

Test name: Cox Proportional Hazards Model

Dataset: D:\DATA ANALYSIS\H Regression Tests and Models\Cox Proportional Hazards Model\dataset.csv

Rows in original dataset: 649

Columns in original dataset: 33

Rows used in Cox model: 649

Events: 569

Censored / no event: 80

Predictors used: age, Medu, Fedu, traveltime, studytime, failures, famrel, freetime, school_MS, sex_M

Duration source: Derived from absences + 1

Event source: Pstatus

Model requirement checked:

- Positive duration / follow-up time.
- Binary event indicator where 1 = event and 0 = censored.
- At least two event and two censored cases.
- Cox PH hazard-ratio interpretation.

Most statistically notable predictor:

- school_MS
- HR = 1.481919
- p-value = 0.00004069

Interpretation guide:

HR > 1 means higher event hazard as the predictor increases.

HR < 1 means lower event hazard as the predictor increases.

For categorical dummy predictors, HR compares that category with the reference category.

Always review proportional-hazards evidence before final reporting.

Charts generated: 8

Cox hazard ratios

predictor	coef	standard_error	z	p_value	hazard_ratio	coef_ci_lower	coef_ci_upper	hazard_ratio_ci_lower	hazard_ratio_ci_upper	decision_alpha_0_05
age	-0.0889	0.0367	-2.4236	0.0154	0.9149	-0.1609	-0.0170	0.8514	0.9831	Statistically significant
Medu	0.0194	0.0514	0.3776	0.7057	1.0196	-0.0814	0.1202	0.9218	1.1278	Not statistically significant
Fedu	-0.0417	0.0505	-0.8249	0.4094	0.9592	-0.1408	0.0574	0.8687	1.0591	Not statistically significant
traveltime	-0.0079	0.0592	-0.1340	0.8934	0.9921	-0.1239	0.1080	0.8835	1.1141	Not statistically significant
studytime	0.1290	0.0520	2.4802	0.0131	1.1377	0.0271	0.2309	1.0274	1.2597	Statistically significant
failures	-0.1115	0.0809	-1.3781	0.1682	0.8945	-0.2700	0.0471	0.7633	1.0482	Not statistically significant
famrel	0.0979	0.0444	2.2029	0.0276	1.1029	0.0108	0.1850	1.0109	1.2033	Statistically significant
freetime	-0.0012	0.0411	-0.0280	0.9776	0.9988	-0.0818	0.0795	0.9215	1.0827	Not statistically significant
school_MS	0.3933	0.0959	4.1035	0.0000	1.4819	0.2055	0.5812	1.2281	1.7882	Statistically significant
sex_M	0.0441	0.0912	0.4829	0.6291	1.0450	-0.1347	0.2228	0.8739	1.2496	Not statistically significant

Model fit statistics

fit_method	n_cases	events	censored	predictors_entered	log_likelihood	aic_partial_likelihood	ties
statsmodels PHReg with	649.0000	569.0000	80.0000	10.0000	-3225.6292	6471.2584	breslow

