

Ridge Regression

Complete cases: 649

Outcome: G3

Predictors: G1, G2, studytime, failures, absences, age, Medu, Fedu

Selected lambda: 1

Cross-validation folds: 10

Testing R-squared: 0.913199

Testing RMSE: 0.915496

Ridge regression applies an L2 penalty and retains all predictors while shrinking coefficient magnitudes.

Model summary

test_name	dataset_path	outcome
Ridge Regression	D:/DATA ANALYSIS/H Regression Tests and Models/Ridge Regression/dataset.csv	G3
	predictors	n_complete_cases training_cases testing_cases
G1, G2, studytime, failures, absences, age, Medu, Fedu	649	520 129
cross_validation_folds	selected_lambda_alpha	training_r_squared testing_r_squared training_rmse testing_rmse
10	1	0.8357455 0.913199 1.318856 0.9154958
full_ridge_r_squared	full_ridge_rmse	full_ols_r_squared full_ols_rmse
0.8507725	1.24704	0.8507772 1.24702

note

Lambda selected by 10-fold CV on the training sample. Final coefficients refit on all complete cases.

Train/test metrics

	split	n	r_squared	rmse	mae
Training	520	0.8357455	1.3188562	0.7961157	
Testing	129	0.9131990	0.9154958	0.7466413	
Full data ridge	649	0.8507725	1.2470397	0.7794116	
Full data OLS comparison	649	0.8507772	1.2470202	0.7800189	

