

Quantile Regression

Test name: Quantile Regression

Dataset: D:\DATA ANALYSIS\H Regression Tests and Models\Quantile Regression\dataset.csv

Rows in original dataset: 649

Rows used in quantile regression: 649

Outcome variable: G3

Quantiles fitted: 0.25, 0.5, 0.75

Numeric predictors: G1, G2, studytime, failures, absences, age

Categorical predictors: school, sex, address

Design matrix columns: 10 including intercept

OLS comparison R squared: 0.8522

Median quantile pseudo R squared: 0.6855

Interpretation: a coefficient is the estimated change in the selected conditional quantile of the outcome.

Decision guide: compare coefficients across tau values to see whether effects differ across low, median, and high outcomes.

Reporting guide: report tau, coefficient, standard error, confidence interval, p-value, pseudo R squared, and pinball-loss fit.

Charts generated: 10

Fit statistics

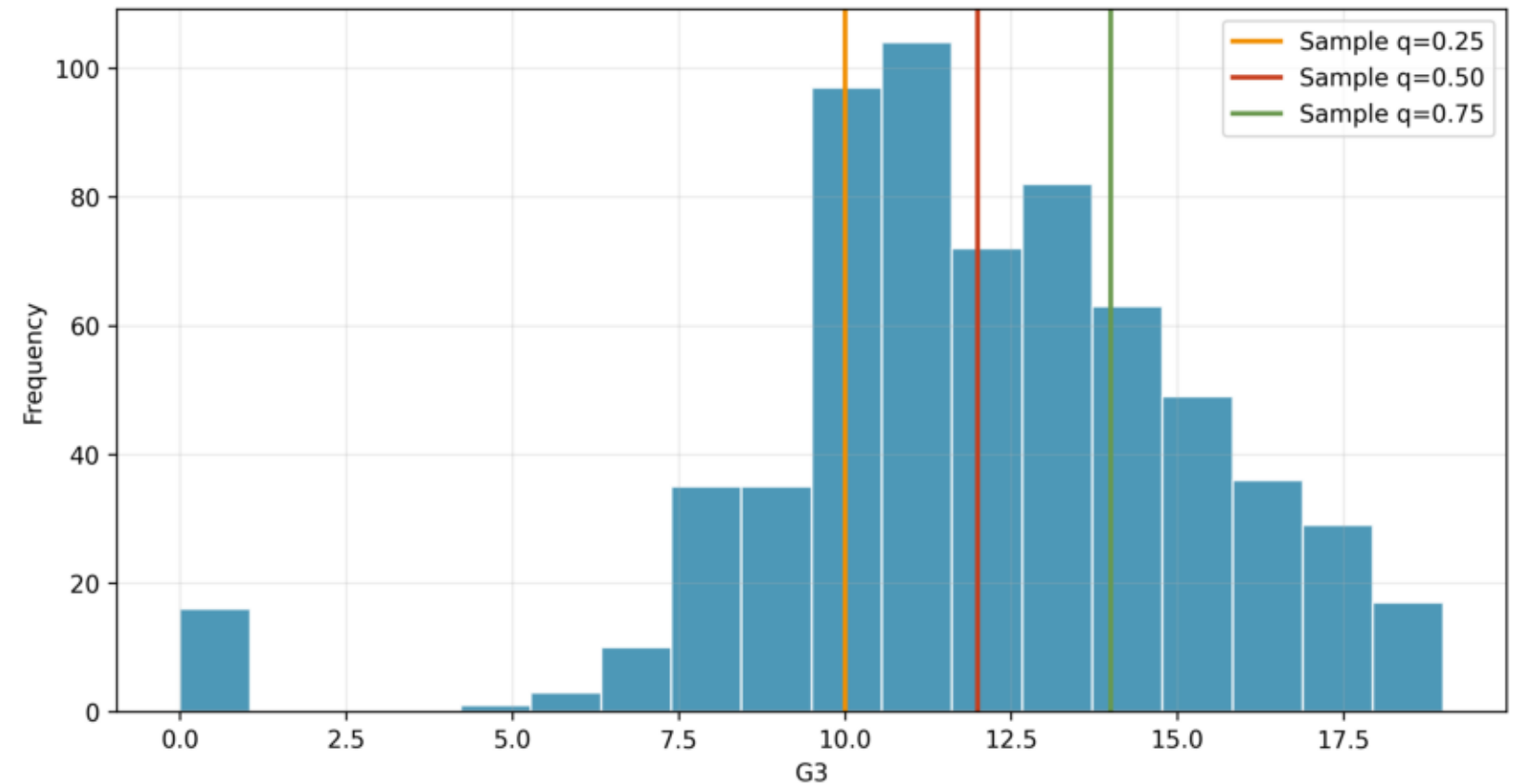
	model	quantile_tau	n	predictor_columns	pinball_loss	null_pinball_loss	pseudo_r_squared	iterations	status	method
Quantile regression tau=0.25		0.25	649	9	194.500023	620.25	0.686417	48.0	success	statsmodels QuantReg
Quantile regression tau=0.50		0.50	649	9	244.875001	778.50	0.685453	506.0	success	statsmodels QuantReg
Quantile regression tau=0.75		0.75	649	9	175.750023	617.75	0.715500	40.0	success	statsmodels QuantReg
OLS comparison		NaN	649	9	NaN	NaN	0.852222	NaN	comparison	statsmodels OLS