Event and duration summary

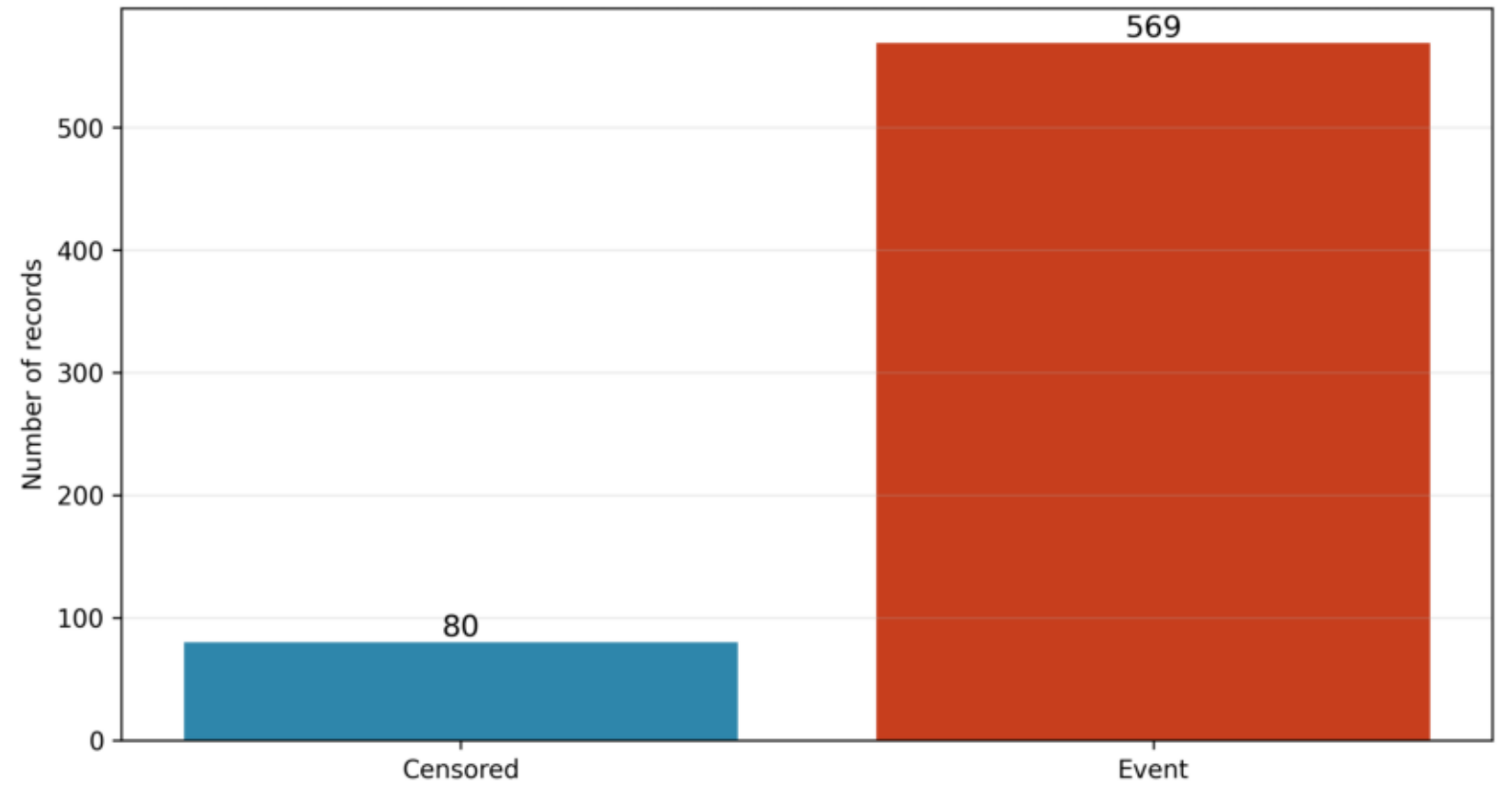
status	n	mean_duration	median_duration	min_duration	max_duration
Censored	80.0000	6.1125	5.0000	1.0000	25.0000
Event	569.0000	4.4552	3.0000	1.0000	33.0000
Overall	649.0000	4.6595	3.0000	1.0000	33.0000

PH assumption context

test	statistic	p_value	note
proportional_hazards_context			Formal Schoenfeld PH test is not returned by st