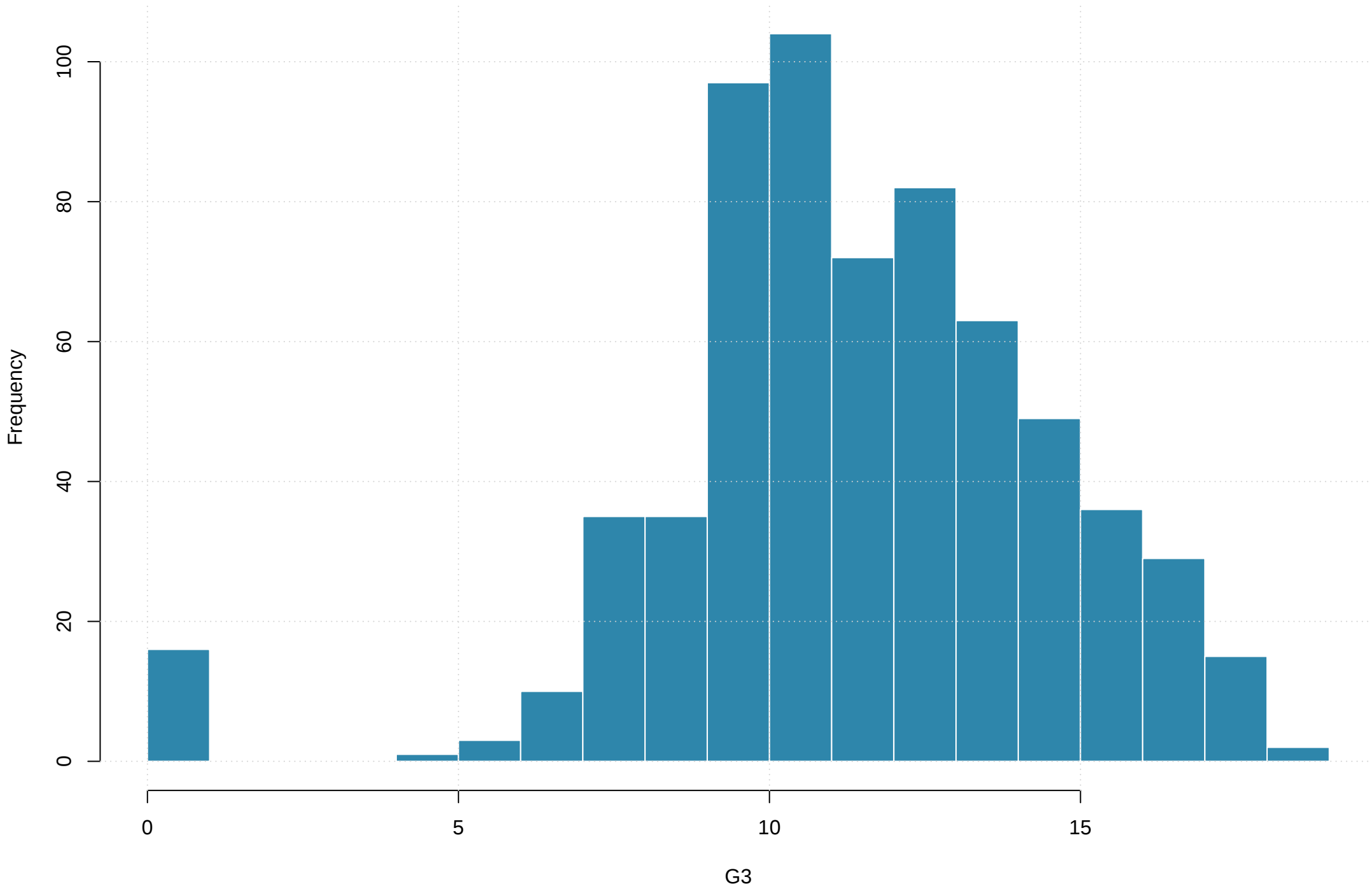
Ridge coefficients

term	ridge_coefficient_original_scale	ridge_standardized_coefficient	ols_coefficient_original_scale
Intercept	-0.50420056	NA	-0.50115470
G1	0.14740179	0.125255353	0.14339666
G2	0.87997455	0.793624475	0.88480738
studytime	0.09679506	0.024853287	0.09663180
failures	-0.23713360	-0.043544090	-0.23536120
absences	0.02270081	0.032609161	0.02276203
age	0.02337968	0.008815445	0.02268549
Medu	-0.04435623	-0.015577162	-0.04495115
Fedu	0.02223768	0.007571191	0.02202534
absolute_ridge_standardized_coefficient	ridge_minus_ols		
	NA	-3.045855e-03	
	0.125255353	4.005125e-03	
	0.793624475	-4.832829e-03	
	0.024853287	1.632568e-04	
	0.043544090	-1.772395e-03	
	0.032609161	-6.121788e-05	
	0.008815445	6.941968e-04	
	0.015577162	5.949166e-04	
	0.007571191	2.123406e-04	

