

MFIN 7037 Homework 1 – Question 2: Smart Beta ETFs (SPMO)

1) What is the beta of SPMO to the UMD factor? Does this mean the ETF is broken?

- **Beta of SPMO to UMD:** 0.4246 (from regression of SPMO excess on Mkt-RF and UMD; see q2_1_regression_summary.csv).

- **R²:** 0.8724; **Alpha (annualized):** 2.11%. Sample: 2015-11 to 2025-12 (N=122 months).

This beta is from a market-controlled regression and shows meaningful momentum exposure. A bivariate regression of SPMO on UMD alone gives a misleadingly low beta because SPMO is mostly market and UMD is market-neutral; the market-controlled specification is the appropriate one.

Does this mean the ETF is broken? No. A beta to UMD below 1 is expected because:

- UMD is long–short; SPMO is long-only, so it captures roughly one leg.
- SPMO has market exposure (S&P; 500); UMD is market-neutral.
- Universe, weighting, and rebalancing differ from academic UMD.

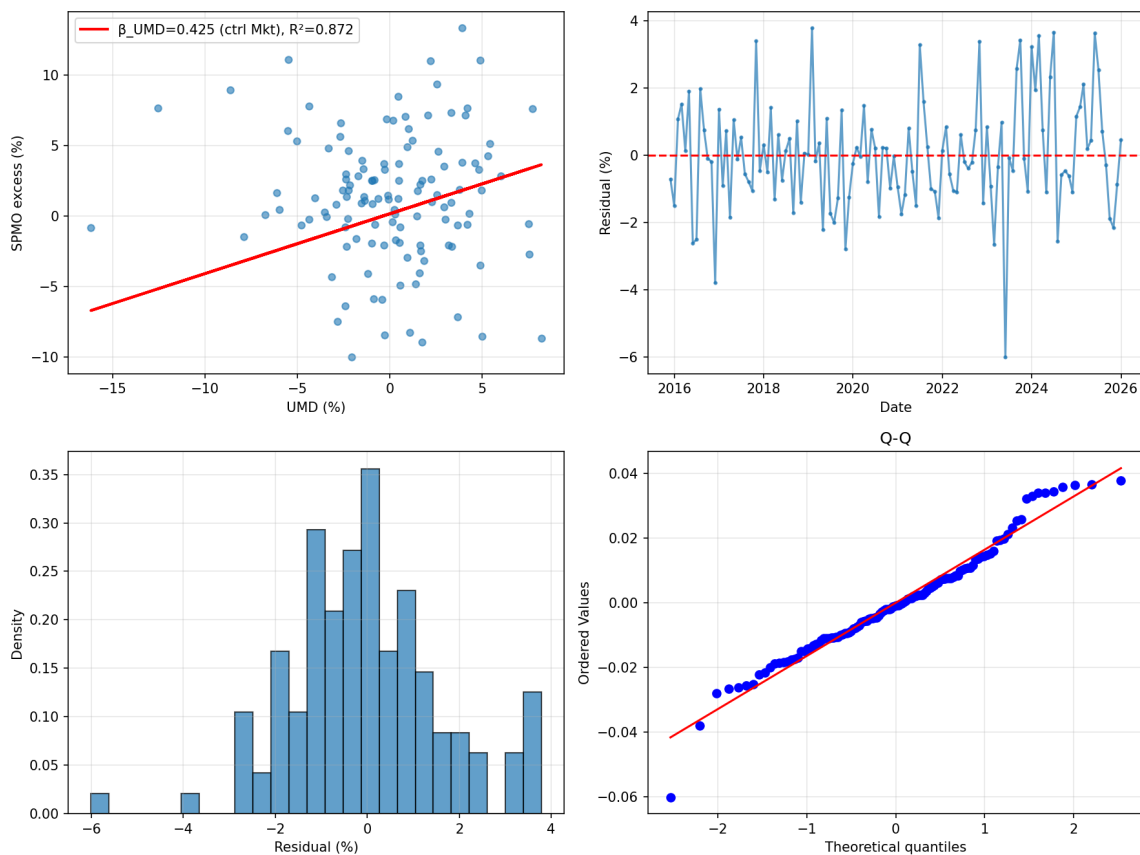


Figure 1: SPMO vs UMD regression diagnostics.

2) Read the SPMO definition, extract a quote. How does this differ from the original UMD construction?

Quote (from Invesco / S&P index methodology):

"The Invesco S&P; 500 Momentum ETF seeks to track the investment results (before fees and expenses) of the S&P; 500 Momentum Index. The Index measures the performance of securities in the S&P; 500 that exhibit the highest momentum characteristics based on price performance and risk. Momentum is measured using a momentum score (e.g. 12-month price change, risk-adjusted). The Index typically consists of approximately 100 stocks, reconstituted and rebalanced semi-annually, with weights by momentum score and a cap per security (e.g. 3%)."

How this differs from UMD:

Dimension	UMD (Fama–French)	SPMO
Universe	All US stocks (~3000)	S&P 500 only (~500)
Market Cap	All caps	Large cap only
Selection	Top/Bottom 10% by return	Top by momentum score
Number of Stocks	~300–400 per leg	~100 stocks
Long/Short	Long-Short (market neutral)	Long-only
Lookback	11 months (t-12 to t-2)	12 months (verify prospectus)
Skip Recent Month?	Yes	Verify prospectus
Weighting	Equal-weighted	Momentum-score weighted, cap
Rebalancing	Monthly	Semi-annually
Market Exposure	~0	~1.0

3) Extra credit: Beta to long-leg; construct long/short; VW vs EW; consistency

- **Beta to long leg:** Winners_VW $\beta \approx 0.922$ ($R^2 \approx 0.755$); Winners_EW $\beta \approx 0.622$ ($R^2 \approx 0.518$).