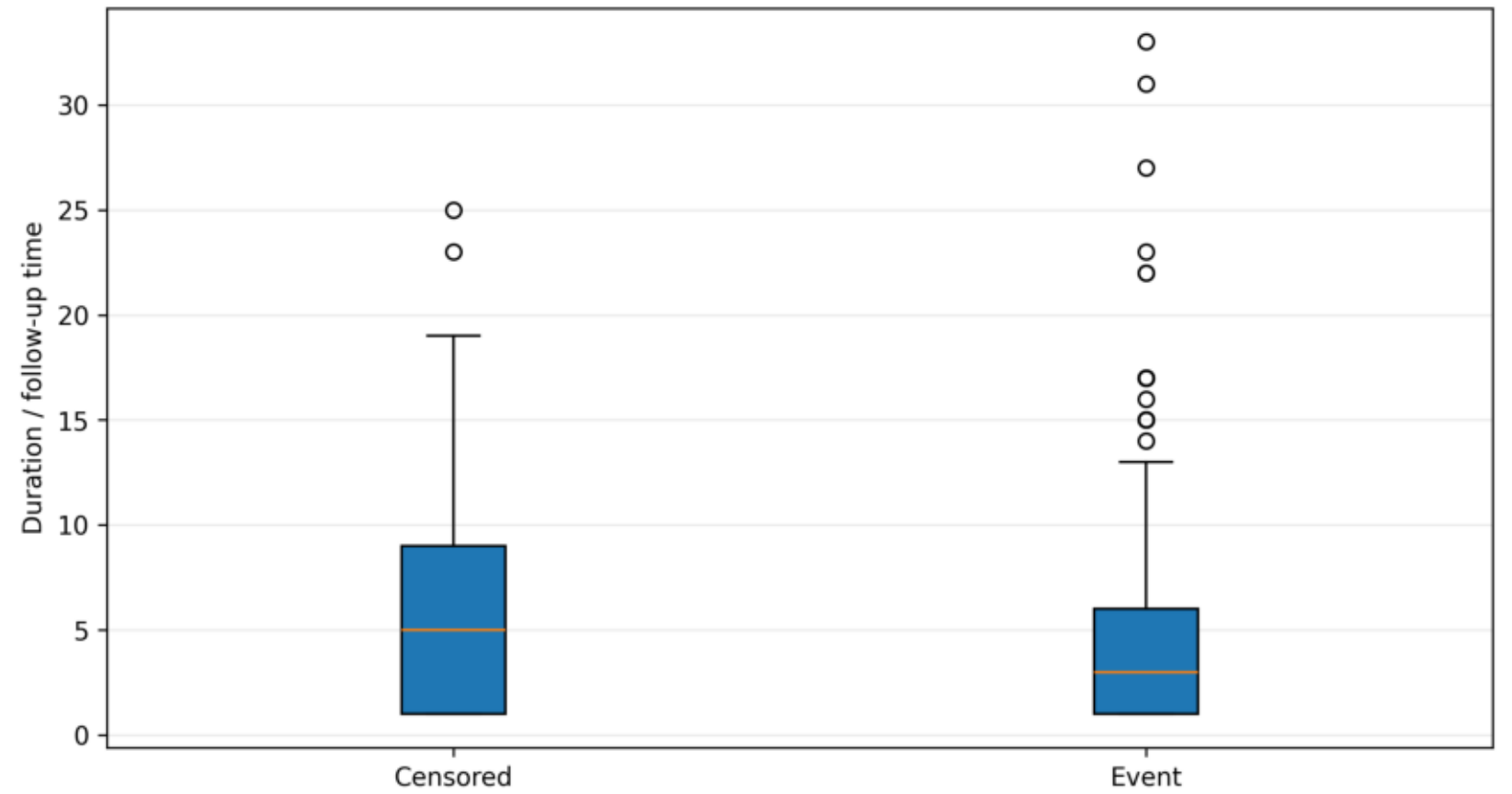
Cox PH event and censored counts

The model needs both event and censored records for survival regression.