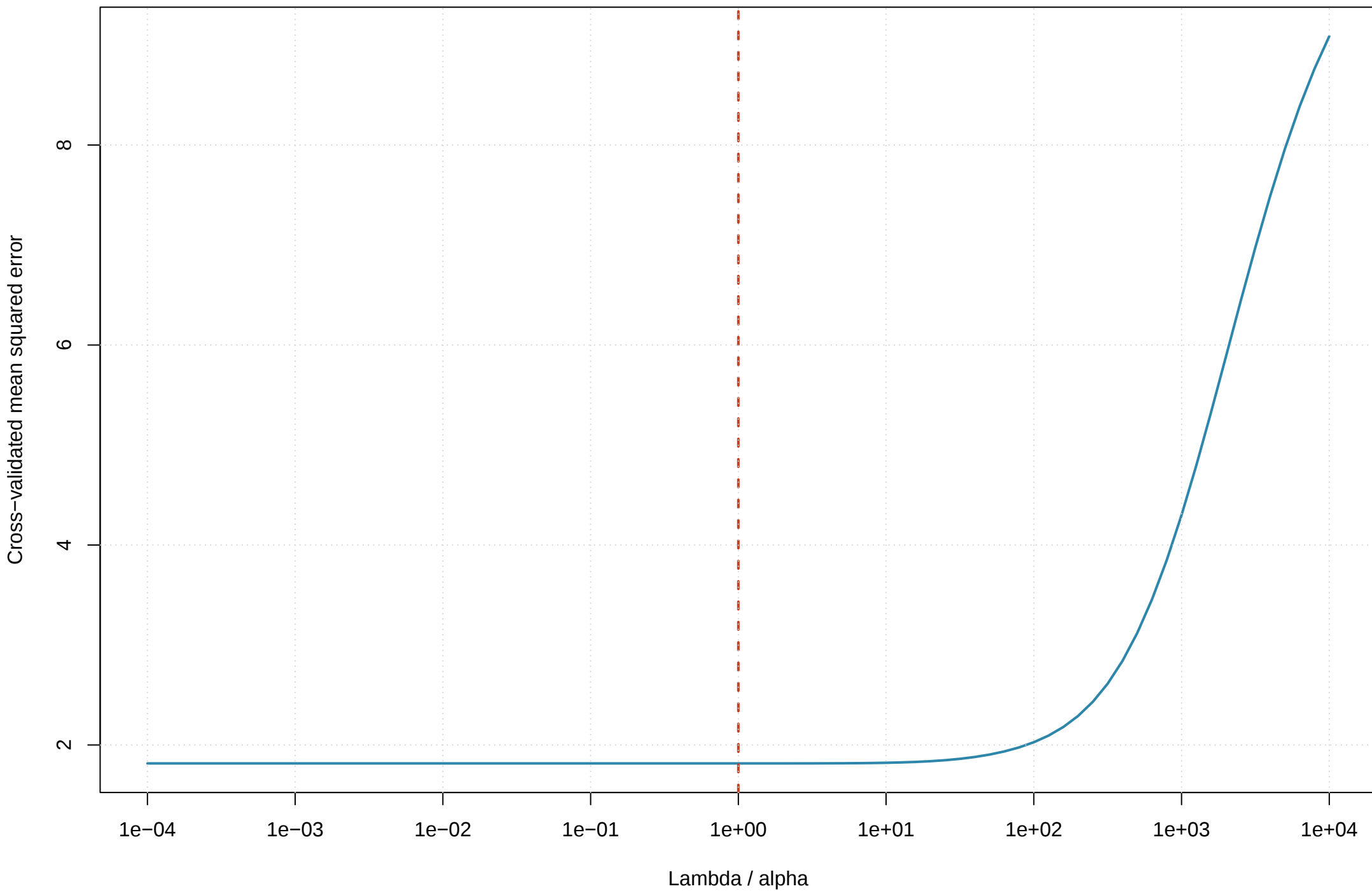
Selected lambda

	selection_rule	lambda_alpha	mean_cv_mse	sd_cv_mse	selected_lambda
Minimum cross-validated mean squared error		1	1.815707	0.9790155	TRUE