The beta to the long leg (winners) is the sensitivity of SPMO to the top-momentum decile. A beta below 1 means SPMO behaves like a diluted or capped version of the winners portfolio (e.g. ~100 names, cap per name). The higher R^2 for Winners_VW than Winners_EW means SPMO's returns are better explained by value-weighted winners—consistent with an S&P; 500, momentum-score-weighted product. Regressing SPMO on MomLS (winners minus losers) gives small or negative beta because SPMO is long-only: it holds winners but not the short leg, so it does not move with the pure long–short factor.

- Constructed long/short: MomLS = Winners (D10) – Losers (D1). SPMO on MomLS gives small/negative betas (long-only).
- VW vs EW: SPMO tracks value-weighted momentum more closely; consistent with S&P; 500 and momentum-score weighting.

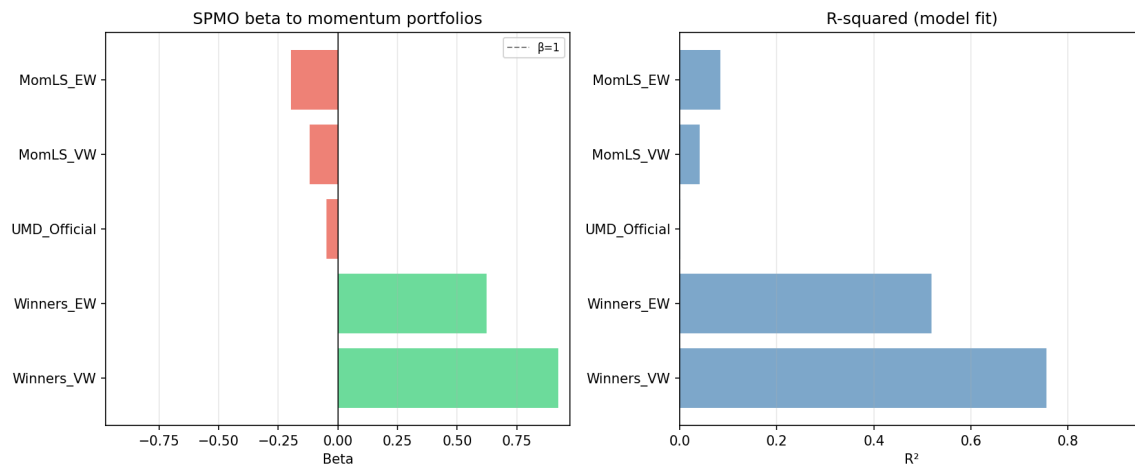


Figure 2: Momentum decomposition (betas and R²).

4) Control for Fama–French factors. Map to SPMO definition. Does correcting for long-bias fix market beta? Size-bias?

- **FF6:** Market beta ≈ 1.064 , SMB ≈ -0.145 , UMD ≈ 0.376 ; alpha (annual) $\approx 1.66\%$.

Market beta (Mkt-RF) near 1 means SPMO has roughly full exposure to the equity market—expected for a long-only S&P; 500 subset. SMB (small minus big) negative means a large-cap tilt, which matches the S&P; 500 universe. UMD positive means the strategy still has a positive loading on the academic momentum factor after controlling for market and size. Alpha is the average monthly return not explained by the six factors; annualized alpha around 1–2% is modest and can reflect fees, implementation, or other tilts. Controlling for factors does not remove market beta: it only isolates it. So the long-bias (market exposure) is still there; the regression just separates it from momentum and size.

- **Mapping:** Market beta near 1 = S&P; 500 exposure; negative SMB = large-cap only. Size bias makes sense.
- Long-bias: Controlling for factors does not remove market beta; it stays ≈ 1 . Correcting isolates exposure; it doesn't remove it.

5) Two other momentum ETFs. FF6 loadings vs index construction? Opaque?

- **MTUM** (iShares MSCI USA Momentum Factor ETF): Mkt-RF ≈ 1.069 , SMB ≈ -0.060 , HML ≈ -0.041 , UMD ≈ 0.421 , $R^2 \approx 0.899$.

Mkt-RF is market exposure (≈ 1 for long-only). SMB > 0 = small-cap tilt, SMB < 0 = large-cap. HML is value tilt. UMD is exposure to the momentum factor; positive UMD is expected for momentum ETFs. R^2 shows how much of the ETF's return variance is explained by the six factors; high R^2 means the strategy is well described by these exposures.

Reconciliation: Large-cap momentum; market beta ≈ 1 and negative SMB consistent; construction transparent.

- **QMOM** (Alpha Architect US Quantitative Momentum ETF): Mkt-RF ≈ 1.204 , SMB ≈ 0.537 , HML ≈ -0.006 , UMD ≈ 0.584 , $R^2 \approx 0.819$.

Mkt-RF is market exposure (≈ 1 for long-only). SMB > 0 = small-cap tilt, SMB < 0 = large-cap. HML is value tilt. UMD is exposure to the momentum factor; positive UMD is expected for momentum ETFs. R^2 shows how much of the ETF's return variance is explained by the six factors; high R^2 means the strategy is well described by these exposures.

Reconciliation: Quantitative momentum; positive SMB = small-cap tilt; loadings partly opaque but consistent with momentum + market.

