

How Should You Diversify? Evaluating Approaches to Systematic Portfolio Design

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Cross-sector vs same-instrument diversification,
hold times, and implementation trade-offs

Disclaimer

Futures trading involves substantial risk of loss and is not suitable for all investors.

Past performance is not necessarily indicative of future results.

Hypothetical performance results have many inherent limitations, some of which are described under CFTC Rule 4.41.

This material is for informational purposes only and is not an offer to buy or sell any futures or derivatives contract.

Treat all results in this presentation as hypothetical.

Why diversification matters

The objective is not more signals. The objective is more independent P&L streams.



Risk-adjusted returns

Combine edges with different drivers so one regime does not control the outcome.



Drawdown mitigation

Reduce concentration risk when a sector, signal family, or horizon temporarily stops working.



Robustness

Make the portfolio less fragile to overfitting and implementation surprises.

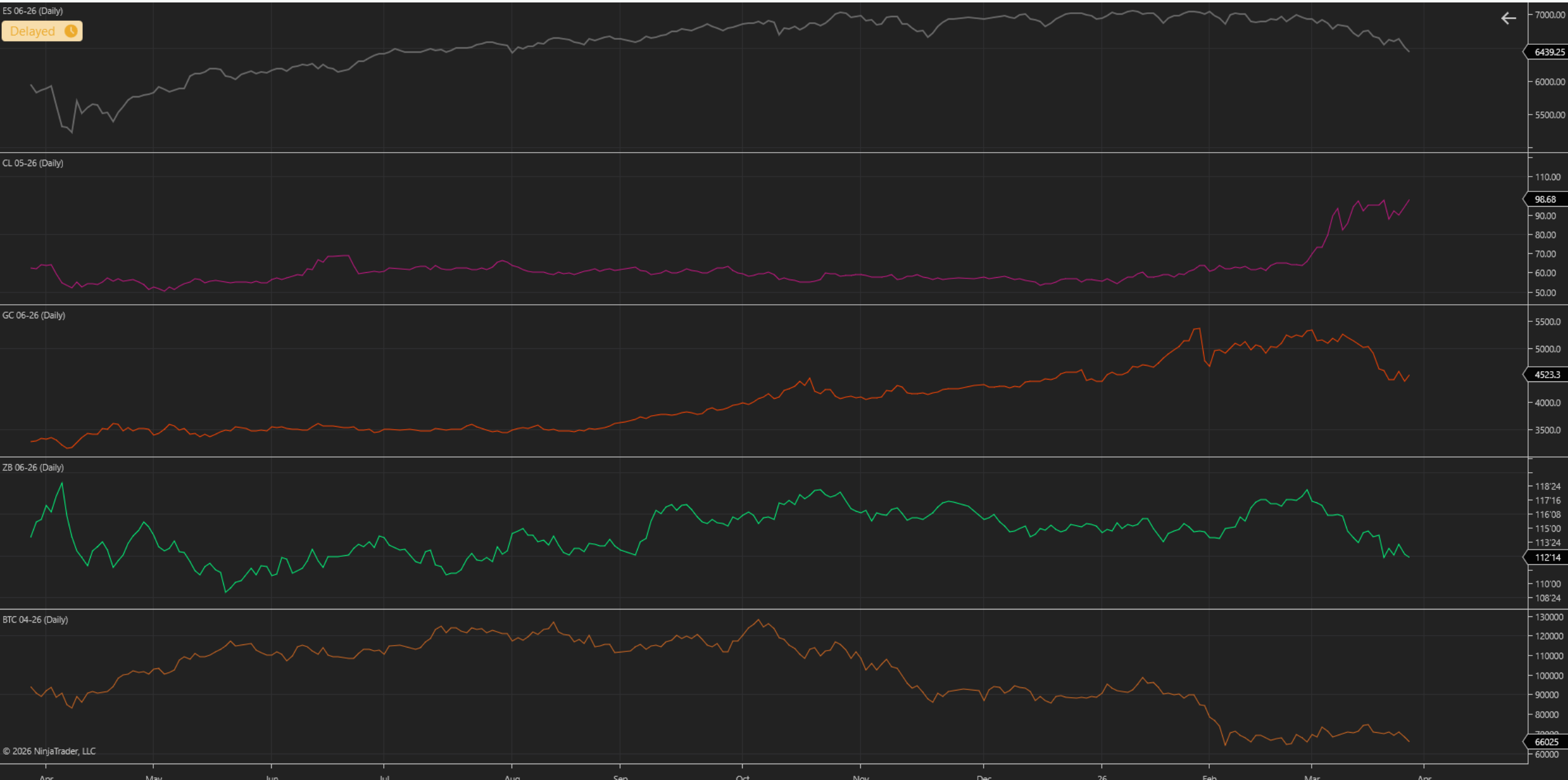
The two central design questions

**Diversify across
sectors?**

OR

**Diversify across
systems within a sector?**

Third lever: diversify across holding periods



Three ways to diversify a systematic portfolio

Think in layers: markets, systems, and horizons.

