

Document S3: Mplus output of the simulation study conducted for power analysis

Mplus VERSION 8.9

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08/13/2025 5:17 PM

INPUT INSTRUCTIONS

TITLE: Monte Carlo power for 1-factor model (true = 1-factor)

MONTECARLO:

NAMES = y1-y10;

NOBSERVATIONS = 82;

NREPS = 1000;

SEED = 12345;

RESULTS = mc_1factor_true.dat;

MODEL POPULATION:

f1 BY y1-y10*0.7;

y1-y10*0.51;

f1@1;

MODEL:

f1 BY y1-y10*;

f1@1;

y1-y10*;

OUTPUT:

TECH9;

INPUT READING TERMINATED NORMALLY

Monte Carlo power for 1-factor model (true = 1-factor)

SUMMARY OF ANALYSIS

Number of groups	1
Number of observations	82
Number of replications	
Requested	1000
Completed	1000
Value of seed	12345

Number of dependent variables	10
Number of independent variables	0
Number of continuous latent variables	1

Observed dependent variables

Continuous

Y1	Y2	Y3	Y4	Y5	Y6
Y7	Y8	Y9	Y10		

Continuous latent variables

F1

Estimator	ML
Information matrix	OBSERVED
Maximum number of iterations	1000
Convergence criterion	0.500D-04
Maximum number of steepest descent iterations	20

SAMPLE STATISTICS FOR THE FIRST REPLICATION

SAMPLE STATISTICS

Means

Y1	Y2	Y3	Y4	Y5
0.008	0.053	0.007	0.117	0.050

Means

Y6	Y7	Y8	Y9	Y10
-0.082	0.104	0.060	0.211	0.000

Covariances

	Y1	Y2	Y3	Y4	Y5
Y1	0.679				
Y2	0.449	1.011			
Y3	0.461	0.388	1.154		
Y4	0.502	0.613	0.540	1.111	
Y5	0.352	0.503	0.546	0.514	1.087
Y6	0.282	0.347	0.260	0.499	0.272
Y7	0.452	0.421	0.544	0.607	0.455

Y8	0.471	0.427	0.395	0.506	0.343
Y9	0.490	0.446	0.477	0.600	0.508
Y10	0.387	0.362	0.473	0.536	0.463

Covariances

	Y6	Y7	Y8	Y9	Y10
Y6	0.872				
Y7	0.378	0.993			
Y8	0.408	0.516	1.004		
Y9	0.402	0.419	0.437	0.971	
Y10	0.435	0.362	0.322	0.466	0.896

Correlations

	Y1	Y2	Y3	Y4	Y5
Y1	1.000				
Y2	0.542	1.000			
Y3	0.521	0.359	1.000		
Y4	0.578	0.579	0.477	1.000	
Y5	0.410	0.480	0.488	0.468	1.000
Y6	0.367	0.370	0.260	0.507	0.280
Y7	0.550	0.420	0.508	0.578	0.438
Y8	0.570	0.424	0.367	0.479	0.328
Y9	0.604	0.450	0.451	0.578	0.494
Y10	0.496	0.380	0.465	0.537	0.469

Correlations

	Y6	Y7	Y8	Y9	Y10
Y6	1.000				
Y7	0.406	1.000			
Y8	0.436	0.517	1.000		
Y9	0.437	0.426	0.442	1.000	
Y10	0.492	0.384	0.340	0.500	1.000

MODEL FIT INFORMATION

Number of Free Parameters 30

Loglikelihood

H0 Value

Mean -969.381
 Std Dev 21.611
 Number of successful computations 1000

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	0.987	-1019.654	-1022.536
0.980	0.982	-1013.763	-1013.318
0.950	0.954	-1004.928	-1004.056
0.900	0.910	-997.077	-996.061
0.800	0.809	-987.569	-986.976
0.700	0.693	-980.714	-981.066
0.500	0.487	-969.381	-970.099
0.300	0.295	-958.048	-958.418
0.200	0.198	-951.193	-951.360
0.100	0.096	-941.685	-941.963
0.050	0.048	-933.833	-935.232
0.020	0.020	-924.999	-926.352
0.010	0.014	-919.108	-913.151