Duration distribution by event status

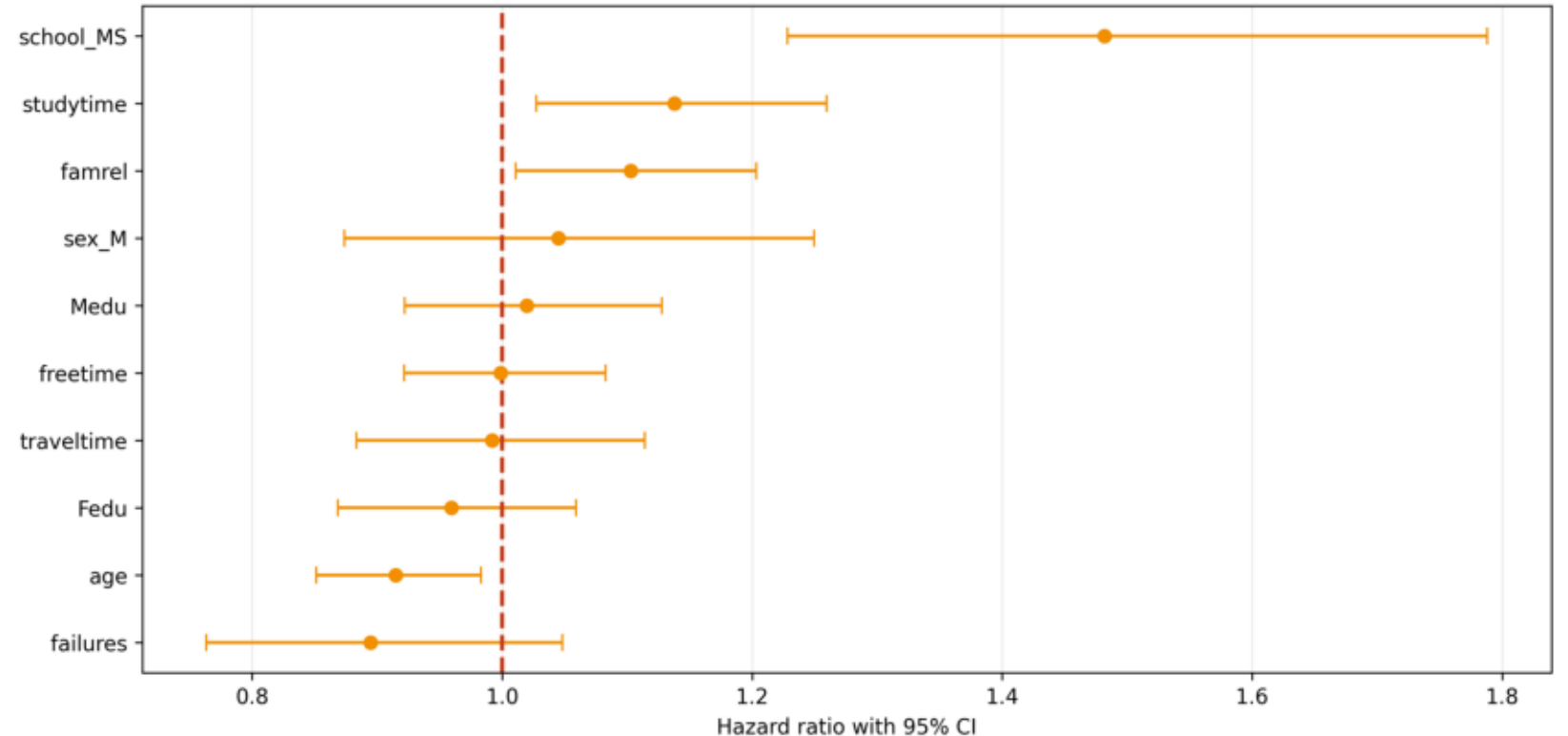
This checks whether the event and censored groups cover a usable time range.