1 Markets / sectors

Equities, rates, FX, commodities

EQ

Rates

FX

Cmdty

2 Systems / signals

Trend, breakout, carry, mean reversion

Trend

Breakout

Carry

MR

3 Horizons / hold times

Fast, medium, and slow decision cycles

Fast

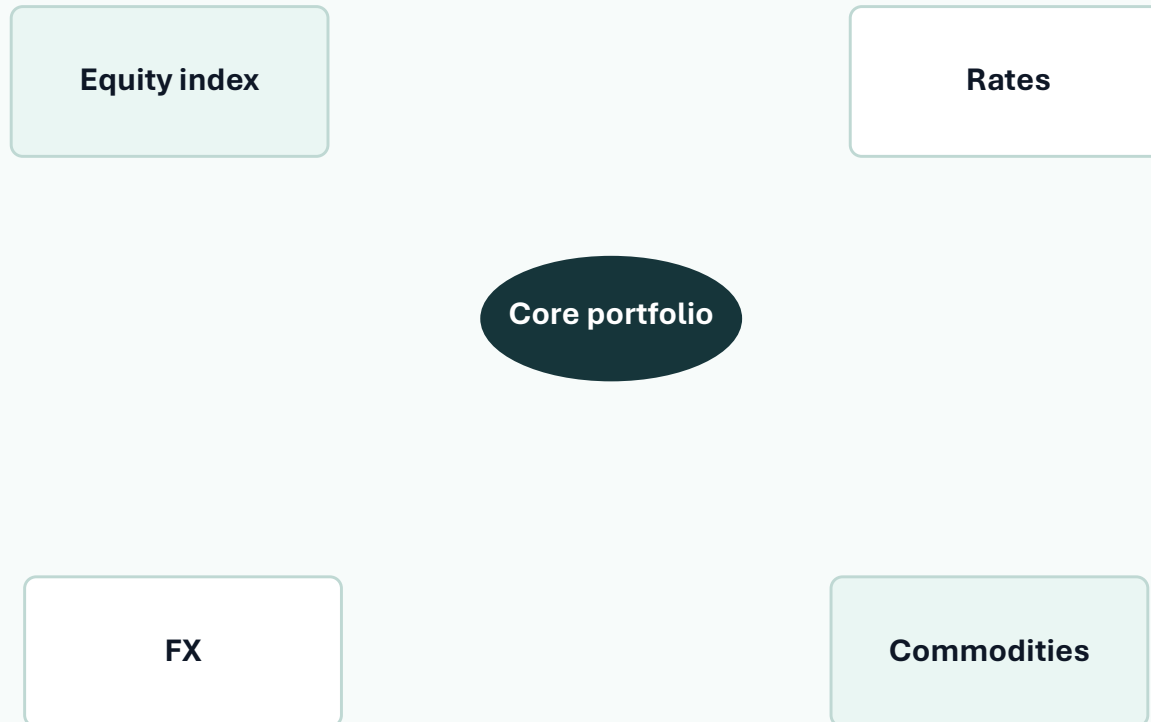
Medium

Slow

Best practice: diversify by independent return drivers rather than by the raw number of models.

Diversifying across sectors

A broad multi-asset base is often the cleanest way to reduce regime concentration.



Advantages

- Lower dependence on any single economic regime.
- More crisis resilience when leadership rotates across assets.
- Often the best starting point for robust systematic portfolios.

Drawbacks

- Can dilute a strong domain specific edge.
- Requires cross market normalization, risk scaling, and execution discipline.
- Crowded macro regimes can push correlations up when you need diversification most.

Best when the objective is breadth, smoother drawdowns, and lower regime fragility.

Diversifying across systems within the same instrument

Useful when one market offers enough distinct edges, liquidity, and execution quality.

