Investment Strategy Modeling Plan

1. Objective

Develop a data-driven framework to model and compare multiple investment strategies in order to determine optimal portfolio allocation and decision-making rules.

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2. Summary Statistics & Performance Metrics

Analyze each asset and strategy using core financial metrics:

- **Average Return**
  - Measures long-term performance.
- **Standard Deviation (Volatility)**
  - Measures risk and variability of returns.
- **Risk-Adjusted Metrics (Optional Extension)**
  - Sharpe Ratio
  - Sortino Ratio
  - Maximum Drawdown

Purpose: Establish baseline risk–return profiles for each asset and strategy.

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3. Modeling Investment Allocation

A. Portfolio Allocation Framework

Determine how capital should be split among investments.

Key questions:

- How should money be allocated across assets?
- What factors signal when to invest or divest?
- How should allocations change over time?

Variables to consider:

- Returns
- Volatility
- Correlation
- Market indicators

- Macroeconomic data (optional)

B. Asset Universe

Model allocation among **four ETFs**.

Focus:

- Optimal weightings
- Rebalancing rules
- Sensitivity to market changes

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4. Strategy Design

Develop and test three core portfolio strategies:

Strategy 1: Aggressive

- High equity exposure
- Higher risk tolerance
- Higher expected volatility
- Focus on growth

Strategy 2: Moderate

- Balanced allocation
- Medium risk
- Combination of growth and stability

Strategy 3: Conservative

- Lower equity exposure
- Higher allocation to defensive assets
- Lower volatility
- Capital preservation focus

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5. Strategy Evaluation

For each strategy:

- Backtest historical performance
- Compare returns and volatility

- Analyze drawdowns
- Measure consistency

Goal: Evaluate how each strategy performs under different market conditions.

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6. Bayesian Updating Framework

Incorporate Bayesian methods to update strategies based on new information.

Purpose:

- Adjust initial assumptions using market data
- Improve allocation over time

Key Question:

> How do initial strategy beliefs change as new data arrives?

Process:

1. Define prior assumptions (expected returns, risk).
2. Observe new market data.
3. Update beliefs (posterior distributions).
4. Adjust portfolio weights accordingly.

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7. Trading and Exit Rules

A. Profit-Taking Rule

Implement a sell rule based on returns:

- Sell when return reaches **+5% ± ε**

Example range:

- 5.10%
- 5.09%
- 5.08%
- 4.90%

Where ε represents acceptable variation.

Purpose:

- Lock in gains

- Reduce emotional trading
- Improve discipline

B. Risk Management (Optional Extension)

- Stop-loss levels
- Position size limits
- Volatility-based exits

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8. Probability & Decision Modeling

Incorporate probability-based decision rules:

- Estimate probability of favorable outcomes
- Use expected value and risk metrics
- Example: P(positive return | current conditions)

Purpose: Improve timing and allocation decisions.

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9. Implementation Plan

Step 1: Data Collection

- ETF price data
- Returns
- Volatility
- Market indicators

Step 2: Data Processing

- Clean data
- Calculate returns
- Compute rolling statistics

Step 3: Strategy Construction

- Define weights
- Apply rebalancing rules
- Implement Bayesian updates

Step 4: Backtesting

- Run simulations
- Compare strategies
- Analyze performance

Step 5: Optimization

- Adjust parameters
- Improve risk-adjusted returns
- Refine exit rules

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10. Final Deliverables

- Performance comparison report
- Allocation models
- Strategy dashboards
- Recommendation summary

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11. Key Research Questions

1. How should capital be optimally allocated among four ETFs?
2. Which variables best predict invest vs. divest decisions?
3. How do aggressive, moderate, and conservative strategies perform across cycles?
4. How does Bayesian updating improve results?
5. Does a 5% profit-taking rule enhance long-term performance?