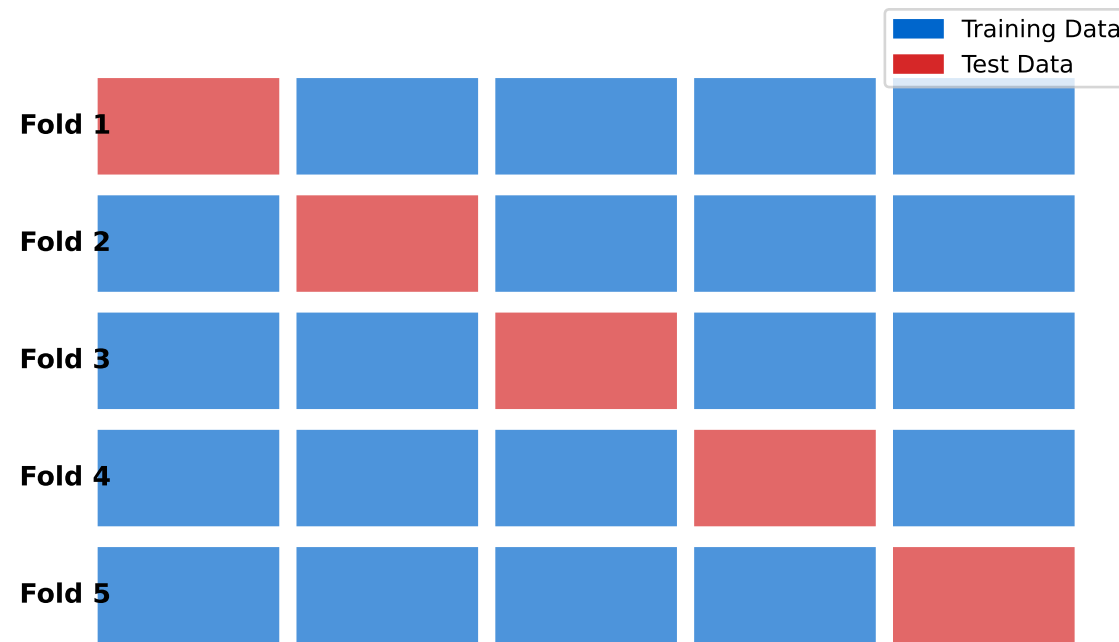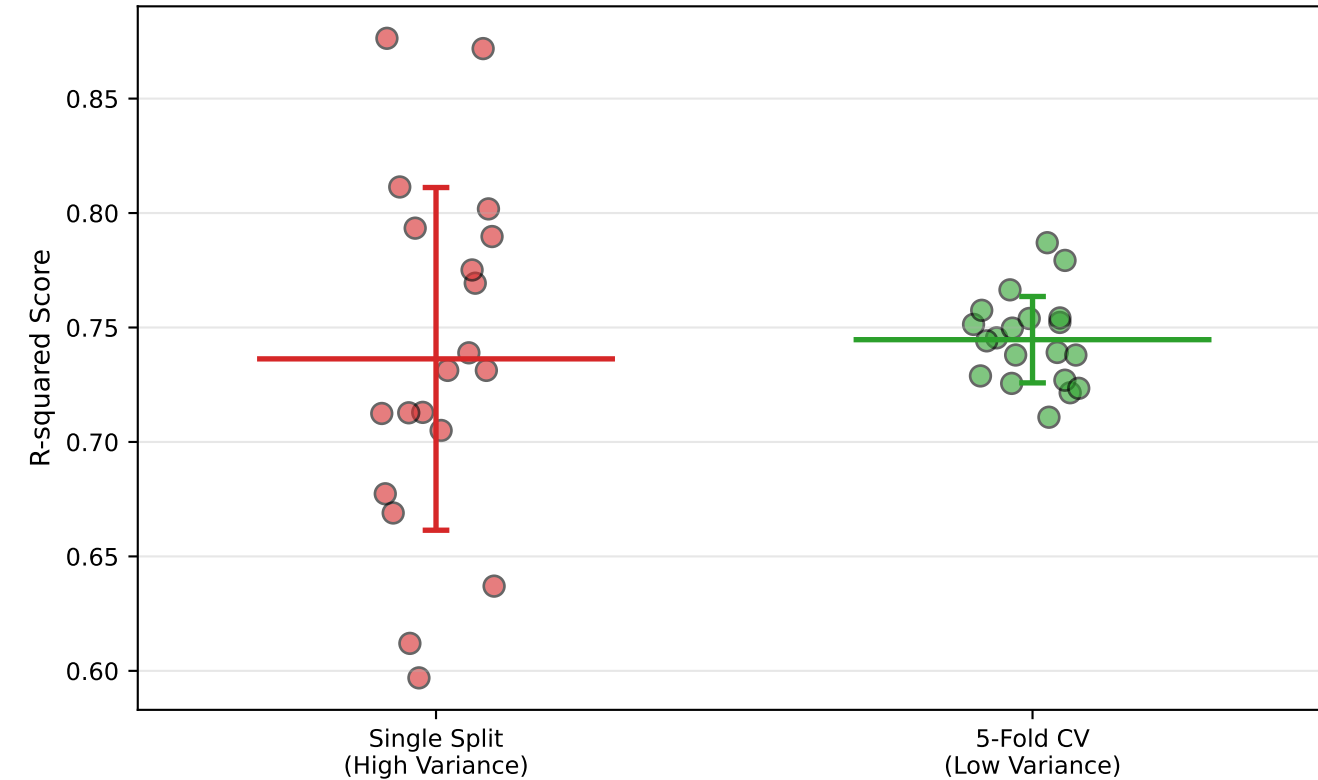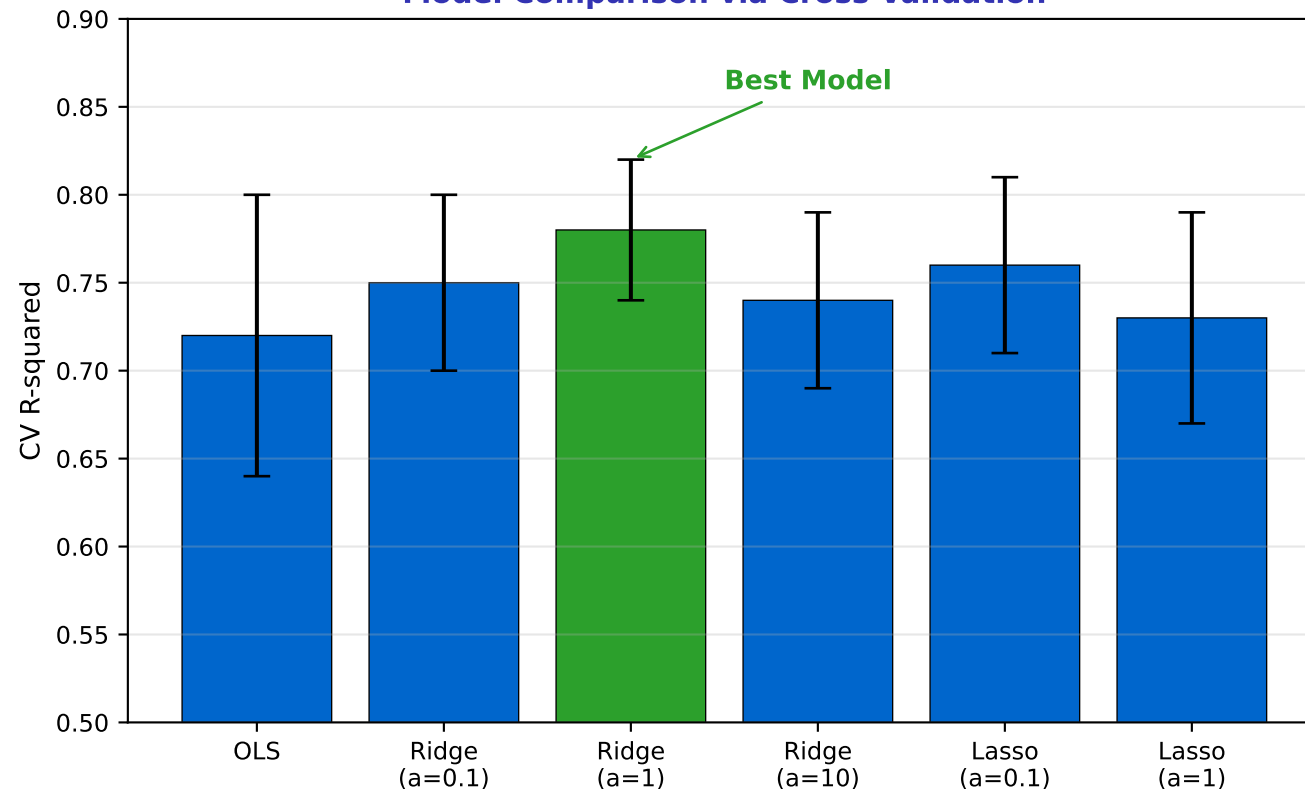# Cross-Validation: Reliable Model Evaluation

5-Fold Cross-Validation Structure

CV Reduces Evaluation Variance

Model Comparison via Cross-Validation

sklearn Implementation

```
Cross-Validation with sklearn

from sklearn.model_selection import cross_val_score
from sklearn.linear_model import Ridge

# Basic cross-validation
model = Ridge(alpha=1.0)
scores = cross_val_score(
    model, X, y,
    cv=5,  # 5-fold CV
    scoring='r2'
)

print(f"Scores: {scores}")
print(f"Mean: {scores.mean():.3f}")
print(f"Std:  {scores.std():.3f}")

# Cross-validation with shuffle
from sklearn.model_selection import KFold

kf = KFold(n_splits=5, shuffle=True, random_state=42)
scores = cross_val_score(model, X, y, cv=kf)

# Get predictions via cross_val_predict
from sklearn.model_selection import cross_val_predict

y_pred = cross_val_predict(model, X, y, cv=5)
# Each point predicted when NOT in training
```