Coefficient table

quantile	term	coefficient	standard_error	t_value	p_value	ci95_lower	ci95_upper	decision_alpha_0_05		
0.25	const	-1.403427e-06	0.337934	-0.000004	9.999967e-01	-0.663596	0.663594	Not	statistically significant	or not estimated
0.25	G1	2.489031e-07	0.015437	0.000016	9.999871e-01	-0.030313	0.030314	Not	statistically significant	or not estimated
0.25	G2	9.999997e-01	0.015524	64.417880	1.145699e-281	0.969516	1.030483		Statistically significant	
0.25	studytime	8.715416e-08	0.029069	0.000003	9.999976e-01	-0.057083	0.057083	Not	statistically significant	or not estimated
0.25	failures	-1.398092e-06	0.039192	-0.000036	9.999715e-01	-0.076962	0.076960	Not	statistically significant	or not estimated
0.25	absences	1.196969e-08	0.004804	0.000002	9.999980e-01	-0.009433	0.009433	Not	statistically significant	or not estimated
0.25	age	9.002450e-08	0.019013	0.000005	9.999962e-01	-0.037336	0.037336	Not	statistically significant	or not estimated
0.25	school_MS	-1.711042e-07	0.047232	-0.000004	9.999971e-01	-0.092749	0.092749	Not	statistically significant	or not estimated
0.25	sex_M	-1.790108e-07	0.043628	-0.000004	9.999967e-01	-0.085672	0.085672	Not	statistically significant	or not estimated
0.25	address_U	1.323029e-07	0.048506	0.000003	9.999978e-01	-0.095251	0.095251	Not	statistically significant	or not estimated
0.50	const	-1.384611e+00	0.659040	-2.100952	3.603636e-02	-2.678757	-0.090465		Statistically significant	
0.50	G1	1.666665e-01	0.031153	5.349894	1.227608e-07	0.105491	0.227842		Statistically significant	

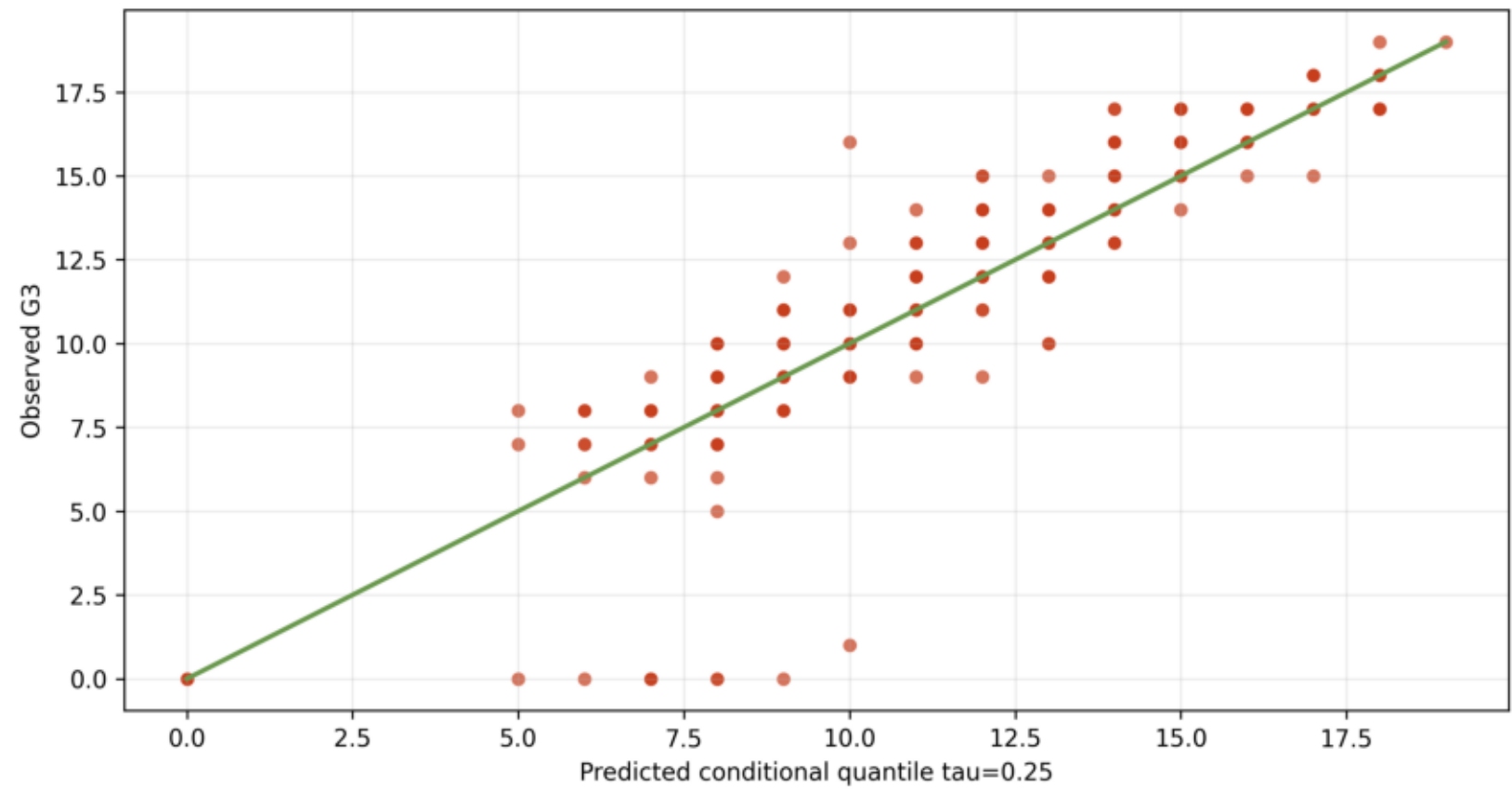
Outcome distribution with sample quantiles