Example: one liquid market sleeve

Different systems can attack different behaviors even when they trade the same contract.

Trend

Breakout

Carry / curve

Mean reversion

Market
portfolio

Advantages

- Let's you exploit multiple micro-edges inside a market you know well.
- Preserves domain expertise, execution focus, and simpler monitoring.
- Can compete with sector diversification if the market has many low-correlation trading systems.

Drawbacks

- Hidden concentration remains if the entire sleeve depends on one market regime.
- False diversification is common when models differ in form but not in driver.
- Instrument-specific shocks can hit every trading system at once despite different rules.

Best when research depth and execution quality in one market are genuine competitive advantages.

Workbook test design: across sectors vs same instrument

Using CSCB trading systems, treat as hypothetical

140 valid strategies

Known market/sector, present in the settings data, and at least 60 non-zero daily observations.

11 markets with 4+ trading systems

Same-instrument portfolios were sampled only from markets with enough distinct trading systems.

7 usable sectors

Across-sector portfolios were sampled from four distinct sectors per test portfolio.

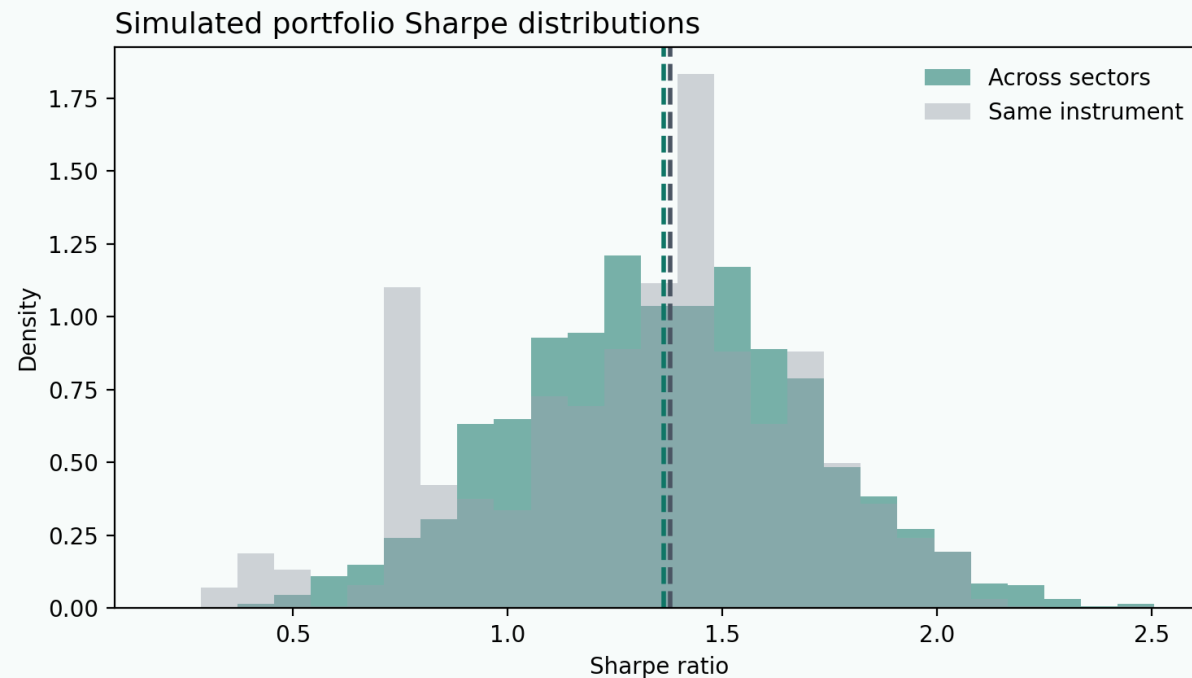
Methodology

- The daily P&L streams were mapped by market and sector for each trading system.
- Settings data added bar size, trading hours, and average hold days so the test could measure operational diversity as well as return statistics.
- Each trading system was scaled to the same 10% annualized volatility target so the comparison test's structure, not raw contract sizing.
- Each test portfolio held four trading systems and began when the last selected trading system became active, creating a fair common-history comparison.

Interpret the test as a portfolio-construction experiment, not a literal production allocation.

Test results: across sectors vs same instrument

Median central tendency is similar. The difference shows up in dependence and left-tail robustness.



