

Characteristic Correlation Stabilized (CCS) SDF

Common Task Framework Methodology

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Source paper. Pourmohammadi, Mo (2026). *Characteristic Correlations Matter*. Working paper, October 4, 2026. [SSRN 7562238](#).

I apply CCS to the 402 characteristics supplied by the Common Task Framework (CTF). Relative to the paper’s 153-characteristic panel, the CTF has more characteristics and fewer firms. I therefore use the Ridge-CCS regularization in Section 6, applying the same Ledoit–Wolf shrinkage as AIPT-CCS in Section 6.2 to the linear characteristics.

Factor construction. Each month, I use all supplied stocks, map characteristic ranks to $[-0.5, 0.5]$, fill missing entries with zero, and center and scale each column to unit variance. Let Z_t contain these characteristics for the N stocks. With $K = 402$, define

$$\hat{G}_t = \frac{Z_t' Z_t}{N}, \quad \hat{G}_{t,LW} = (1 - a_t) \hat{G}_t + a_t \tau_t I_K, \quad \tau_t = \frac{\text{tr}(\hat{G}_t)}{K}.$$

The Ledoit–Wolf intensity a_t uses the current characteristic cross-section. Let $\bar{G}_t$ be the expanding average of $\hat{G}_s$ over $s < t$. The factors are

$$f_{t+1}^{\text{Raw}} = \frac{Z_t' r_{t+1}}{N}, \quad f_{t+1}^{\text{CCS}} = \bar{G}_t (\hat{G}_{t,LW})^{-1} f_{t+1}^{\text{Raw}},$$

where r_{t+1} denotes next-month excess returns.

Portfolio allocation. I combine the CCS factors using the paper’s expanding-window MSRR-ridge estimator. With $F = f^{\text{CCS}}$,

$$\hat{\lambda}_t = \left(\hat{\mathbb{E}}_t[FF'] + \eta I \right)^{-1} \hat{\mathbb{E}}_t[F].$$

Here $\hat{\mathbb{E}}_t$ uses factor returns realized by formation month t . The separate time-series penalty η is selected by leave-one-out cross-validation using the Sharpe objective over ten spectrum-scaled ridge penalties. Stock weights are

$$w_t \propto \frac{1}{N} Z_t (\hat{G}_{t,LW})^{-1} \bar{G}_t \hat{\lambda}_t, \quad \|w_t\|_1 = 2.$$

Characteristics determine the cross-sectional shrinkage, and only realized historical returns enter the time-series fit. The output reports `id`, formation-month `eom`, and `w` for every supplied `ctff_test` row.

Shrinkage reference. Ledoit, Olivier, and Michael Wolf (2004). “A Well-Conditioned Estimator for Large-Dimensional Covariance Matrices.” *Journal of Multivariate Analysis* 88(2), 365–411.