Reference lines show the 25th, 50th, and 75th sample quantiles.



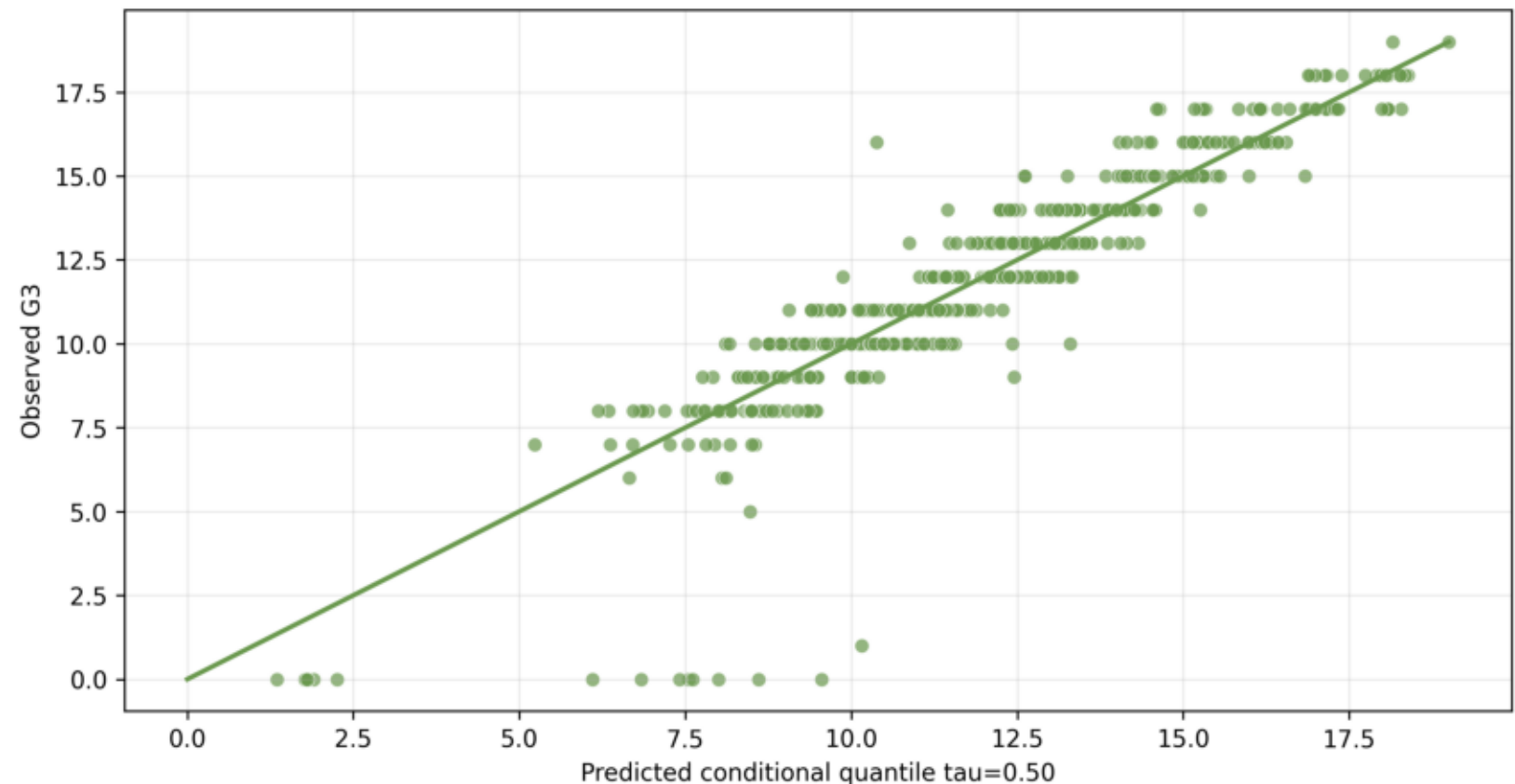
Observed vs predicted quantile tau=0.25

Points near the diagonal indicate stronger predictive alignment.