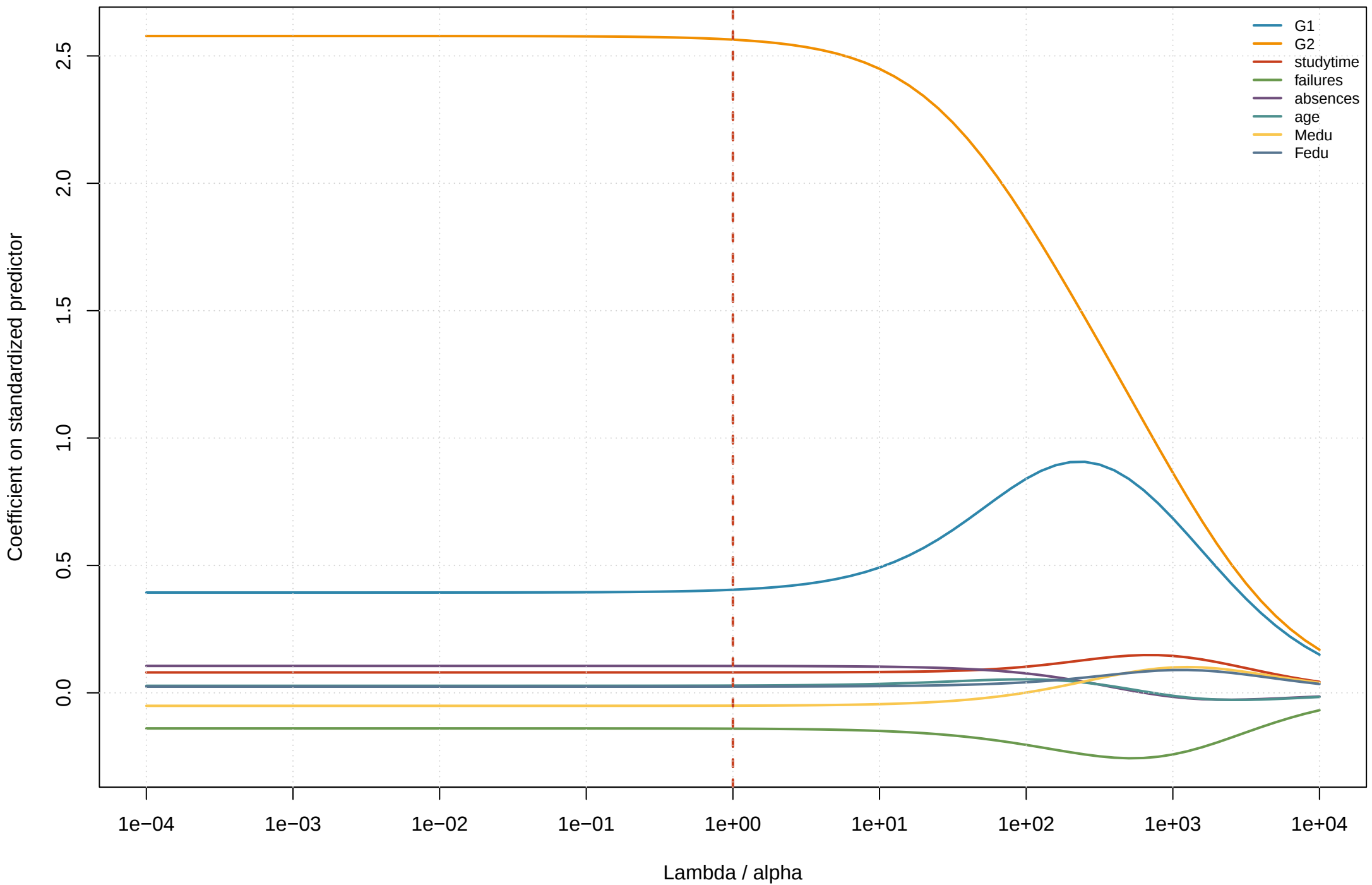
Outcome distribution



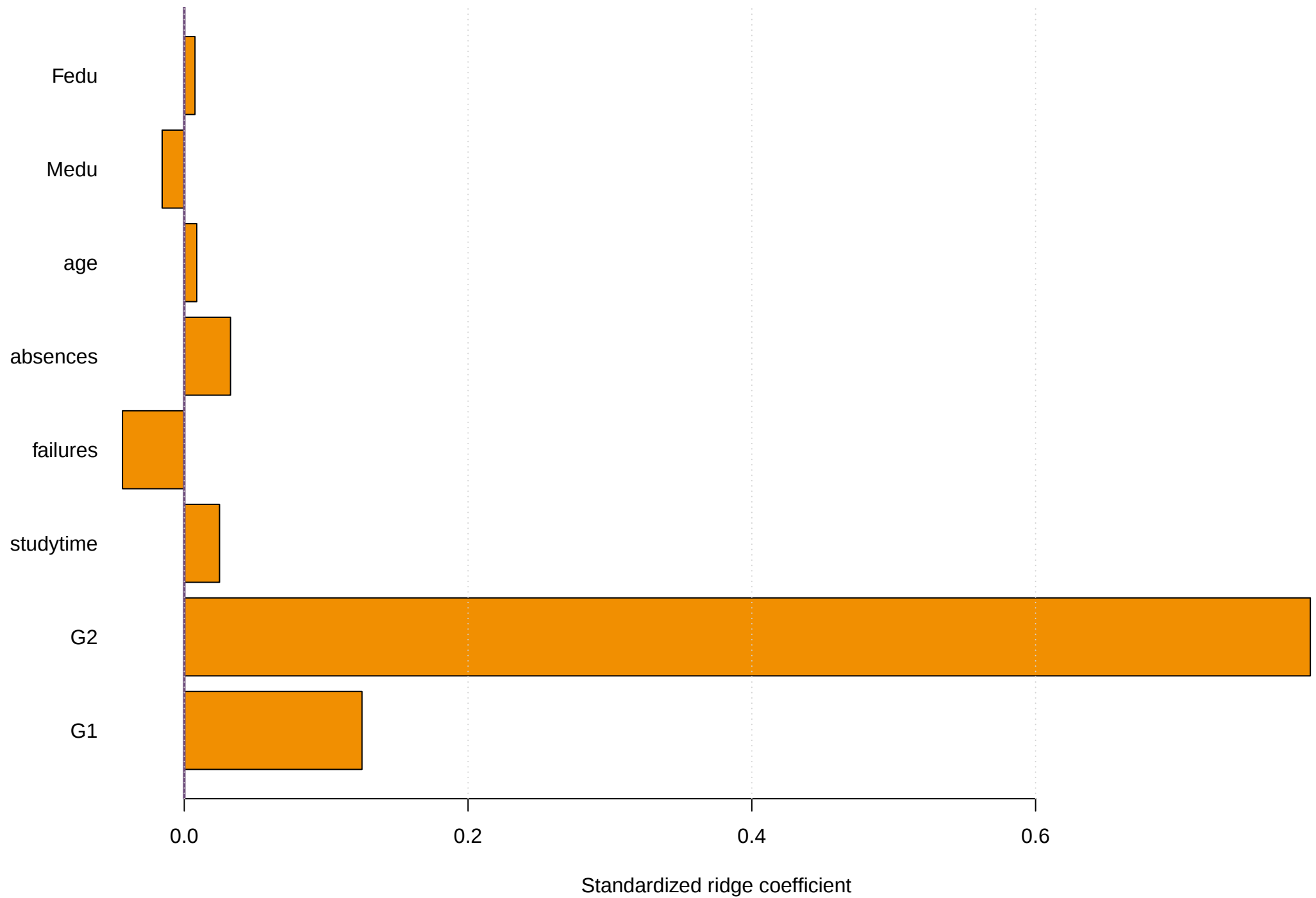
