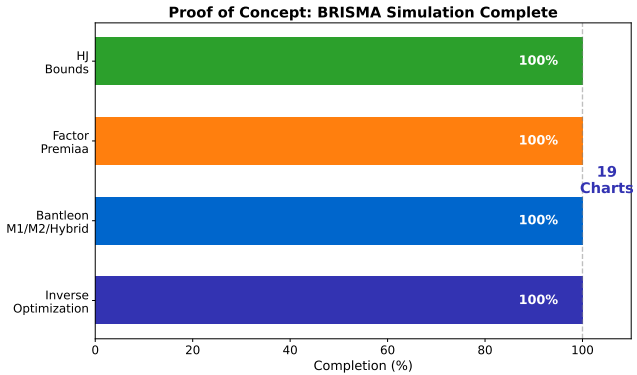
Bantleon InnoCheck Project

January 2026

1. Current State (Proof of Concept)
2. The Core Problem
3. Gap Analysis
   - Lambda Calibration
   - Factor Model
   - Covariance & Data
4. Validation Framework
5. Success Criteria
6. Research Roadmap
7. Next Steps
8. Discussion

BRISMA Simulation Complete

- 19 interactive Plotly charts
- Full methodology demonstrated



Complete dashboard: `complete_dashboard.html`

Extract Factor Premia from Portfolio Weights

Step 1: Inverse Optimization

$$\mu^* = \lambda \cdot Q \cdot w + r_f$$

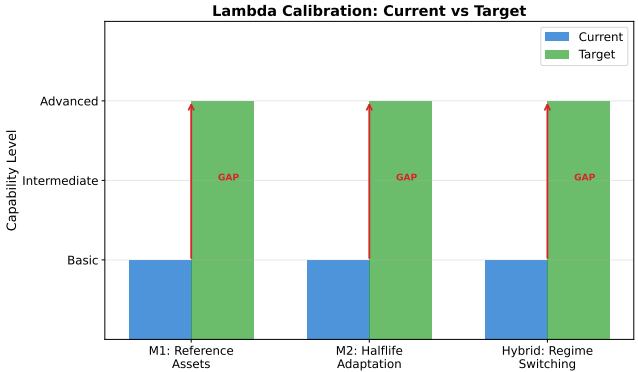
Step 2: Factor Premia Extraction

$$\pi = (B'B)^{-1}B'(\mu^* - r_f)$$

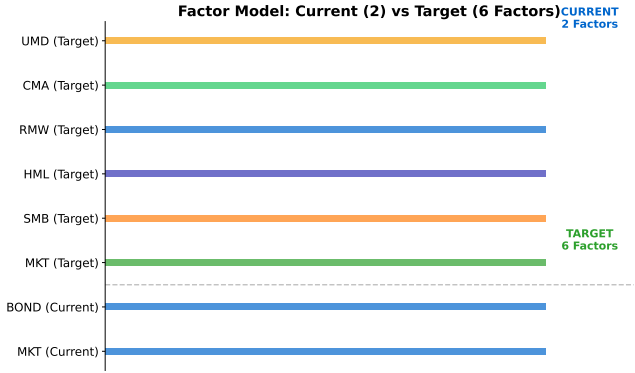
Key Question

How do we make π closer to reality?

Current: Synthetic data, 2 factors, fixed lambda calibration



Method	Current	Target
M1 (Market)	10Y bond only	Multiple reference assets
M2 (Historical)	Fixed halflife (24m)	Adaptive halflife
Hybrid	Linear R^2 blend	Regime-switching model



Component	Current	Target
Factors	2 (MKT, BOND)	6 (FF5 + UMD)
Beta estimation	Static OLS	Rolling / Bayesian
Factor loadings	Time-invariant	Time-varying

Component	Current	Target
Covariance Q	Empirical	Shrinkage / DCC-GARCH
Data source	Synthetic	Real Fama-French + Bantleon
Frequency	Monthly	Daily with aggregation
Validation	None	Out-of-sample backtests

Key Insight: Estimation error in Q propagates to μ^* and π

$$\mathrm{Var}(\hat{\mu}^*) = \lambda^2 \cdot w^\top \mathrm{Var}(\hat{Q})\, w$$

How do we know implied premia are "correct"?

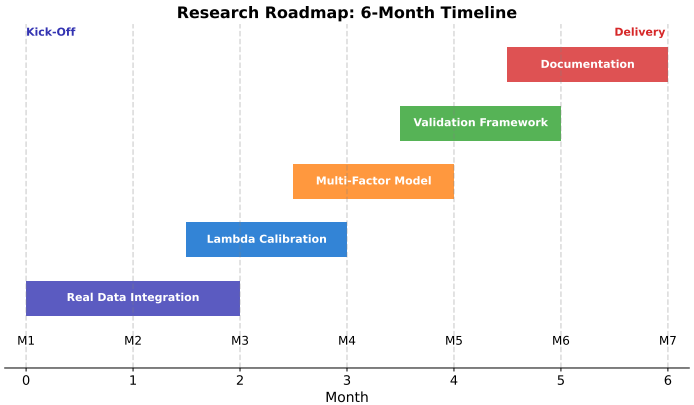
1. **Out-of-sample predictability** – Do implied premia forecast returns?
2. **Survey comparison** – Duke CFO, ZEW, Bloomberg consensus
3. **Economic plausibility** – HJ bounds, Sharpe ratio consistency

Already implemented: HJ bounds chart in simulation

Measurable KPIs for "Closer to Reality"

Metric	Threshold	Validation
Implied vs realized correlation	$R^2 > 0.3$	Out-of-sample
Predictability t-statistic	$t > 2.0$	Fama-MacBeth
Economic plausibility	Within HJ bounds	SDF test
Survey alignment	$\rho > 0.5$	Bloomberg correlation

Success = Implied premia that predict actual returns better than historical averages



Month	Milestone
1–2	Real data integration
2–3	Lambda calibration
3–4	Multi-factor model
4–5	Validation framework
5–6	Documentation

1. **Week 1:** Integrate real Fama-French data
   - Already available in `academic-primer-framework`
   - 726 months (1963–2023)
2. **Week 2:** Replace synthetic weights with Bantleon portfolios
   - Need: Historical portfolio weights from Bantleon
3. **Week 3:** Implement regime-switching lambda
   - Markov switching model for R^2 regimes
4. **Week 4:** First validation test
   - Compare implied vs realized returns

Key Decisions

- Which improvements have highest impact on realism?
- Resource allocation across workstreams
- Data access: Bantleon historical weights?

Questions?

Thank you!

Documentation: `brisma/docs/simulation/complete_dashboard.html`