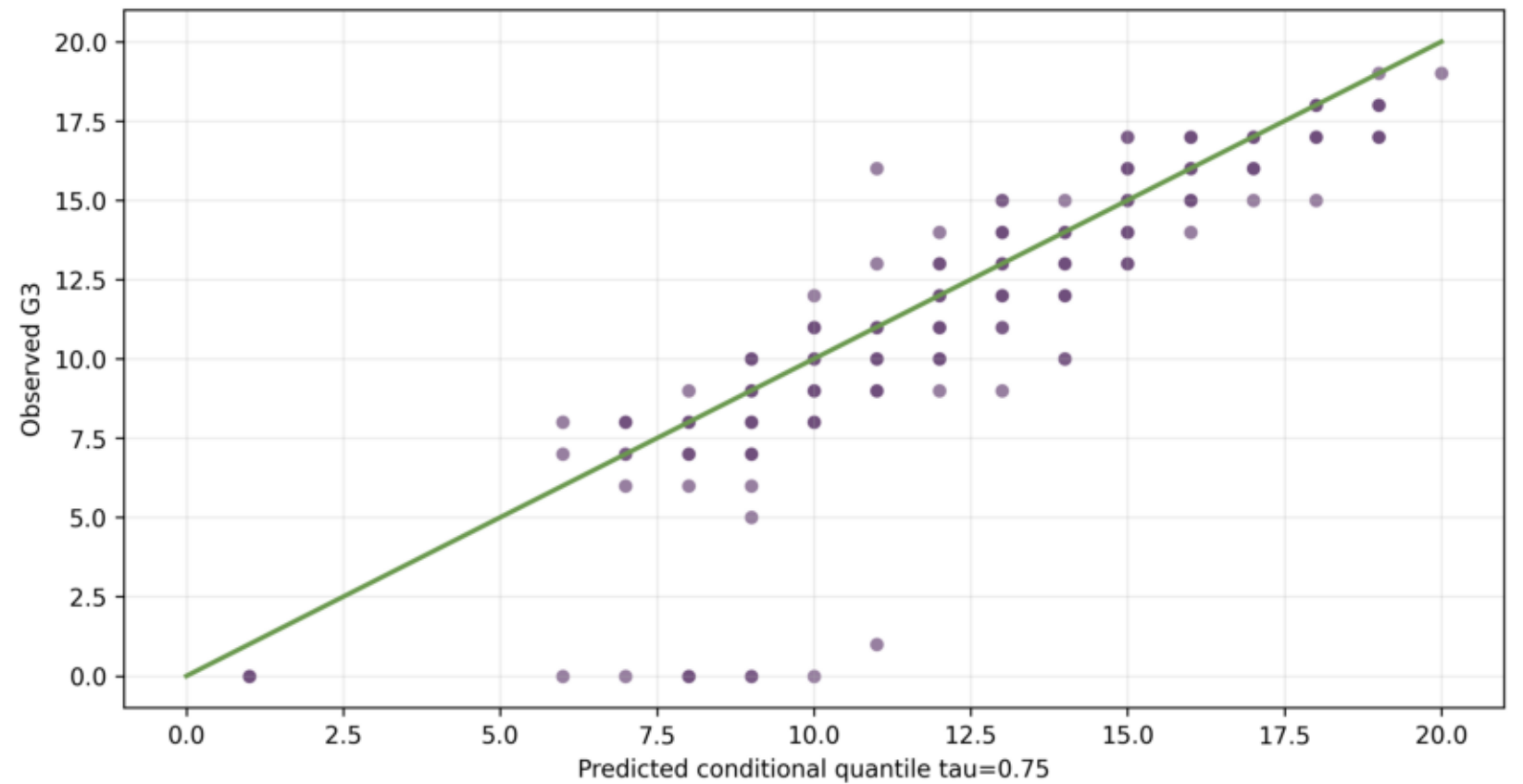
Observed vs predicted quantile tau=0.50

Points near the diagonal indicate stronger predictive alignment.