chart_03_cox_hazard_ratios_forest.png

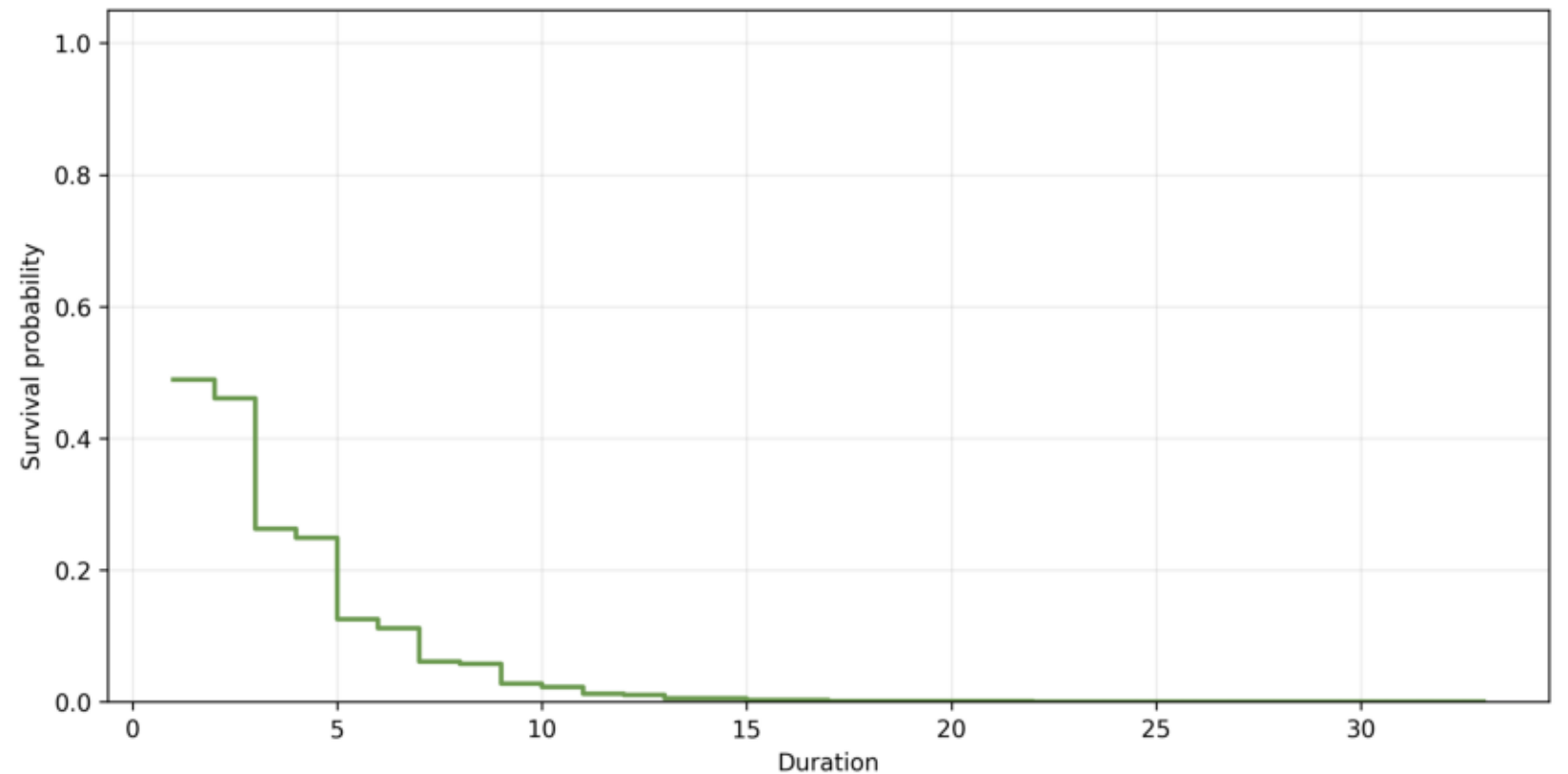
Cox PH hazard-ratio forest plot

HR above 1 indicates higher event hazard; HR below 1 indicates lower event hazard.



