

Section 3–Inference using Bootstrap Resampling

Bootstrap Confidence Intervals

Bootstrap estimation is provided for the following parameters

μ_{θ} Mean(Rate)

Median(θ)

σ_{θ}^2 var(Rate)

$\rho(\hat{\theta})$ rel(Rate)

$\rho_{\eta(t)\theta}$ Corr(Rate, Initial status)

$\beta_{\theta W}$ Beta(Rate, W)

$\beta_{\eta(t)W}$ Beta(Eta(T1), W)

For each parameter, there are two sections of the display:

1. **Estimate (Est)** contains the parameter estimate from the mixed-model analysis—either from fixed or random effects output—given the generic “mle” label; the mean over the bootstrap resamples of that estimate (mean.boot); and the standard deviation of that estimate over the bootstrap resamples (se.boot).

In addition some parameters include a se.SAS entry, which gives (for comparison) the standard error provided by the PROC MIXED run on the data. Also, regression coefficients include a se.OLS entry, which gives (for comparison) the standard error provided by the OLS regressions shown in the descriptive portions of the Timepath97 output.

2. Confidence Interval (CI plus BCa Detail)

The CI portion of the section gives the Standard Interval—symmetric interval using $N(0,1)$ and se.boot Percentile—based on the unadjusted percentiles of the bootstrap distribution.

BCa—Bias Corrected and Accelerated intervals: BCa Detail gives the coefficients and percentile shifting used in the procedure.

The columns in CI give the endpoints for various percentiles—i.e. a 90% interval would be constructed with endpoints obtained from the .05 and .950 columns. Also Shape and Length for the 95% interval is given.

* Number of Bootstraps: 4000

* Mean(Rate) *

Est:	mle	mean.boot	se.boot			
	36.4481	36.4451	0.44428			

CI:	0.025	0.050	0.950	0.975	Shape95	Length95
Standard	35.5773	35.7173	37.1788	37.3188	1	1.74
Percentile	35.566	35.709	37.1855	37.3192	0.99	1.75
BCa	35.576	35.7168	37.1973	37.3297	1.01	1.75
BCa Detail:	a	z0	0.025	0.050	0.950	0.975
	-214E-7	0.01598	0.02692	0.05338	0.9532	0.97681

* Median(Rate) *

Est:	mle	mean.boot	se.boot			
	36.4167	36.4546	0.31607			

CI:	0.025	0.050	0.950	0.975	Shape95	Length95
Standard	35.7972	35.8968	36.9365	37.0361	1	1.24
Percentile	35.8333	35.8571	36.9524	37.0238	1.04	1.19
BCa	35.8333	35.8571	36.9762	37.0238	1.04	1.19
BCa Detail:	a	z0	0.025	0.050	0.950	0.975
	-349E-7	0.01379	0.02665	0.0529	0.95277	0.97656

* var(Rate) *

Est:	mle	mean.boot	se.boot	se.SAS		
	46.2293	45.8976	5.88593	.		

CI:	0.025	0.050	0.950	0.975	Shape95	Length95
Standard	34.6931	36.5478	55.9108	57.7655	1	23.1
Satterthwaite	38.1469	39.3323	55.2507	57.198		
Percentile	34.9386	36.6664	56.1952	58.4156	1.08	23.5
BCa	36.7909	38.3039	58.5592	61.2847	1.6	24.5
BCa Detail:	a	z0	0.025	0.050	0.950	0.975
	0.03941	0.10799	0.05283	0.08995	0.97676	0.99085

* Rel(Rate) *

Est:	mle	mean.boot	se.boot			
	0.82795	0.82497	0.01883			

CI:	0.025	0.050	0.950	0.975	Shape95	Length95
Standard	0.79103	0.79697	0.85893	0.86486	1	0.07
Percentile	0.78492	0.79225	0.85433	0.85853	0.71	0.07
BCa	0.79197	0.79795	0.85825	0.8629	0.97	0.07
BCa Detail:	a	z0	0.025	0.050	0.950	0.975
	0.03499	0.09162	0.04825	0.08355	0.97384	0.98933

* Corr(Rate, Initial status) *

Est:	mle	mean.boot	se.boot			
	0.651	0.66128	0.09068			

CI:	0.025	0.050	0.950	0.975	Shape95	Length95
Standard	0.47328	0.50185	0.80015	0.82872	1	0.36
Percentile	0.48425	0.51163	0.80785	0.83411	1.1	0.35
BCa	0.45642	0.48381	0.78466	0.80622	0.8	0.35
BCa Detail:	a	z0	0.025	0.050	0.950	0.975
	-0.0354	-0.1055	0.0098	0.02434	0.91218	0.94895

* Beta(Rate, W) *

Est:	mle	mean.boot	se.boot	se.SAS	se.OLS	
	0.33569	0.33534	0.02736	.	0.02537	

CI:	0.025	0.050	0.950	0.975	Shape95	Length95
Standard	0.28207	0.29069	0.3807	0.38932	1	0.11
Percentile	0.28127	0.28959	0.37939	0.38898	0.98	0.11
BCa	0.28184	0.29044	0.38059	0.39029	1.01	0.11
BCa Detail:	a	z0	0.025	0.050	0.950	0.975
	0.00921	0.00501	0.02772	0.05365	0.95356	0.97758

* Beta(Eta(TI), W) *

Est:	mle	mean.boot	se.boot	se.SAS	se.OLS	
	0.82948	0.83143	0.07881	.	0.08258	

CI:	0.025	0.050	0.950	0.975	Shape95	Length95
Standard	0.67502	0.69985	0.9591	0.98394	1	0.31
Percentile	0.67393	0.70195	0.9641	0.98557	1	0.31
BCa	0.66749	0.69527	0.95871	0.98081	0.93	0.31
BCa Detail:	a	z0	0.025	0.050	0.950	0.975
	-0.0129	-0.0213	0.01996	0.04235	0.94167	0.96926