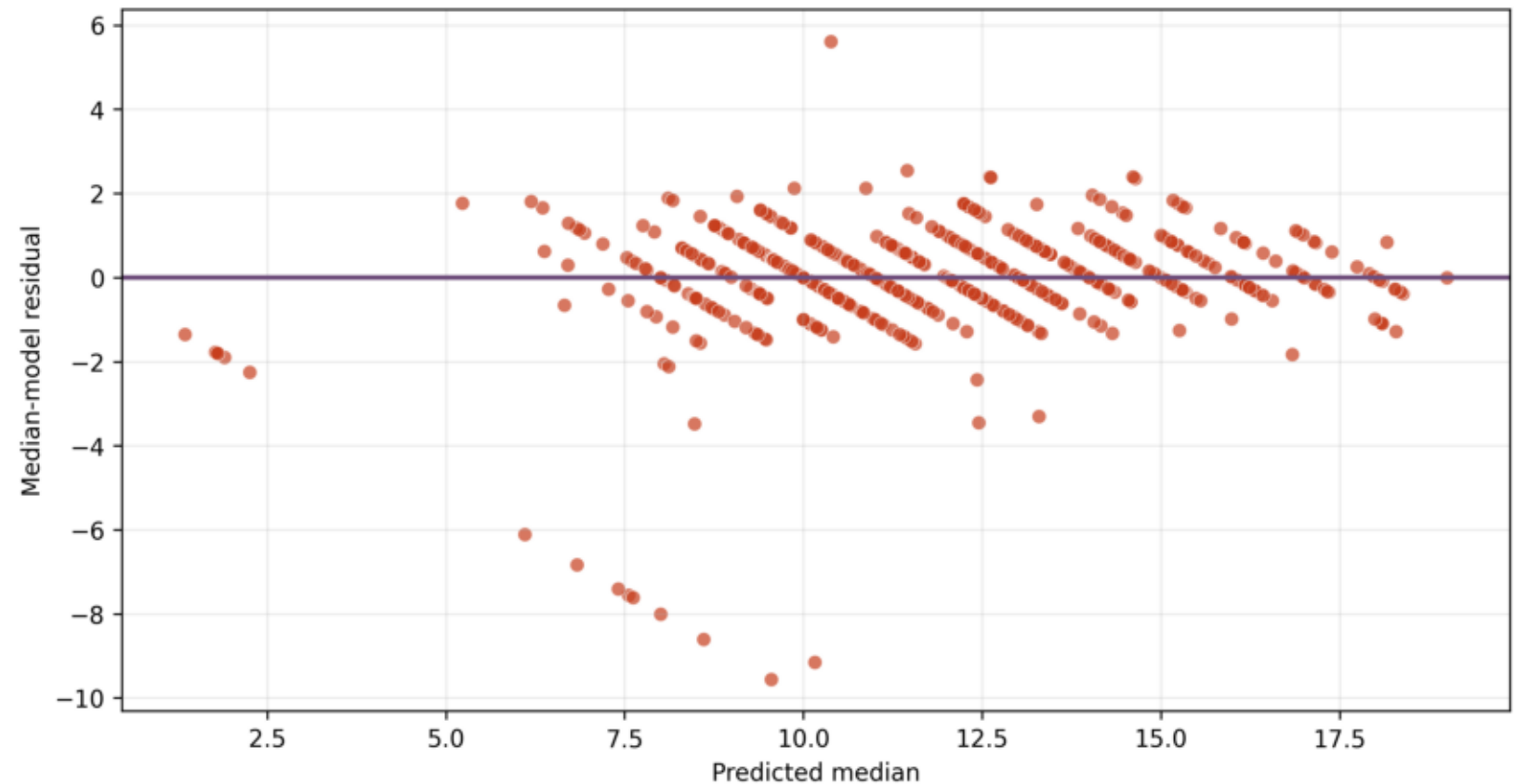
Observed vs predicted quantile tau=0.75

Points near the diagonal indicate stronger predictive alignment.



