

Accelerated Failure Time Model

Test name: Accelerated Failure Time Model

Dataset: D:/DATA ANALYSIS/H Regression Tests and Models/Accelerated Failure Time Model/dataset.csv

Rows in original dataset: 649

Columns in original dataset: 33

Rows used in AFT models: 649

Events: 151

Right censored: 498

Constructed survival time: $\text{aft_time} = \text{absences} + 1$

Constructed event indicator: $G3 < 10$ OR failures > 0

Numeric predictors: G1, G2, studytime, age, Medu, Fedu

Categorical predictors: school, sex, address

Formula: $\text{survival::Surv}(\text{aft_time}, \text{aft_event}) \sim G1 + G2 + \text{studytime} + \text{age} + \text{Medu} + \text{Fedu} + \text{school} + \text{sex} + \text{address}$

Models fitted: Weibull AFT and Log-Normal AFT using survival::survreg .

Best model by AIC: Weibull AFT

Strongest fitted acceleration term in Weibull AFT: schoolMS with acceleration factor 0.6025.

Interpretation: $\exp(\text{coefficient})$ is the acceleration factor / time ratio.

Acceleration factor > 1 means longer expected time to event; < 1 means shorter time to event.

Decision guide: $p < 0.05$ and acceleration-factor CI not crossing 1 indicates stronger evidence for a predictor effect.

Reporting guide: state survival time, event definition, censoring count, distribution, acceleration factors, 95% CIs, and model fit.

Charts generated: 8

AFT model fit statistics

model	n	events	right_censored	distribution	scale
Weibull AFT	649	151	498	weibull	0.7223146
Log-Normal AFT	649	151	498	lognormal	1.0812029
log_likelihood		aic	bic	iterations	
	-489.1226	1000.245	1049.475	10	
	-498.1509	1018.302	1067.532	5	

AFT acceleration coefficients

model	term	coefficient	standard_error	z_value
Weibull AFT	(Intercept)	-0.08791780	0.96286804	-0.09130825
Weibull AFT	G1	0.09383609	0.04226109	2.22038952
Weibull AFT	G2	0.20991165	0.02948909	7.11828244
Weibull AFT	studytime	0.06534992	0.09522326	0.68628108
Weibull AFT	age	-0.02084927	0.04562091	-0.45701136
Weibull AFT	Medu	0.02867766	0.07004835	0.40939809
Weibull AFT	Fedu	0.04084709	0.07313373	0.55852601
Weibull AFT	schoolMS	-0.50673985	0.14308367	-3.54156314
Weibull AFT	sexM	-0.06250968	0.12782575	-0.48902260
Weibull AFT	addressU	0.30956328	0.12571844	2.46235382
Weibull AFT	Log(scale)	-0.32529447	0.06090636	-5.34089456
Log-Normal AFT	(Intercept)	-0.07936468	1.10307257	-0.07194874
p_value	ci95_lower	ci95_upper	acceleration_factor_exp_b	
9.272477e-01	-1.97510447	1.79926887	NA	
2.639234e-02	0.01100587	0.17666630	1.0983797	
1.092803e-12	0.15211410	0.26770919	1.2335691	
4.925359e-01	-0.12128424	0.25198408	1.0675325	
6.476629e-01	-0.11026460	0.06856606	0.9793666	
6.822475e-01	-0.10861459	0.16596991	1.0290928	
5.764853e-01	-0.10249239	0.18418657	1.0416928	
3.977636e-04	-0.78717869	-0.22630101	0.6024565	
6.248257e-01	-0.31304354	0.18802418	0.9394040	
1.380284e-02	0.06315967	0.55596690	1.3628298	
9.248904e-08	-0.44466875	-0.20592019	NA	
9.426427e-01	-2.24134719	2.08261783	NA	
acceleration_ci95_lower	acceleration_ci95_upper			
NA	NA			
1.0110667	1.193233			
1.1642931	1.306967			