Across sectors

Median Sharpe 1.36 | Avg pairwise corr 0.003

P(Sharpe < 1) 14.4% | P(MaxDD < -3%) 28.8%

Median Calmar 1.06 | Markets/Sectors 4/4

Same instrument

Median Sharpe 1.38 | Avg pairwise corr 0.015

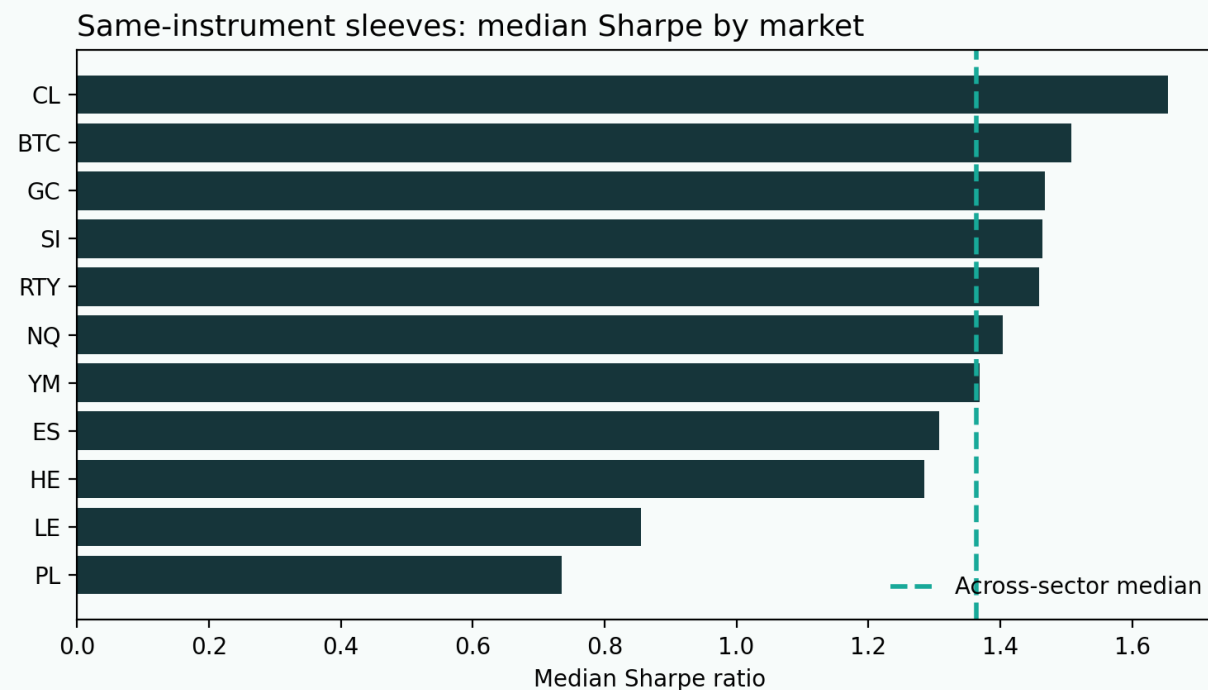
P(Sharpe < 1) 20.7% | P(MaxDD < -3%) 32.1%

Median Calmar 1.05 | Markets/Sectors 1/1

Takeaway: same-market sleeves can match the median, but cross-sector portfolios reduce dependence and improve the weak-case distribution.

Operational lens: time frames, trading hours, and market choice

The structure question is not only about Sharpe. It is also about how the book behaves operationally.



- Across-sector portfolios mixed 2+ trading-hour regimes in 74.9% of simulations vs 65.4% for same-instrument sleeves.
- Across-sector portfolios mixed 2+ hold-time buckets in 96.3% vs 84.7% for same-instrument sleeves.
- Best same-market sleeves in this workbook were CL (1.65), BTC (1.51), GC (1.47), and NQ (1.40).
- Start with sectors for breadth; stay inside one market only when you have many genuinely distinct trading systems and strong execution confidence.

Trading system design & hold times

There is rarely one universally best hold time. The practical winner is the blend that survives costs and regime shifts.