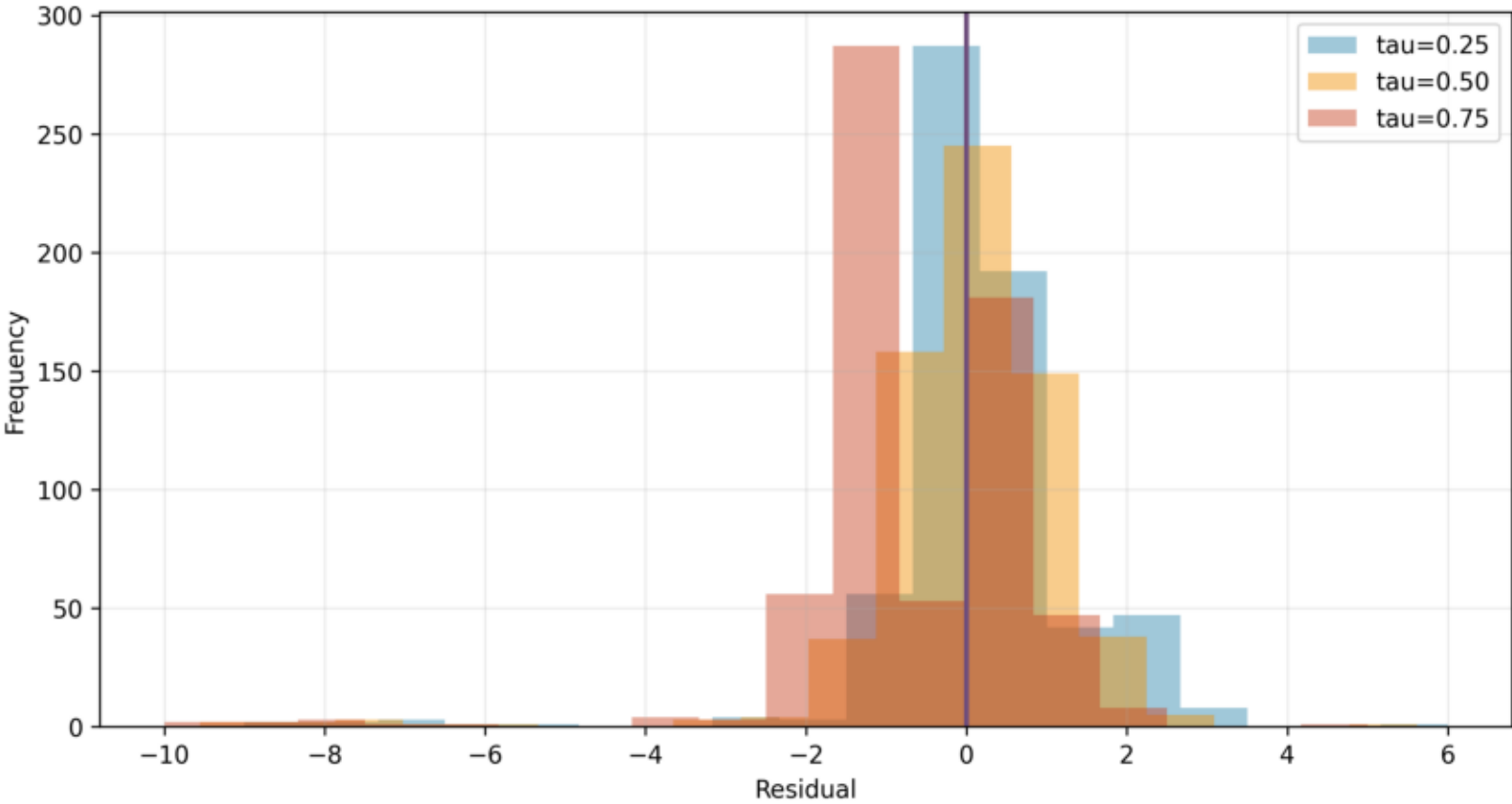
Median quantile residuals vs fitted values

Random scatter around zero supports a stable median regression fit.



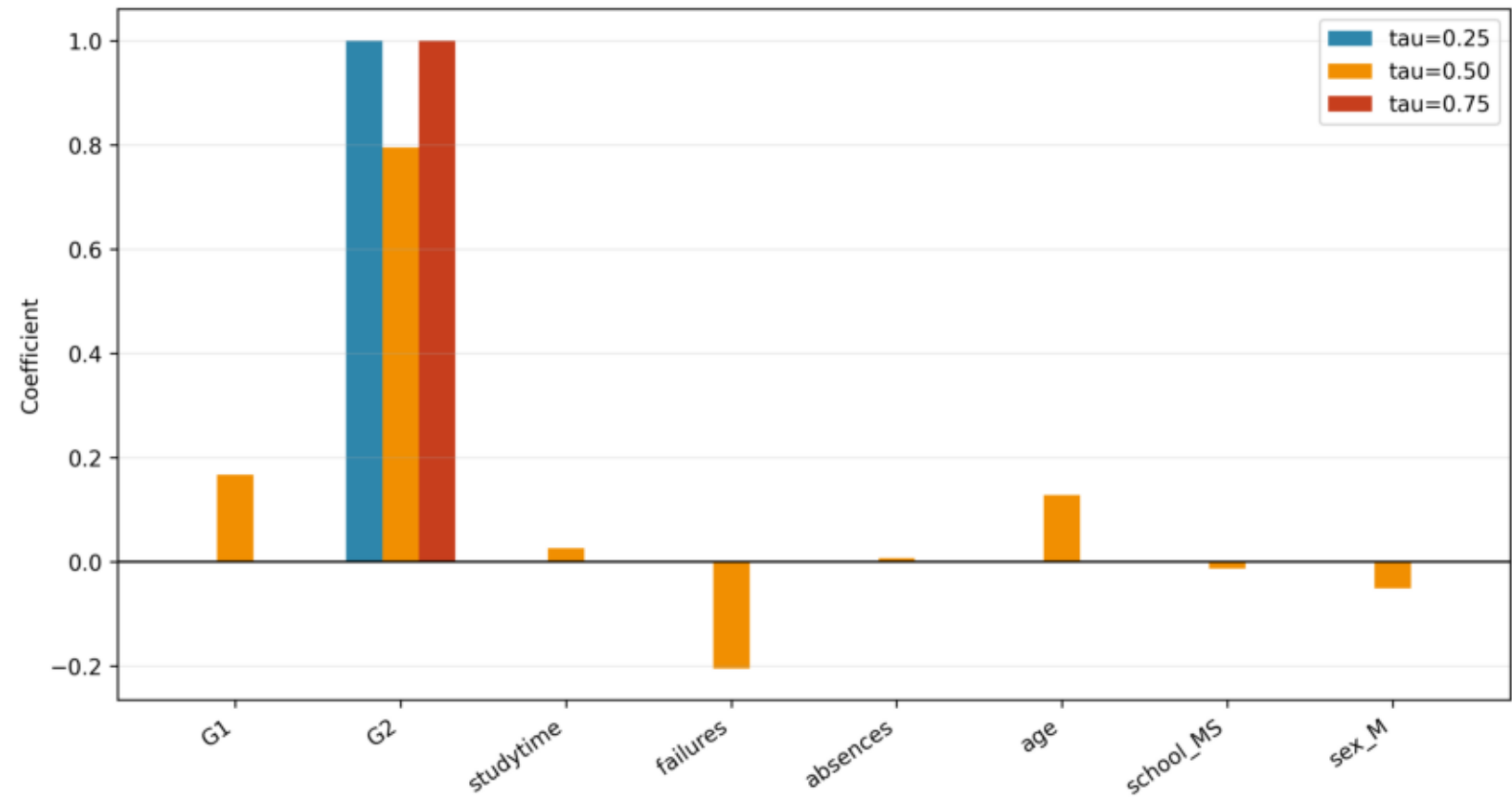
Residual distribution across fitted quantiles

