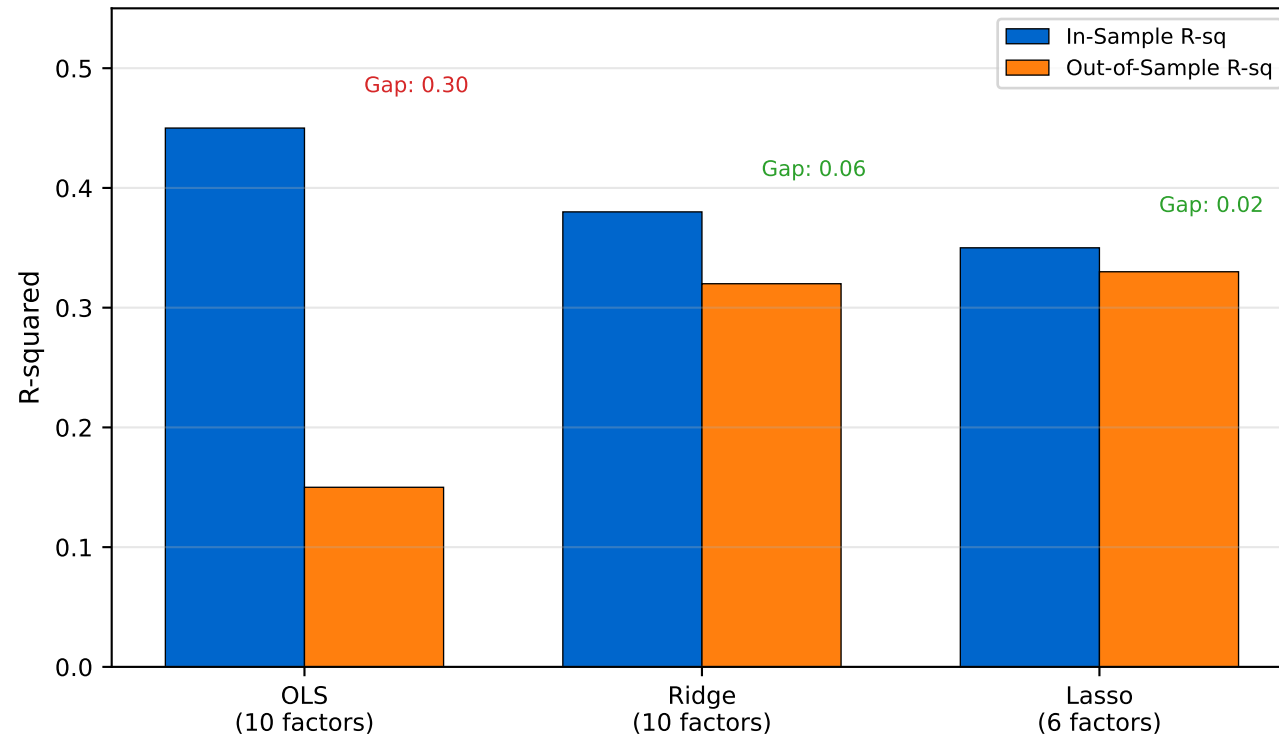
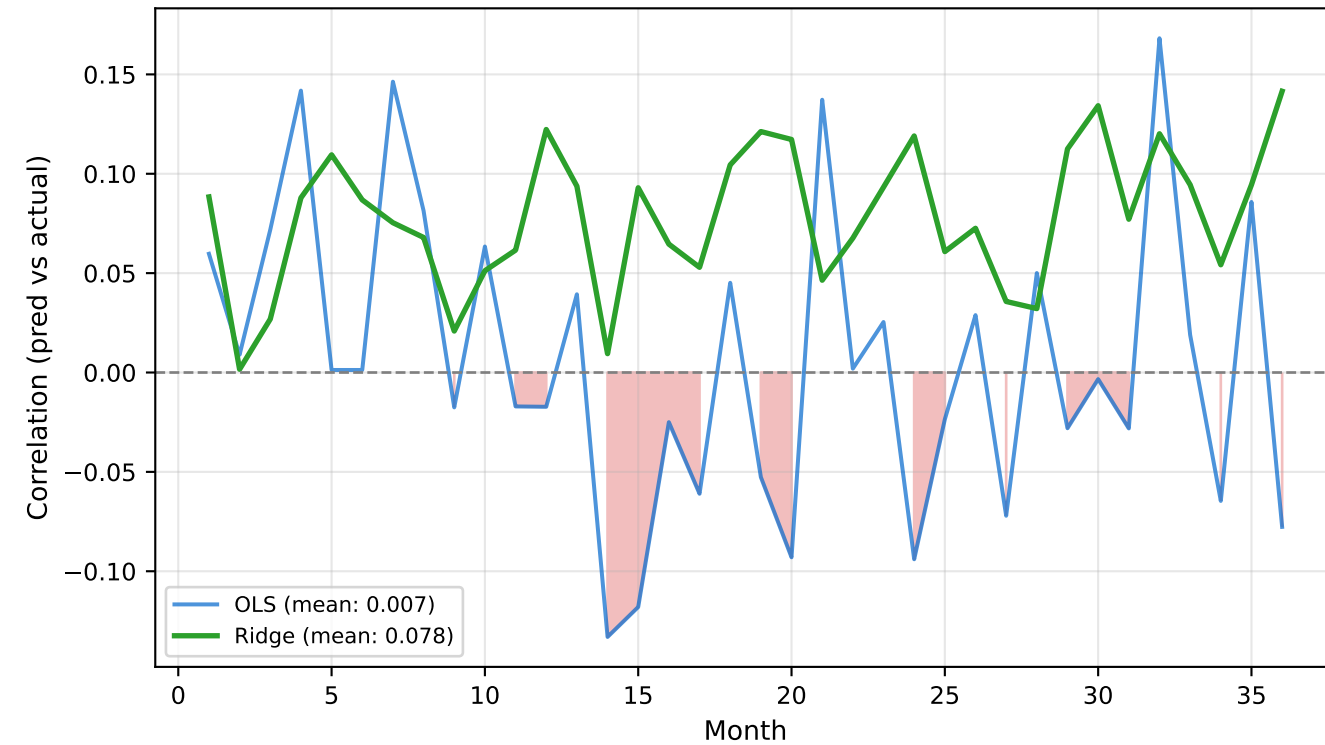


