
PORTFOLIO THEORY / COVARIANCE PHYSICS

Modern Portfolio Theory: *Inputs* Own the Map

Diversification is not a vibe; it is a set of assumptions about returns, risks, and correlations you are willing to defend when all lines point northeast together.

SYSTEM ARCHETYPE 044

MPT / *Frontier* /

Modern Portfolio Theory formalizes trade-offs between expected return and variance, then asks covariance matrices and constraints to do honest work. Read it with [system sensitivity](#), [entropy](#) in implementation,

[inversion](#) on model failure, and [asset location](#)—because the after-tax frontier is the one you live on.

"The efficient frontier looks eternal until correlations go to one in a panic."

1. Mean-Variance *Spine*

The frontier is a map drawn from covariance matrices that behaved until they did not; crisis correlation is the tax on textbook confidence. When correlations spike, the household policy should specify which constraints are hard (no tobacco) versus soft (tracking error budgets). If two analysts cannot reproduce the frontier inputs, you do not have a policy. Read [network effects](#) where crowding makes factors correlate in stress.

Factor tilts are MPT's descendants; crowding turns a smart beta slide into a concert exit when liquidity thins. Quarterly risk reviews should stress employer equity, rental real estate, and private business cash flows outside the brokerage grid. The frontier moves when you move; revisit after life events.

Budget entropy for turnover, spreads, and tax drag that mean-variance slides omit.

Inputs dominate outputs: bad expected returns and unstable covariances produce gorgeous charts about fiction. A serious IPS should publish after-tax returns when bonds live in IRA and equities in taxable—or the reverse by design. Constraints are features: they encode ethics and sleep. Use Stock vs. Flow so rebalancing policy references wealth stock, not only monthly trades.

Modern Portfolio Theory is mean-variance optimization: diversify until marginal risk reduction per unit return flattens—elegant, teachable, and assumption-hungry. Before trusting a covariance matrix, ask whether drawdown paths, not only terminal wealth distributions, for the decade before retirement. Models without stress tests are poetry with Greek letters. Run inversion: list three ways the frontier lies because inputs are wrong.

International sleeves add diversification on paper; currency, policy, and reporting friction are real entropy terms. The adult version of diversification is to document assumptions about three consecutive years where correlations invert the narrative used to build the matrix. When doubt appears, shrink bets, not honesty. Pair asset location with taxable versus deferred sleeves when optimization crosses accounts.

Idiosyncratic risk can be diversified away in models; career, geography, and regulatory exposure often cannot leave the household balance sheet. If leverage appears in the solution, interrogate sample length, regime changes, and survivorship in the asset-class return series feeding the optimizer.

Correlation is a weather forecast—update it or sail blind. Stress system sensitivity when a single factor dominates reported diversification.

2. Covariance *Humility*

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Tax-aware MPT is a different game: location, harvest, and deferral change the after-tax frontier materially. Stress the plan by assuming three consecutive years where correlations invert the narrative used to build the matrix. Boring covariance hygiene beats brilliant tilts on stale data. Budget entropy for turnover, spreads, and tax drag that mean-variance slides omit.

Rebalancing is policy, not superstition—it crystallizes which risk you repurchase after markets move. Second-order thinkers ask how human capital correlates with sample length, regime changes, and survivorship in the asset-class return series feeding the optimizer. Turnover is a leak; name its annualized tax bill. Run inversion: list three ways the frontier lies because inputs are wrong.

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3. Human Capital *Overlap*

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4. Inputs *and Priors*

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5. Rebalancing *as Law*

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6. Factors *and Crowding*

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7. Tax-Aware *Frontiers*

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01

Return and risk priors

Document sources, horizons, and doubt bands.

02

Constraint list

Hard vs. soft; tracking error budget if any.

03

Correlation stress

Shock key pairs; record worst paths.

04

Rebalance rule

Calendar, threshold, or hybrid—write the tax logic.

8. Atlas *Integration*

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