Cross-validation curve



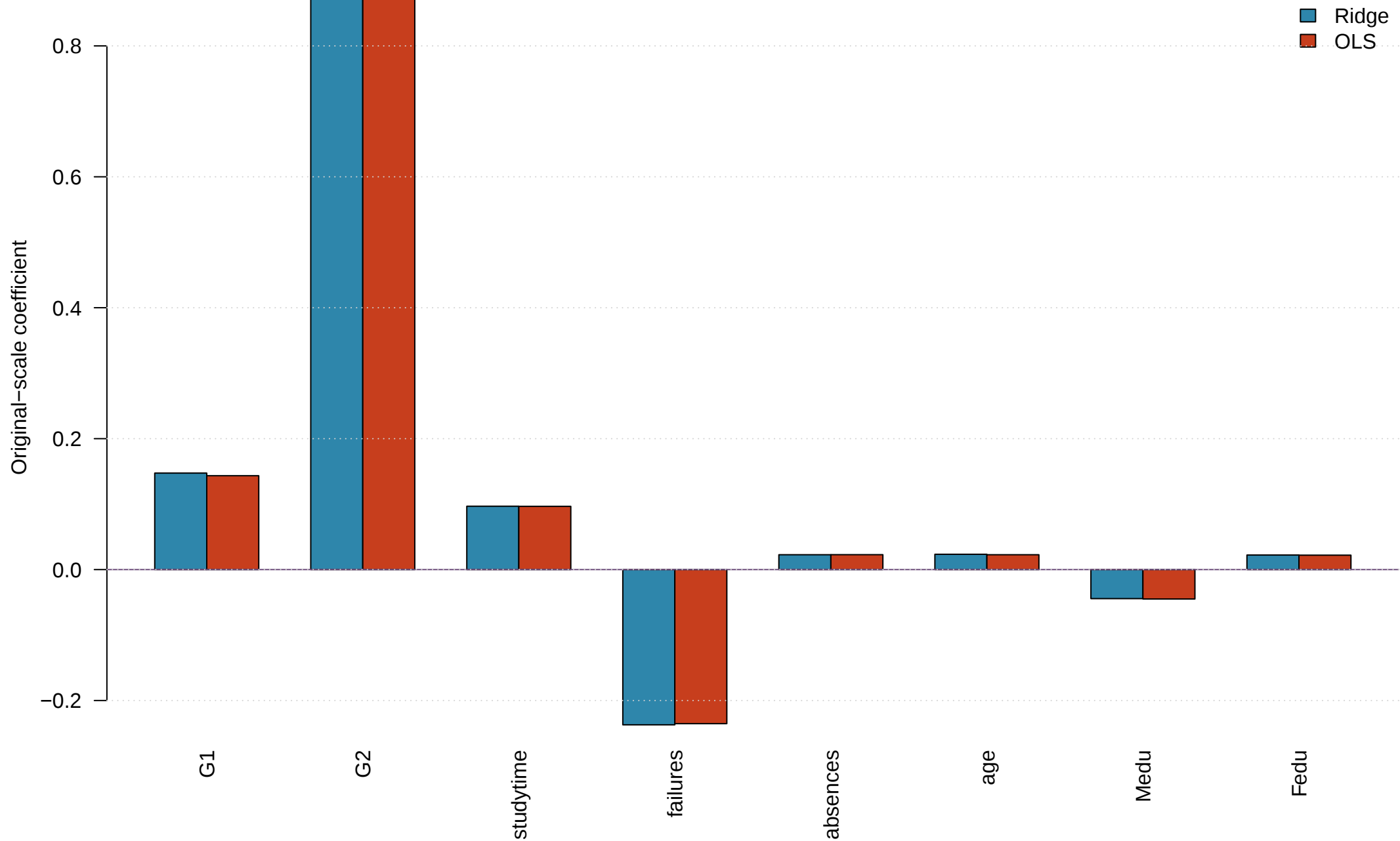
Ridge coefficient paths