Design implications

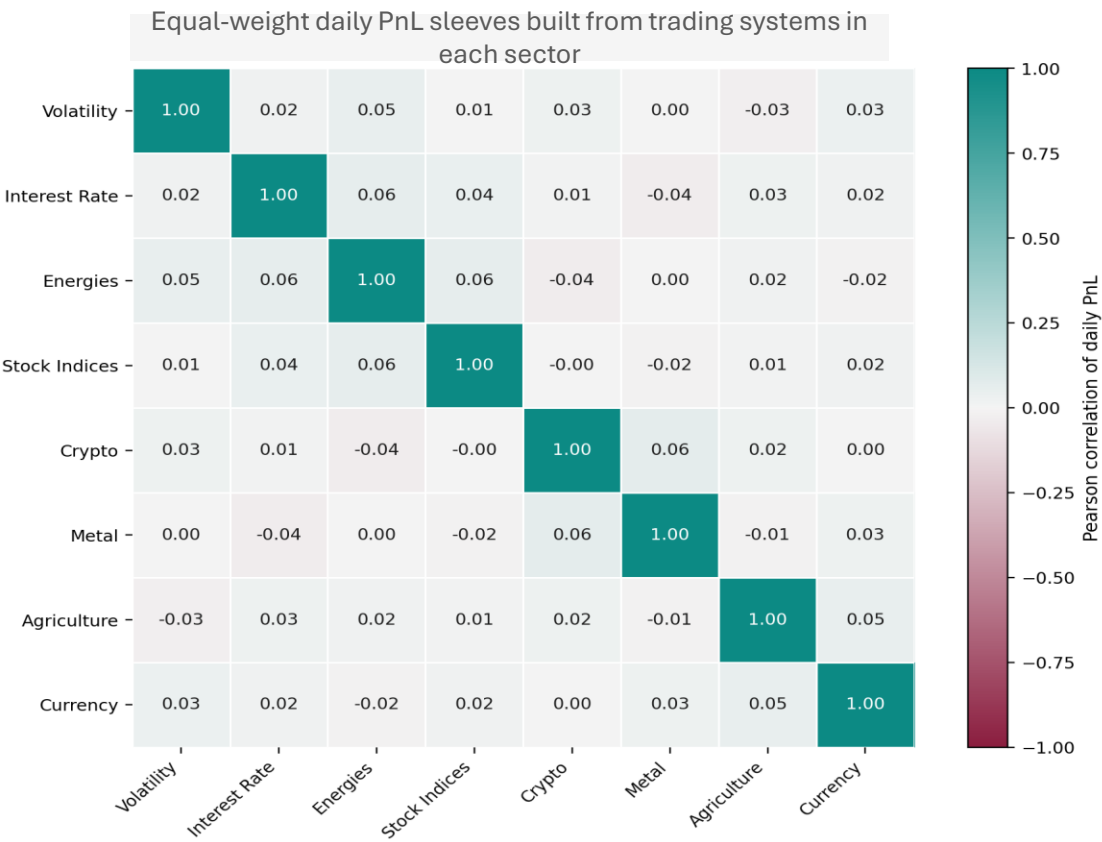
- Short holding periods need a real execution edge because turnover and friction dominate quickly.
- Medium horizons often strike the best balance between responsiveness and cost efficiency.
- Longer holds lower turnover but can react too slowly when market structure changes.
- A stacked design can be stronger: fast risk control, medium-term core, slow trend anchor.

Rule of thumb: choose the horizon mix your edge can implement net of costs.

Correlation across sectors is low

Each cell reflects correlation of equal weight daily P&L sleeves built from universe.

Sector correlation heatmap



Source: Herculean_portfolio_optimizer.xlsm

What it says

Average off-diagonal sector correlation is 0.01. Median is 0.02, with a tight range from -0.04 to 0.06.

Why this matters

Cross-sector sleeves behave like distinct return engines. That is the cleanest evidence for broad diversification first, then finer optimization second.

Sector coverage in the workbook

Stock Indices 153 trading systems, Agriculture 26, Energies 23, Metal 23, Interest Rate 16, Crypto 13, Currency 12.

