Scenario 2 Validation Results: Paired t-Test

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1 Study Design

Scenario 2 emulates a one-sample design with two repeated measurements for each independent sampling unit. We devise a paired t-test expressed as a general linear hypothesis test comparing the mean responses at the first and second repeated measurements. Several conditional linear missing data processes and Markov missing data processes are considered.

1.1 Linear Mixed Model Inputs

1.1.1 Type I Error Rates (α)

0.0500

1.1.2 Beta Scale Values (δ_β)

0.0000, 0.5000, 1.0000, 1.5000, 2.0000, 2.5000

1.1.3 Sigma Scale Values (δ_σ)

1.0000

1.1.4 Planned Sample Sizes (N)

20

1.1.5 Matrix Inputs

$$Es(\mathbf{X}_M) = \begin{bmatrix} 1.0000 \end{bmatrix}$$

$$\boldsymbol{\beta} = \begin{bmatrix} 0.0000 \\ 1.0000 \end{bmatrix}$$

$$\mathbf{L} = \begin{bmatrix} 1.0000 & -1.0000 \end{bmatrix}$$

$$\boldsymbol{\theta}_0 = \begin{bmatrix} 0.0000 \end{bmatrix}$$

$$\boldsymbol{\Sigma}_M = \begin{bmatrix} 2.0000 & 1.0000 \\ 1.0000 & 2.0000 \end{bmatrix}$$

2 Conditional Linear Missing Data Models

Pattern Index	$\boldsymbol{\pi}$	$\gamma_{jj'}$	Correlation Pattern
1	(1.0000, 1.0000)	0.25	UN
2	(0.9000, 0.9000)	0.25	UN
3	(0.9000, 0.8000)	0.25	UN
4	(0.8000, 0.8000)	0.25	UN

3 Validation Results

3.1 Summary Statistics

Maximum Deviation from the Complete Case Scenarios	0.0076
Maximum Deviation from the Observed Case Scenarios	0.0461

3.2 Full Validation Results

3.2.1 Complete Case Analysis

Missing Process	Pattern Index	δ_σ	δ_β	N	$\mathcal{E}(N_c)$	Analytical Power	Empirical Power	Absolute Deviation	Iterations	Converged
CLP	1	1	0	20	20	0.05	0.0552	0.0052	10000	10000
CLP	2	1	0	20	16.65	0.05	0.0494	6e-04	10000	10000
CLP	3	1	0	20	15	0.05	0.0515	0.0015	10000	10000
CLP	4	1	0	20	13.6	0.05	0.0497	3e-04	10000	10000
CLP	1	1	0.5	20	20	0.3236	0.3245	9e-04	10000	10000
CLP	2	1	0.5	20	16.65	0.2706	0.2711	5e-04	10000	10000
CLP	3	1	0.5	20	15	0.2442	0.2498	0.0056	10000	10000
CLP	4	1	0.5	20	13.6	0.2217	0.2264	0.0047	10000	10000
CLP	1	1	1	20	20	0.8506	0.8486	0.002	10000	10000
CLP	2	1	1	20	16.65	0.7675	0.772	0.0045	10000	10000
CLP	3	1	1	20	15	0.714	0.7125	0.0015	10000	10000
CLP	4	1	1	20	13.6	0.6613	0.664	0.0027	10000	10000
CLP	1	1	1.5	20	20	0.9943	0.9933	0.001	10000	10000
CLP	2	1	1.5	20	16.65	0.9807	0.9777	0.003	10000	10000
CLP	3	1	1.5	20	15	0.9656	0.959	0.0066	10000	10000
CLP	4	1	1.5	20	13.6	0.9446	0.937	0.0076	10000	10000
CLP	1	1	2	20	20	1	1	0	10000	10000
CLP	2	1	2	20	16.65	0.9997	0.9991	6e-04	10000	10000
CLP	3	1	2	20	15	0.9989	0.9979	0.001	10000	10000
CLP	4	1	2	20	13.6	0.9972	0.9947	0.0025	10000	10000
CLP	1	1	2.5	20	20	1	1	0	10000	10000
CLP	2	1	2.5	20	16.65	1	1	0	10000	10000
CLP	3	1	2.5	20	15	1	0.9998	2e-04	10000	10000
CLP	4	1	2.5	20	13.6	1	0.9996	4e-04	10000	10000

3.2.2 Observed Case Analysis

Missing Process	Pattern Index	δ_σ	δ_β	N	$\mathcal{E}(N_m)$	Analytical Power	Empirical Power	Absolute Deviation	Iterations	Converged
CLP	1	1	0	20	20	0.05	0.0552	0.0052	10000	10000
CLP	2	1	0	20	18	0.05	0.0469	0.0031	10000	10000
CLP	3	1	0	20	17	0.05	0.0548	0.0048	10000	10000
CLP	4	1	0	20	16	0.05	0.0504	4e-04	10000	10000
CLP	1	1	0.5	20	20	0.3236	0.3245	9e-04	10000	10000
CLP	2	1	0.5	20	18	0.2921	0.2798	0.0123	10000	10000
CLP	3	1	0.5	20	17	0.2762	0.2615	0.0147	10000	10000
CLP	4	1	0.5	20	16	0.2603	0.2435	0.0168	10000	10000
CLP	1	1	1	20	20	0.8506	0.8486	0.002	10000	10000
CLP	2	1	1	20	18	0.8048	0.787	0.0178	10000	10000

CLP	3	1	1	20	17	0.7777	0.7367	0.041	10000	10000
CLP	4	1	1	20	16	0.7475	0.7014	0.0461	10000	10000
CLP	1	1	1.5	20	20	0.9943	0.9933	0.001	10000	10000
CLP	2	1	1.5	20	18	0.9881	0.9812	0.0069	10000	10000
CLP	3	1	1.5	20	17	0.983	0.9686	0.0144	10000	10000
CLP	4	1	1.5	20	16	0.9757	0.9562	0.0195	10000	10000
CLP	1	1	2	20	20	1	1	0	10000	10000
CLP	2	1	2	20	18	0.9999	0.9998	1e-04	10000	10000
CLP	3	1	2	20	17	0.9997	0.9987	0.001	10000	10000
CLP	4	1	2	20	16	0.9995	0.9978	0.0017	10000	10000
CLP	1	1	2.5	20	20	1	1	0	10000	10000
CLP	2	1	2.5	20	18	1	1	0	10000	10000
CLP	3	1	2.5	20	17	1	0.9999	1e-04	10000	10000
CLP	4	1	2.5	20	16	1	0.9999	1e-04	10000	10000