# Regularization in Finance Applications

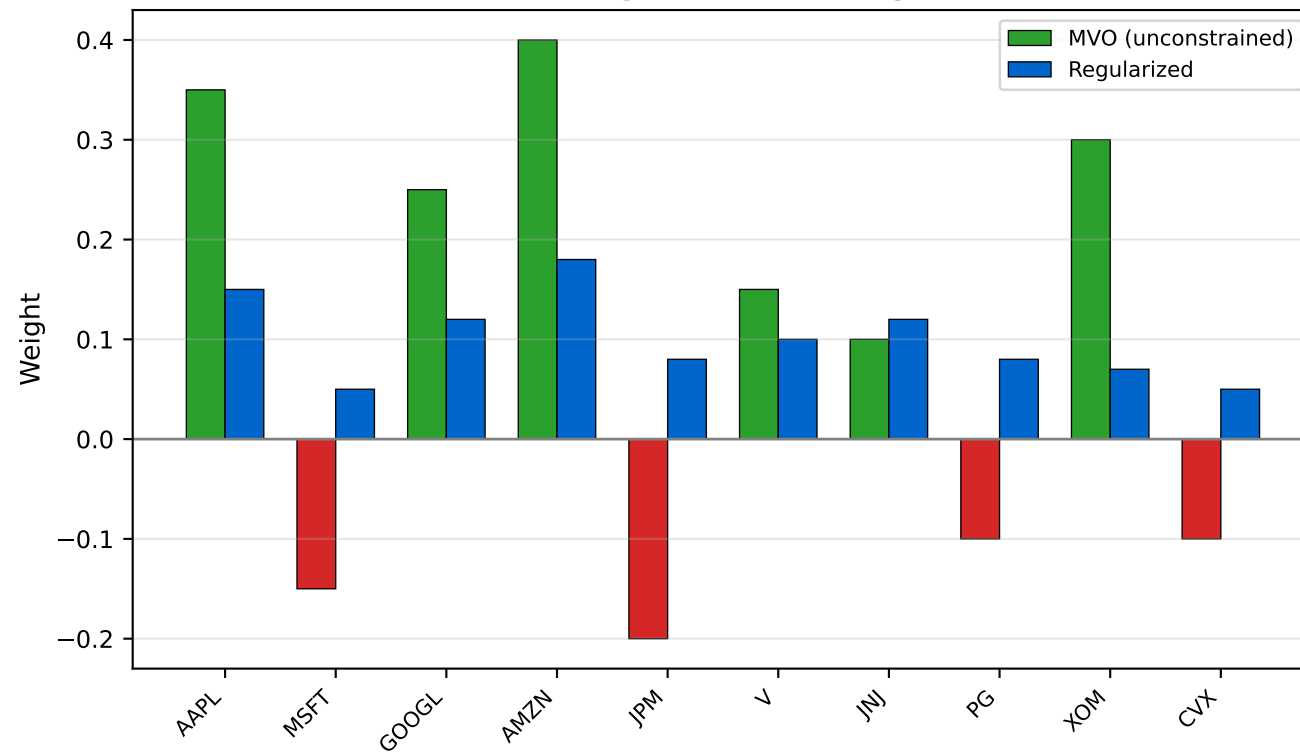
## Factor Model Performance



## Monthly Prediction Correlation



## Portfolio Weights: MVO vs Regularized



## Practical Guidelines

### REGULARIZATION IN FINANCE: WHEN TO USE

#### OLS (No regularization):

- Small number of features
- Large sample size ( $n \gg p$ )
- All features known to be relevant
- Theory-driven model (e.g., CAPM)

#### RIDGE:

- Many correlated features
- All factors potentially relevant
- Want to shrink but keep all
- Example: Multi-factor risk models

#### LASSO:

- Many candidate features
- Want automatic selection
- Need interpretable sparse model
- Example: Stock return prediction

#### ELASTIC NET (Ridge + Lasso):

- Best of both worlds
- Handles correlated features
- Also does selection
- Example: Machine learning alphas

#### PRACTICAL TIPS:

1. Always use cross-validation
2. Time-series: Use walk-forward CV
3. Start with Ridge (safer)
4. Use Lasso if interpretability matters
5. Watch for data snooping