# IQIC - Quantitative Tools

#1: Investment Hypothesis

# From Opinion to Testable Idea

**The foundation of every quantitative strategy**

- **An investment hypothesis is a falsifiable statement:** if it can't be proven wrong, it can't be tested.
- **It is not a prediction:** it's a proposition about *why* and *under what conditions* a pattern should exist.
- **Every quantitative strategy starts here:** without a clear hypothesis, you're just fitting noise.
- **Testable hypotheses lead to measurable results:** you can evaluate, refine, or discard them.

| Opinion | Hypothesis |
| --- | --- |
| "Tech stocks will go up" | "Stocks with above-median 6-month momentum and positive earnings revisions outperform over the next 3 months" |
| "Gold is a good investment" | "Gold returns are negatively correlated with real interest rates over 12-month horizons" |
| Cannot be tested | Can be tested with historical data |

# From "I Noticed..." to "I Can Test..."

## The hypothesis development process

- **Observe:** Start with a pattern you've seen in markets or data.
- **Ask why:** Propose a mechanism: why might this pattern exist?
- **Specify conditions:** Narrow down when and where it should work.
- **State testably:** Write it as a precise, falsifiable statement.

| Step | Example |
| --- | --- |
| Observe | Stocks that beat earnings tend to rise for weeks after |
| Ask why | Investors underreact to good news; information diffuses slowly |
| Specify conditions | Effect is stronger in smaller companies with less analyst coverage |
| State testably | "Small-cap stocks with positive earnings surprises outperform by 2% over 20 trading days" |

# Making Your Hypothesis Quantitative

**Universe, Signal, Timeframe, Expected Outcome**

- **Universe:** What assets are you looking at? It defines where the strategy can trade and what data you need.
- **Signal:** What measurable variable predicts returns? The core input; must have economic rationale.
- **Timeframe:** Over what period does the signal work? Determines measurement frequency and holding period.
- **Expected Outcome:** What do you expect to happen? Direction, magnitude, benchmark for comparison.

| Variable | Question | Example |
|---|---|---|
| Universe | What assets? | S&P 500 stocks, excluding financials |
| Signal | What predicts returns? | 3-month price momentum |
| Timeframe | Over what period? | Measured monthly, held 1 month |
| Expected Outcome | What should happen? | Top quintile beats bottom by 4% annually |

# What Makes a Hypothesis Testable?

Learning from examples

- **Bad hypotheses are vague, unfalsifiable, or assume the conclusion.**
- **Good hypotheses specify universe, signal, timeframe, and expected outcome.**
- **The test:** Can you measure it? Can you state what would prove it wrong?

| Bad Hypothesis | Why It's Bad |
|---|---|
| "Value investing works" | Too vague: what is "value"? What does "works" mean? |
| "Stocks go up after good news" | "Good news" undefined, no timeframe, not falsifiable |
| **Good Hypothesis** | **Why It's Good** |
| "Stocks with P/E below the 20th percentile of their sector outperform peers by 3% annually over a 1-year holding period" | Specific universe, clear signal, defined timeframe, measurable outcome |
| "Small-cap stocks with positive 1-month earnings estimate revisions outperform the Russell 2000 by 1.5% over 20 trading days" | Defined universe, quantifiable signal, specific magnitude |

# Hypothesis Development Checklist

**Use this template for your IQIC strategy**

- Complete this **BEFORE** building your strategy.
- Every blank **must** be filled: no vague answers.
- This becomes the **foundation** for your backtest and your IQIC submission.

| Component | Example |
|---|---|
| Observation | Stocks that gap up after earnings tend to continue rising |
| Rationale | Underreaction to positive surprises; slow information diffusion |
| Universe | S&P 500 stocks with earnings announcements |
| Signal | Earnings surprise > 5% AND gap up > 2% on announcement day |
| Timeframe | Enter next day open; hold 10 trading days |
| Expected Outcome | Average return > 1.5% over holding period vs 0.3% market average |
| Falsification | If average return ≤ 0.5% or not statistically different from zero |

# Additional Resources

Where to go next

- **"How to Form an Investment Hypothesis" - Investopedia**

  Plain-English guide to turning observations into testable investment ideas.
- **"The Signal and the Noise" - Nate Silver (book excerpt)**

  Chapters on prediction vs. explanation and why falsifiable hypotheses matter.
- **"Quantitative Investing: From Theory to Practice" -QuantStart**

  Free article series on building a systematic strategy, starting with the hypothesis.