Summary

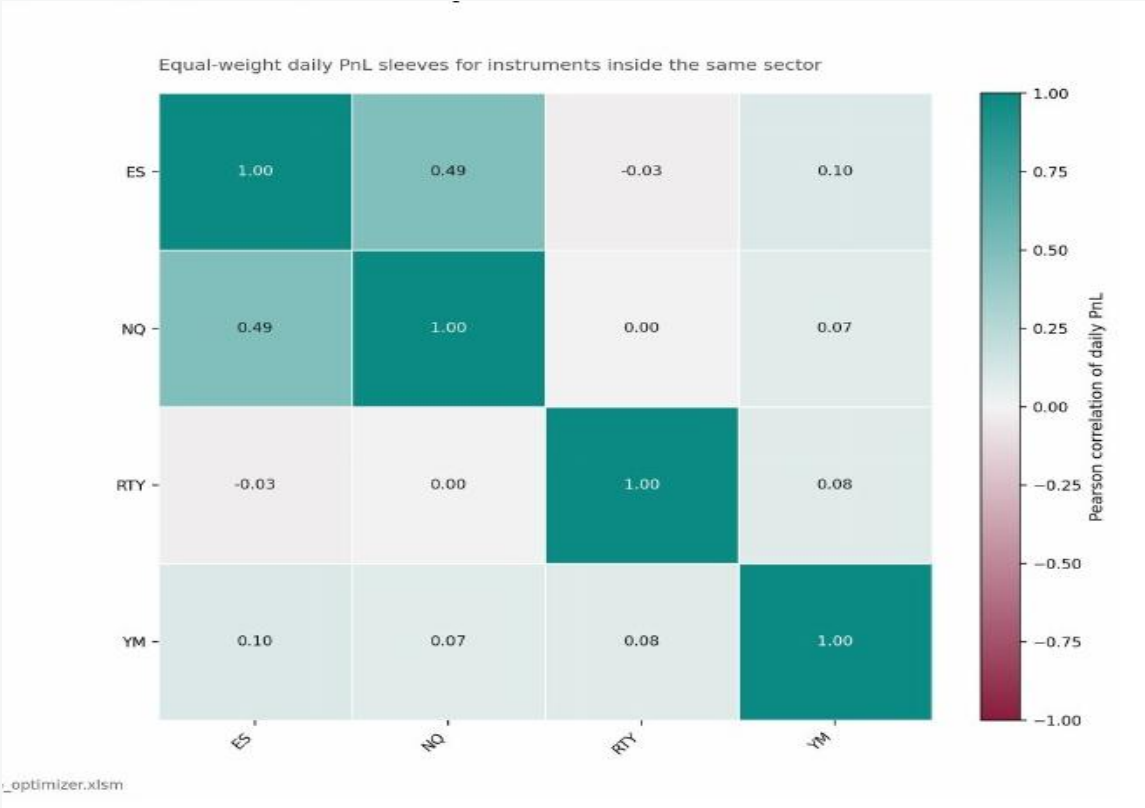
Sector diversification reduces regime dependence better than simply adding more trading systems to the same market.

Interpretation: sector sleeves are mostly independent, which supports breadth-first portfolio construction.

Inside one sector, instrument diversification still helps, but less

This view isolates Stock Indices and compares instrument sleeves built from trading systems on ES, NQ, RTY, and YM.

Stock Indices instrument heatmap



Stock Indices sleeve mix

NQ 93 trading systems, ES 43, YM 8, RTY 7.

Correlation profile

Average instrument-level correlation is 0.12 and median is 0.08. The strongest pair is 0.49, which is materially higher than the sector-level average.

Operational angle

Median hold time for Stock Indices trading systems is 0.09 days. Instruments in the same sector often share session structure, index beta, and news transmission, so diversification improves but does not fully reset exposure.

Pros and cons

Pros: easier execution stack, familiar trading hours, tighter research loop. Cons: common macro shocks and overlapping flows can lift correlations when you need diversification most.

Interpretation: diversifying across instruments inside one sector is useful, but it remains a middle layer, not the core layer.

Within the same instrument, system diversification works only when edges are truly distinct

Shown here: top NQ systems from the workbook ranked by Ret/DD and then compared on daily P&L correlation.

NQ same-instrument system heatmap



Source: Herculean_portfolio_optimizer.xlsm

Interpretation: staying in one instrument is valid only when you can prove low realized correlation across the systems you pair together.

NQ concentration profile

The workbook contains 93 NQ trading systems. Median hold time is 0.06 days, so most of the sleeve is intraday or very short swing.

Correlation profile

For the 12 systems shown, average pairwise correlation is 0.04 and the 90th percentile is 0.22. That means some combinations are independent, but clusters definitely exist.

Trading-hours context

Dominant session template is US Equities RTH (55 systems), followed by CME ETH trading hours. Shared session windows can synchronize risk even when entry logic differs.

Summary

Same-instrument diversification is a refinement layer. It is attractive when execution, liquidity, and research focus are strong, but only if the systems differ in regime, trigger family, and holding-period behavior.