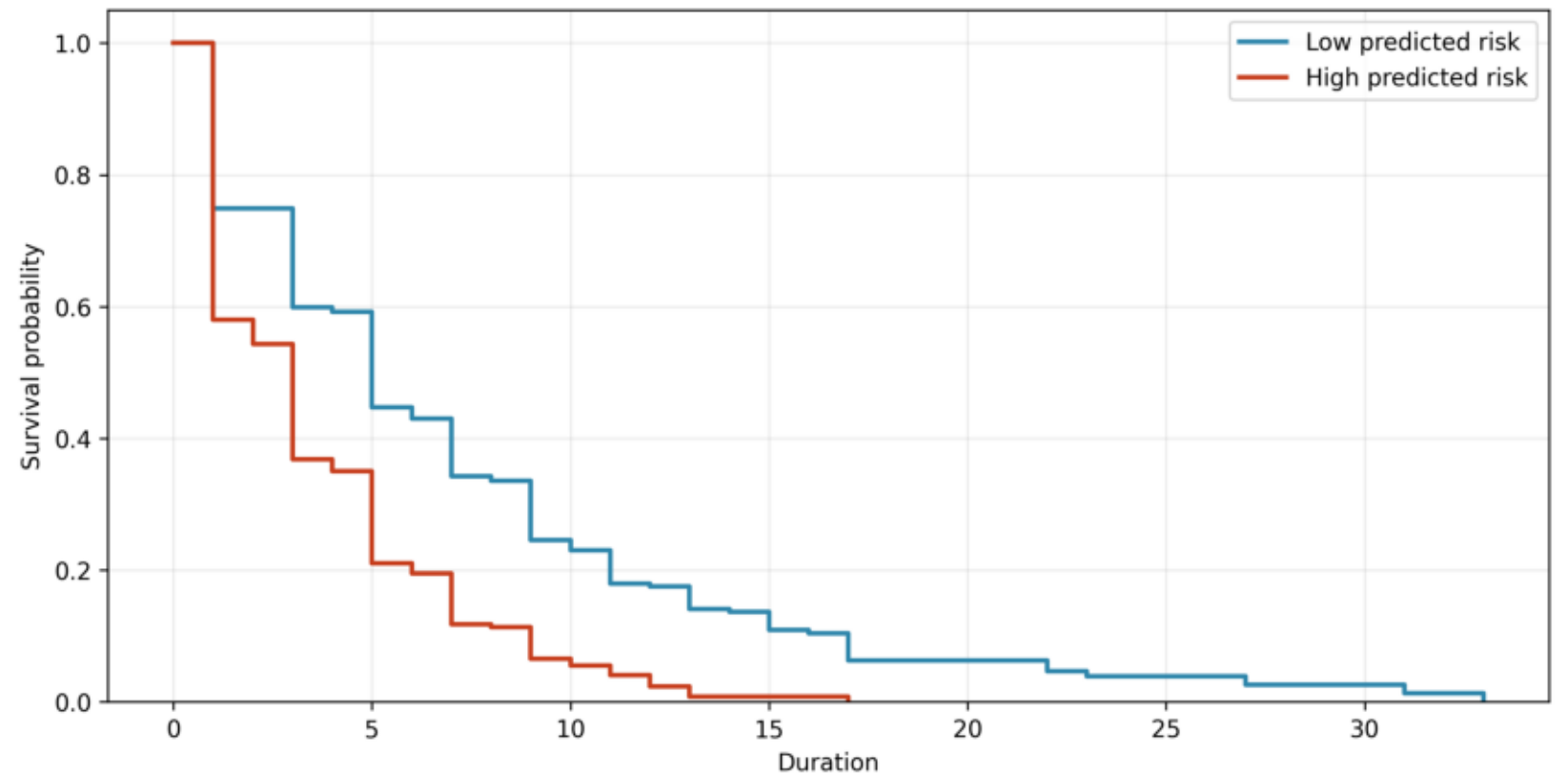
Cox PH baseline or overall survival curve

Baseline survival curve from the fitted Cox model.



