which can sit at a premium or discount to NAV for years.
- Exchange-traded fund (ETF): trades on an exchange all day; authorised participants create and redeem shares, usually in kind, keeping the price near NAV and tending to make ETFs tax-efficient.
- Separately managed account: you own the securities directly, allowing customisation and tax management, with a high minimum. Hedge funds and private equity funds are pools limited to qualified investors, less regulated, less liquid, with performance fees.

> **NAV per share = (assets − liabilities) ÷ shares outstanding**

FUND WITH ASSETS $520M, LIABILITIES $20M, 25M SHARES

Net assets	520 − 20	**$500m**
NAV per share	500 ÷ 25	**$20.00**
Closed-end price $18.40: discount	1 − 18.40 ÷ 20.00	**8.0%**
Open-end redemption price	NAV	**$20.00**

Key takeaways

- Judge an asset by what it adds to the whole portfolio; correlation, not volatility alone, drives the effect.
- Return is a weighted average; risk is not, and any correlation below +1 helps.
- Investors differ in return objective, risk, horizon, liquidity, tax, regulation and unique circumstances.
- The process is a loop: planning, execution, feedback.
- In a DB plan the sponsor carries the risk; in a DC plan the employee does.
- NAV per share = (assets − liabilities) ÷ shares; open-end funds deal at NAV, closed-end funds and ETFs trade on an exchange.

Quick check

1. Calm asset with correlation 0.9, or volatile asset with correlation −0.2: which cuts risk more?
   Answer: The volatile one. Correlation drives it.
2. DB plan: assets 90, liabilities 120. Funded ratio, and who bears the shortfall?
   Answer: 90 ÷ 120 = 75%. The sponsor.
3. Fund assets $300m, liabilities $10m, 10m shares. NAV per share?
   Answer: (300 − 10) ÷ 10 = $29.00