Decision rule for portfolio construction

Use correlation heatmaps to choose where to allocate the next dollar of risk capacity.

1. Build breadth first

Start with sectors because that is where the workbook shows the cleanest independence. It lowers regime fragility and improves the odds that one sleeve offsets weakness in another.

2. Add instruments second

Inside a productive sector, add other instruments to improve robustness while keeping research synergies. Expect some common shocks and higher co-movement than true cross-sector sleeves.

3. Add same-instrument systems last

Do this only after you verify low realized correlation, differentiated session behavior, and distinct hold-time or signal families. Otherwise, you are just multiplying one idea.

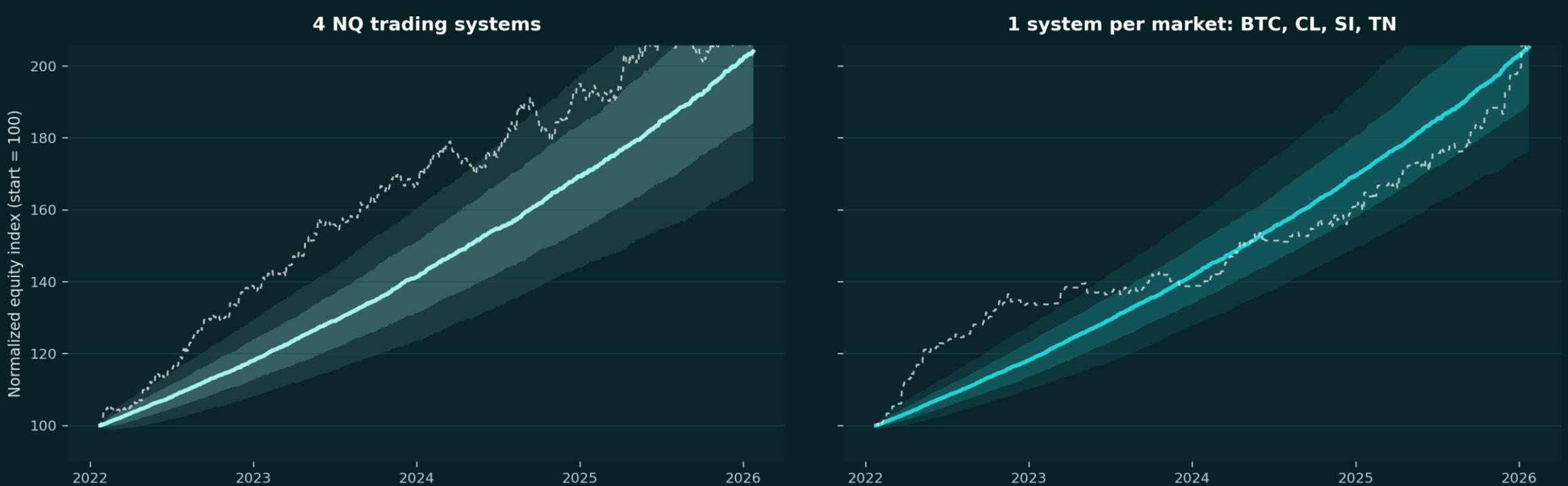
Summary

Diversify across sectors for the base layer, diversify across instruments inside a sector for the middle layer, and diversify across systems on the same instrument only when the data proves those systems are genuinely different.

Heatmaps are useful because they show where “more models” is real diversification versus hidden concentration.

Bootstrapped Monte Carlo

Volatility normalized daily P&L



Bands show 10-90% and 25-75% path ranges from a 5-day moving-block bootstrap; dotted line = realized path.

Monte Carlo design 1,500 paths 5-day blocks Common history: 1,461 sessions Start index = 100	Same instrument sleeve 168 / 204 / 245 Terminal index p10 / p50 / p90 Median max drawdown: 4.8%	Cross-market sleeve 176 / 205 / 239 Terminal index p10 / p50 / p90 Median max drawdown: 3.2%	What stands out Medians are similar; drawdown tails are not. Cross-market diversification tightens the left tail and reduces drawdown severity.
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FAQ

Happy to go deeper on portfolio construction, heatmaps, or the workbook methodology.

- **Should you diversify across sectors first, or within the same market first?**
- **When are multiple trading systems on one instrument truly diversified?**
- **How much of performance comes from the signal, versus the portfolio design around it?**

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