IQIC - Quantitative Tools

#4: Understanding Investment Risk

More Than Just Losing Money

Defining investment risk

- **Risk is uncertainty:** The outcome may be better or worse than expected.
- **Potential loss:** The chance you end up with less money than you started with.
- **Fluctuations in value:** Even if you don't lose money, the path can be bumpy.
- **Why it matters:** You cannot judge a strategy without understanding its risk.

How Bumpy Is the Ride?

Volatility as a measure of risk

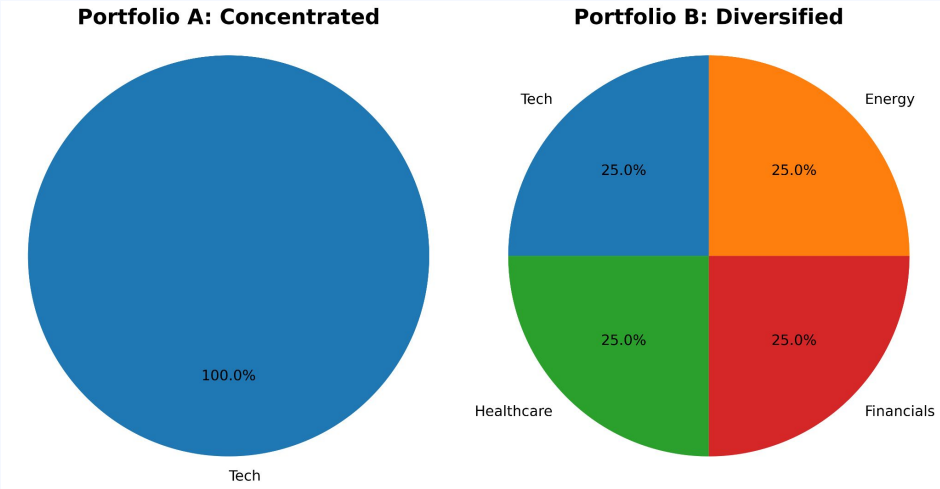
- **Volatility:** How much returns fluctuate around their average.
- **High volatility:** Returns swing widely; more uncertainty.
- **Low volatility:** Returns are more stable; less uncertainty.
- **Measured by:** Standard deviation of returns (a statistical measure of spread).

Stable Strategy	Volatile Strategy
+2%, +2%, +2%	+10%, -8%, +15%
Average: +2%	Average: +5.7%
Low volatility	High volatility

Don't Put All Your Eggs in One Basket

Concentration risk

- **Concentration risk:** Heavy exposure to one company, sector, or idea.
- **Example:** 100% in one stock. If it drops 50%, you lose half your money.
- **Diversification:** Spreading exposure reduces concentration risk.
- **But diversification has limits:** Correlated assets can still fall together.



No Free Lunch

The relationship between risk and return

- **Higher expected return requires taking more risk:** Investors demand compensation for uncertainty.
- **But higher risk does not guarantee higher realized return:** You might take risk and still lose.
- **Expected return is not a promise:** It is an average over many possible outcomes.
- **Key takeaway:** Risk and return are linked, but the link is not a guarantee.

Investment	Expected Return	Risk
Government bond	3%	Low
Large company stock	8%	Medium
Small company stock	12%	High

Two Portfolios, Same Return, Different Paths

Why return alone isn't enough

- **Portfolio A:** Returns 10% per year, steady, low volatility.
- **Portfolio B:** Returns 10% per year on average, but swings wildly.
- **Which is better?** Portfolio A, because you get the same return with less risk.
- **Lesson:** Always evaluate return alongside risk.

Year	Portfolio A	Portfolio B
1	+10%	+30%
2	+10%	-20%
3	+10%	+25%
4	+10%	-5%
Average	+10%	+10%

Additional Resources

Where to go next

- **"What Is Risk?" - Investopedia**
  Clear introduction to investment risk, including volatility and concentration.
- **"Risk and Return" - CFA Institute**
  Short article on the relationship between risk and expected return.
- **"Concentration Risk" - Investopedia**
  Examples of concentration risk and why diversification matters.