Assessing the Benefits of Volatility Timing Strategies of the USA Profitability (RMW) Factor

1. The Scenario

You are a team of quantitative analysts at 'Dynamic Asset Strategies,' a fund manager known for its innovative investment solutions. Your firm is exploring recent academic evidence suggesting that while *expected returns* are notoriously difficult to forecast, *volatility* is far more predictable.

This has led to the development of **volatility timing** (or "volatility targeting") strategies. The premise is that an investor can improve risk-adjusted returns by scaling their exposure to a risky asset based on a volatility forecast, allocating less when volatility is high and more when it is low.

Your team has been asked to investigate the practical benefits of applying this concept to factor investing portfolios.

2. Your Specific Mandate

Each team will be assigned a specific factor mandate and dataset. Your entire analysis must be conducted within the context of this mandate.

You will be provided with an Excel file containing **daily returns** (for volatility forecasting) and **monthly returns** (for performance evaluation) for your assigned mandate. This data, sourced from the Kenneth French database, will include the long/short factor premium and several long-only portfolios (e.g., sorted by size and your factor).

3. Project Tasks

Your report must follow this logical structure, focusing on practical application and results.

The Core Strategy: Volatility Targeting

The volatility timing strategy allocates a percentage ($w_{i,t}$) to the risky asset based on the following rule:

$$w_{i,t} = \frac{\sigma_{target}}{\hat{\sigma}_{i,t}}$$

Where:

- $w_{i,t}$ is the weight in the risky asset for the upcoming period.
- σ_{target} is the fixed, desired target volatility.
- $\hat{\sigma}_{i,t}$ is the *forecasted* volatility for the upcoming period.

A key part of your job is to generate the volatility forecast $\hat{\sigma}_{i,t}$. You should use **daily return data** to construct a monthly volatility forecast (e.g., using a 60-day rolling standard deviation or an Exponentially Weighted Moving Average (EWMA) model or any other prediction model you think appropriate).

Part 1: Volatility Timing the Long/Short USA Profitability Factor

1. **Construct the Strategy:** Create a volatility-timed strategy for the **long/short factor premium**.
    - Set your σ_{target} to be equal to the full-sample (in-sample) annualized volatility of the *unmanaged* long/short factor premium.
    - Generate the time-series of weights ($w_{i,t}$) for each month.
    - Calculate the monthly returns of your *managed* strategy: $R_{managed,t} = w_t \; x \; R_{factor,t}$
2. **Performance Analysis:** Calculate a comprehensive set of performance statistics for *both* the unmanaged (passive) factor and your new managed strategy. This must include:
    - Average return, Volatility (annualized)
    - Sharpe Ratio
    - Skewness, Kurtosis, and Max Drawdown
    - Portfolio **Turnover** (This is crucial for a timing strategy).

3. **Comparative Analysis:** Compare the two. Does the volatility timing strategy provide a superior risk-adjusted return? How does it alter the portfolio's risk profile (e.g., tail risk, drawdowns)?

Part 2: Volatility Timing the Long-Only USA Profitability Portfolios

1. **Construct the Strategies:** Repeat the entire analysis from Part 1 for *each* of the **long-only factor portfolios** provided in your dataset.
2. **Target Volatility:** For each long-only portfolio, set its σ_{target} equal to its *own* in-sample annualized volatility.
3. **Comparative Analysis:** Compare the performance of the managed long-only portfolios to their unmanaged (buy-and-hold) counterparts.
4. **Identify Best Fit:** For which type of portfolio (long/short premium vs. long-only portfolios) does the volatility timing strategy seem to work best, and why might that be?

Part 3: Optimal Combination

Your firm is now considering whether to *fully* replace the passive factor with the managed one, or to hold a *combination* of the two.

1. **Optimize:** Using *only* the **unmanaged (passive) L/S factor premium** and your **managed L/S strategy** (from Part 1) as the two available assets, use Mean-Variance Optimization (MVO) to find the optimal portfolio.
2. **Analysis:** What are the optimal weights in the unmanaged and managed strategies? Report the performance of this MVO-combined portfolio. How does it compare to holding 100% of either strategy?

Part 4: Recommendation & Practical Considerations

1. **Recommendation:** Conclude your report with a clear recommendation to the firm. Based on your analysis, is volatility timing a value-adding strategy for this factor?
2. **Practical Challenges:** Briefly identify and discuss **two (2)** potential practical challenges a practitioner might face when implementing this strategy (e.g., turnover/trading costs, forecast-error/parameter-instability, use of leverage if $w_{i,t} > 1$.

4. Deliverables

1. **Executive Memo:** A professional, 10-page (max) memo (12pt font) addressed to the firm's Investment Committee, detailing your findings. This is a practical report, not a theoretical one. All tables and graphs must be included within the 10-page limit.
2. **Excel File:** A separate, well-organized Excel file containing all your data, volatility forecasts, strategy calculations, and performance statistics. This file must be clear enough for the committee to replicate your work.

5. Deadline: 12.00 p.m. 8 December 2025