Kaplan-Meier survival by predicted risk group

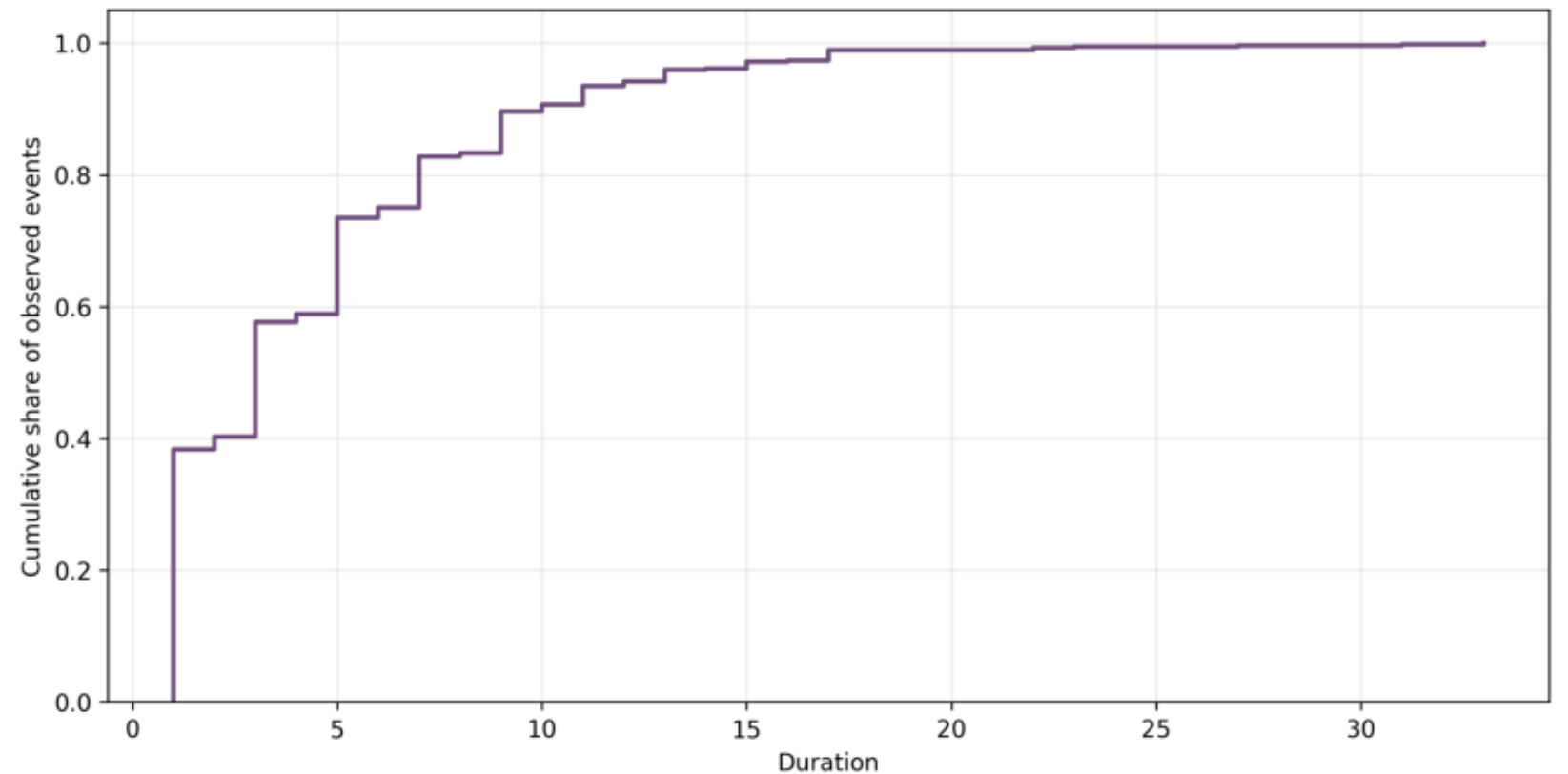
Risk groups are formed from the fitted Cox model median risk score.