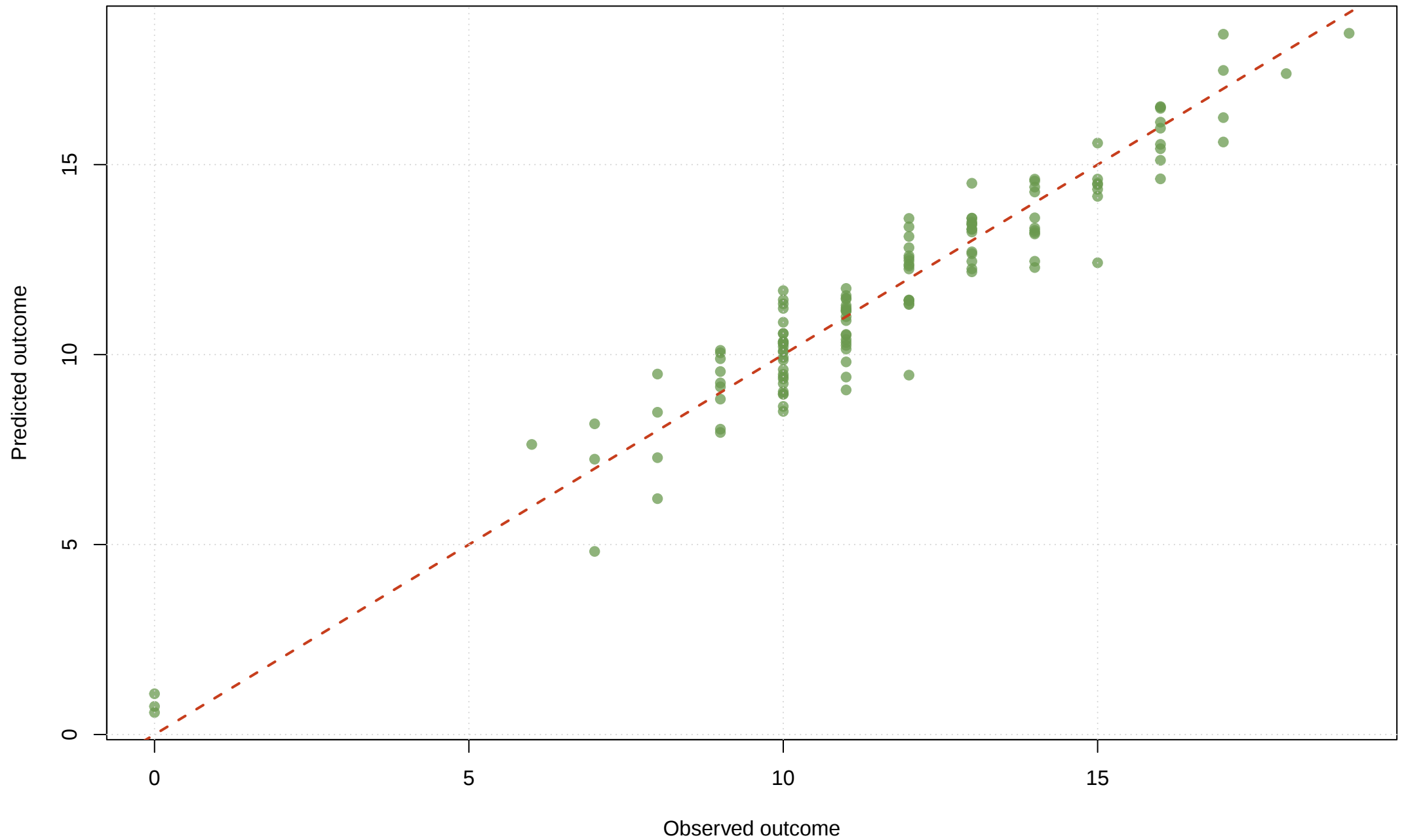
Selected ridge coefficients



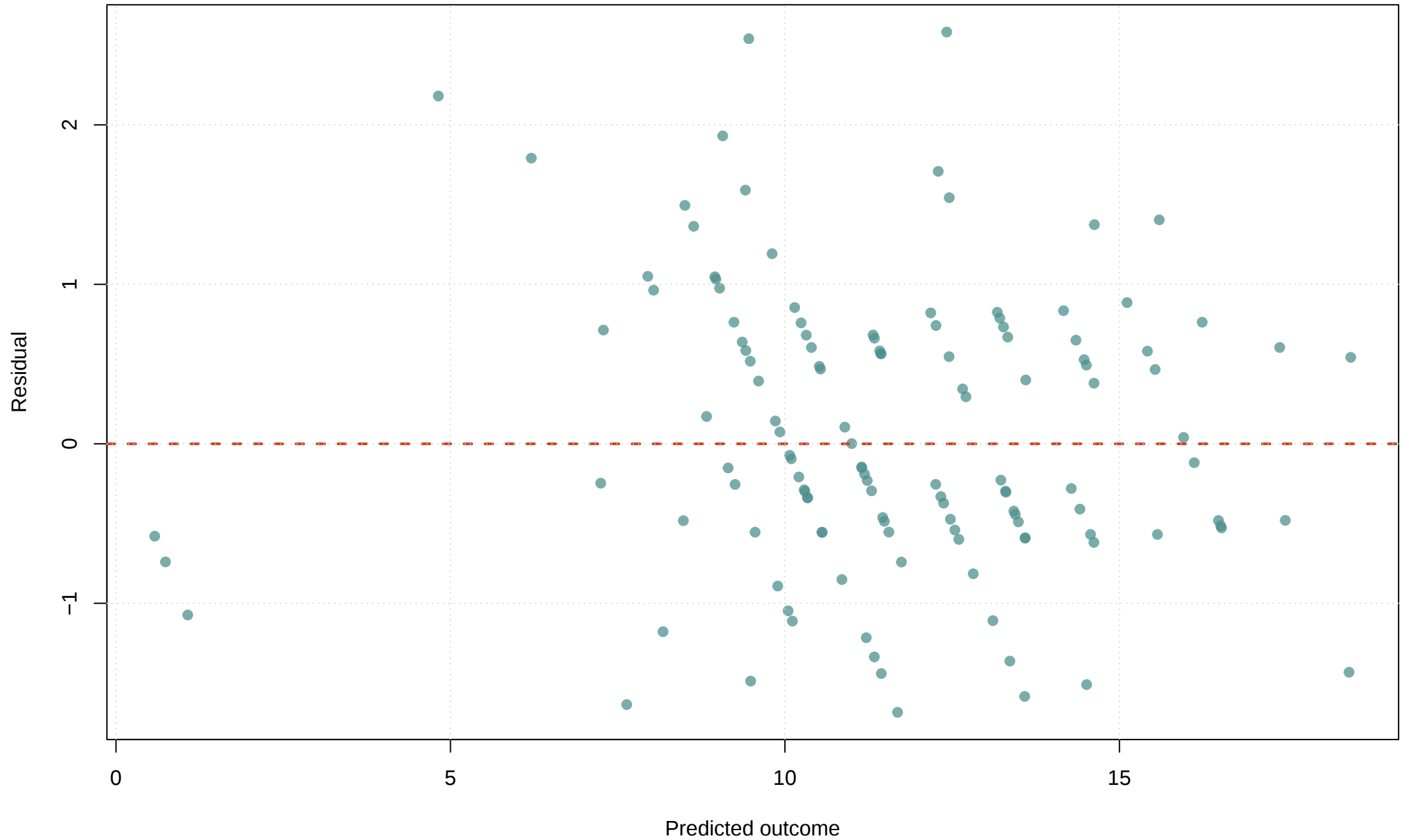
Ridge versus OLS coefficients



Observed versus predicted



Residuals versus predicted values



Residual distribution