The residual location changes by tau because each model targets a different conditional quantile.



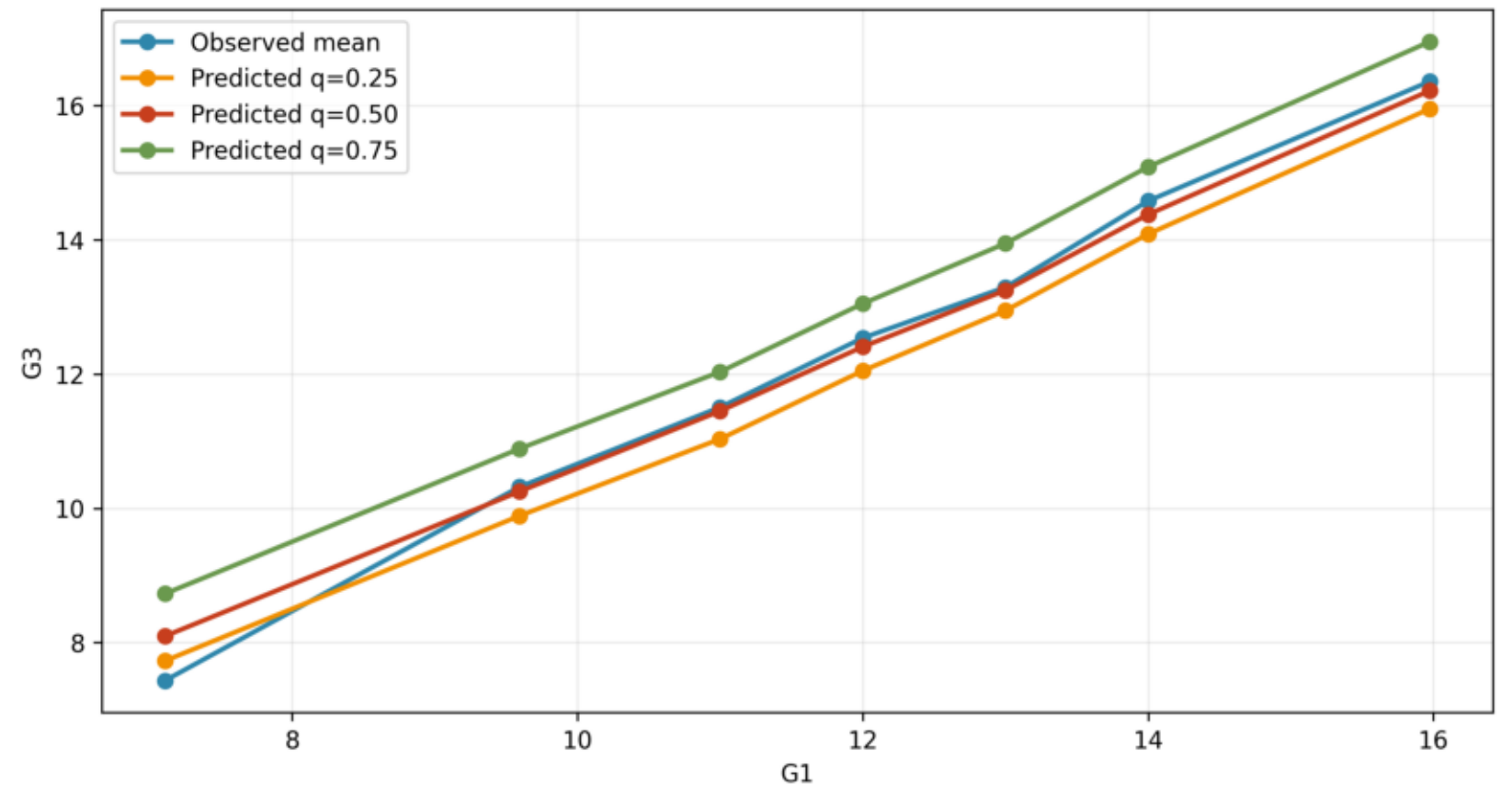
Coefficient comparison across quantiles

Different bar heights suggest that predictor effects vary across the outcome distribution.



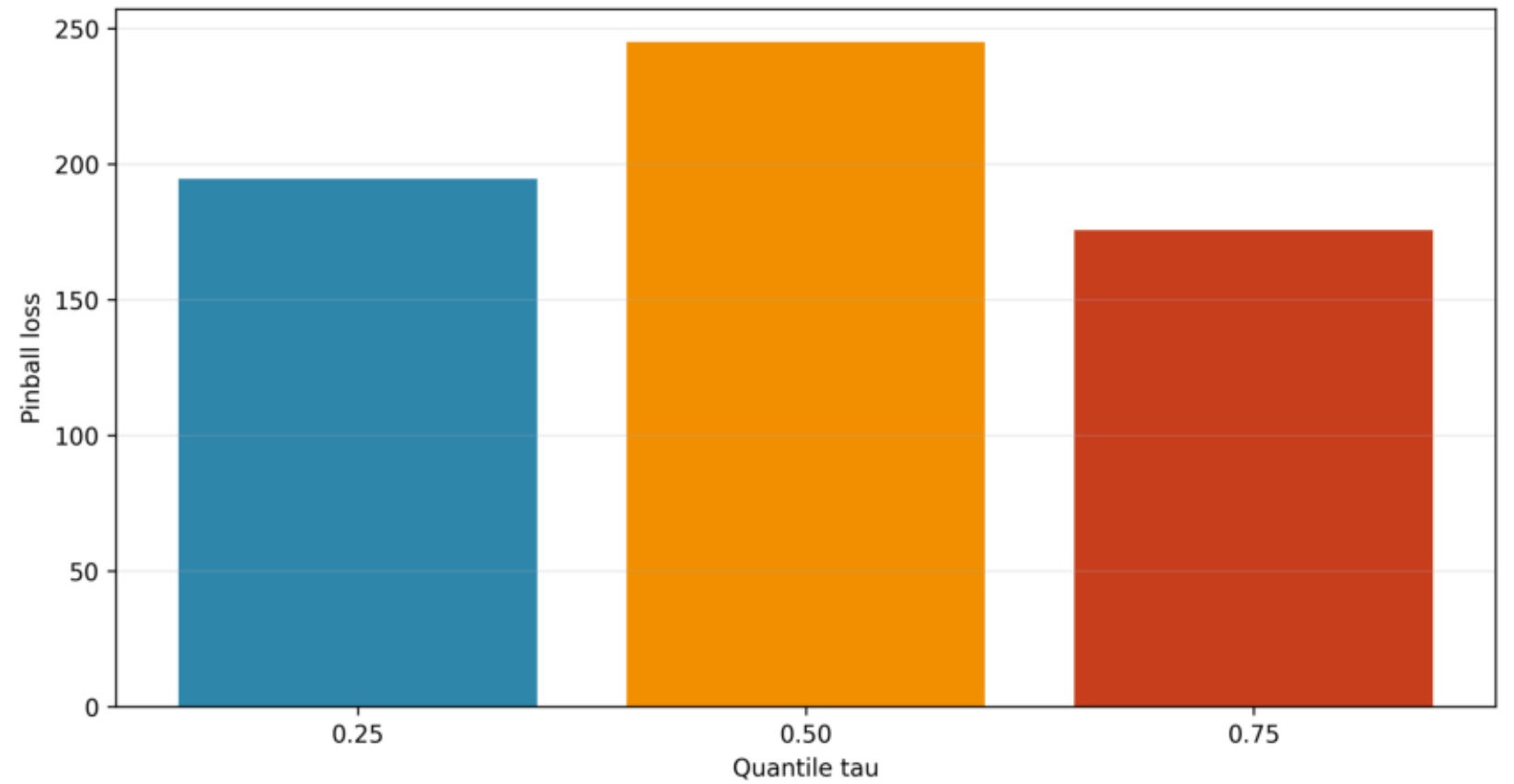
Observed and fitted quantiles by G1

Binned means make the quantile pattern easier to interpret.



Pinball loss by fitted quantile

Lower pinball loss indicates better fit for that quantile-specific loss function.



Observed outcome and fitted quantile curves

The first 120 cases are shown to compare fitted lower, median, and upper conditional quantiles.