chart_06_cumulative_observed_events.png

Cumulative observed events

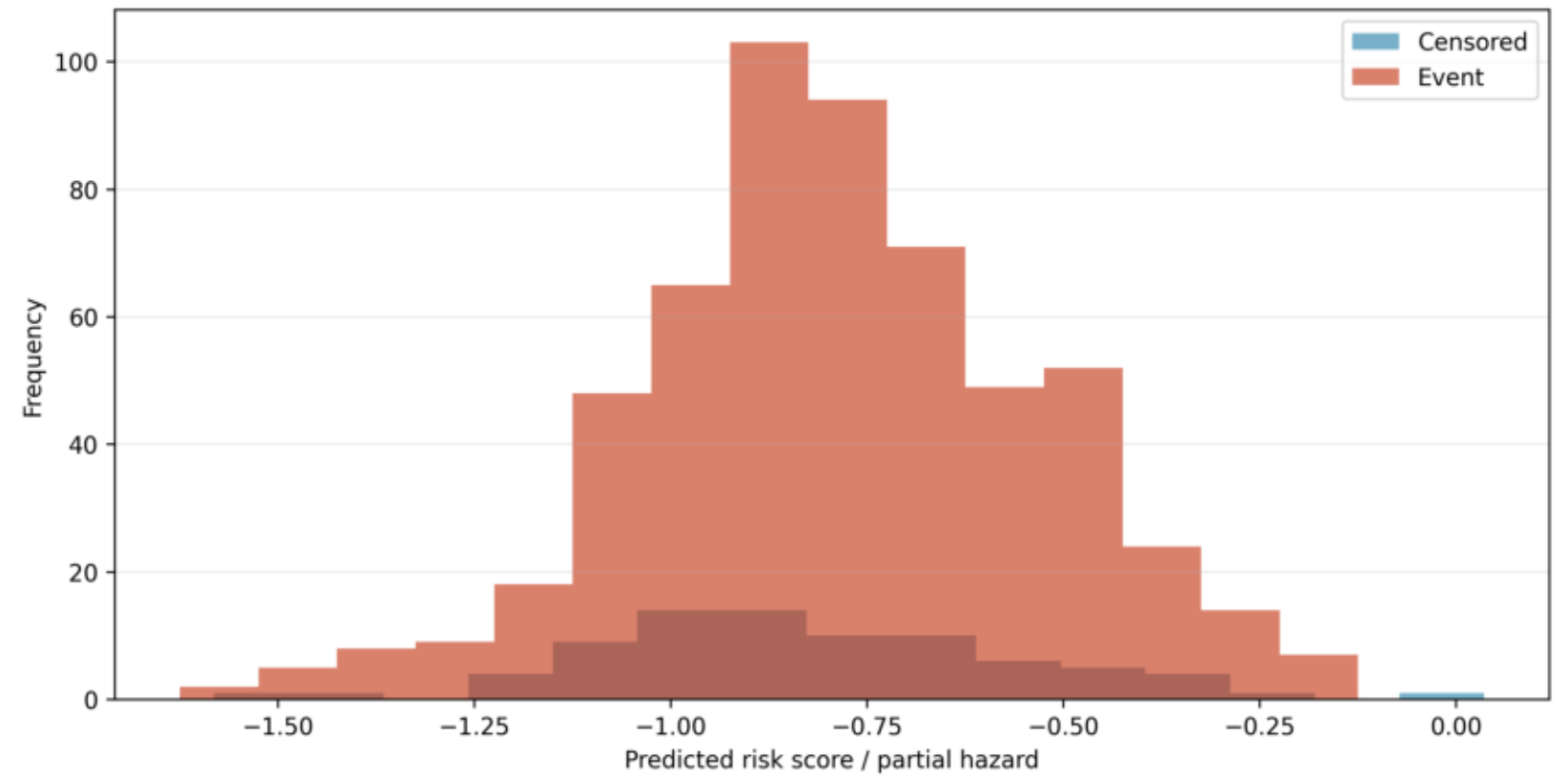
The curve shows how observed events accumulate across follow-up time.



chart_07_predicted_risk_score_distribution.png

Predicted risk score distribution

Separation between groups supports the practical discrimination of the Cox model.



chart_08_hazard_ratio_summary_table.png

Cox PH hazard-ratio summary table

Report HR, 95% CI, p-value, and decision for each predictor.

predictor	hazard_ratio	hazard_ratio_ci_lower	hazard_ratio_ci_upper	p_value	decision_alpha_0_05
age	0.9149	0.8514	0.9831	0.0154	Statistically significant
Medu	1.0196	0.9218	1.1278	0.7057	Not statistically significant
Fedu	0.9592	0.8687	1.0591	0.4094	Not statistically significant
traveltime	0.9921	0.8835	1.1141	0.8934	Not statistically significant
studytime	1.1377	1.0274	1.2597	0.0131	Statistically significant
failures	0.8945	0.7633	1.0482	0.1682	Not statistically significant
famrel	1.1029	1.0109	1.2033	0.0276	Statistically significant
freetime	0.9988	0.9215	1.0827	0.9776	Not statistically significant
school_MS	1.4819	1.2281	1.7882	0.0000	Statistically significant
sex_M	1.0450	0.8739	1.2496	0.6291	Not statistically significant