H1 Value

Mean	-950.601
Std Dev	21.774
Number of successful computations	1000

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	0.989	-1001.254	-1003.331
0.980	0.983	-995.318	-993.123
0.950	0.947	-986.417	-986.917
0.900	0.907	-978.506	-977.516
0.800	0.806	-968.926	-968.545
0.700	0.687	-962.019	-962.886
0.500	0.494	-950.601	-951.207
0.300	0.301	-939.182	-939.158
0.200	0.202	-932.276	-932.058
0.100	0.102	-922.695	-922.555
0.050	0.045	-914.785	-915.768
0.020	0.018	-905.883	-907.738
0.010	0.013	-899.948	-895.681

Information Criteria

Akaike (AIC)

Mean	1998.762
Std Dev	43.221
Number of successful computations	1000

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	0.986	1898.216	1885.911
0.980	0.980	1909.998	1907.133

0.950	0.952	1927.667	1930.446
0.900	0.904	1943.369	1943.772
0.800	0.802	1962.387	1962.489
0.700	0.705	1976.097	1976.730
0.500	0.513	1998.762	2000.180
0.300	0.307	2021.427	2022.015
0.200	0.191	2035.137	2033.850
0.100	0.090	2054.154	2051.948
0.050	0.046	2069.857	2067.966
0.020	0.018	2087.526	2086.296
0.010	0.013	2099.308	2104.018

Bayesian (BIC)

Mean	2070.963
Std Dev	43.221
Number of successful computations	1000

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	0.986	1970.417	1958.113
0.980	0.980	1982.200	1979.334
0.950	0.952	1999.869	2002.647
0.900	0.904	2015.571	2015.974
0.800	0.802	2034.588	2034.691
0.700	0.705	2048.298	2048.931
0.500	0.513	2070.963	2072.381
0.300	0.307	2093.629	2094.216
0.200	0.191	2107.339	2106.051
0.100	0.090	2126.356	2124.149
0.050	0.046	2142.058	2140.168
0.020	0.018	2159.727	2158.498
0.010	0.013	2171.509	2176.219

Sample-Size Adjusted BIC ($n^* = (n + 2) / 24$)

Mean	1976.345
Std Dev	43.221
Number of successful computations	1000

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	0.986	1875.799	1863.494
0.980	0.980	1887.581	1884.716
0.950	0.952	1905.250	1908.029
0.900	0.904	1920.952	1921.355
0.800	0.802	1939.970	1940.072
0.700	0.705	1953.679	1954.313
0.500	0.513	1976.345	1977.762
0.300	0.307	1999.010	1999.597
0.200	0.191	2012.720	2011.433

0.100	0.090	2031.737	2029.531
0.050	0.046	2047.440	2045.549
0.020	0.018	2065.109	2063.879
0.010	0.013	2076.891	2081.601

Chi-Square Test of Model Fit

Degrees of freedom	35
Mean	37.560
Std Dev	8.873
Number of successful computations	1000

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	0.996	18.509	19.841
0.980	0.989	20.027	21.640
0.950	0.975	22.465	24.168
0.900	0.937	24.797	26.340
0.800	0.862	27.836	30.062
0.700	0.799	30.178	32.397
0.500	0.620	34.336	36.954
0.300	0.397	38.859	41.576
0.200	0.298	41.778	44.558
0.100	0.164	46.059	49.314
0.050	0.090	49.802	53.588
0.020	0.043	54.244	57.574
0.010	0.023	57.342	60.226

RMSEA (Root Mean Square Error Of Approximation)

Mean	0.029
Std Dev	0.029
Number of successful computations	1000

Cumulative Distribution Function

Value	Function Value
0.990	1.000
0.980	1.000
0.950	1.000
0.900	1.000
0.800	1.000
0.700	1.000
0.500	1.000
0.300	1.000
0.200	1.000
0.100	0.994
0.050	0.715
0.020	0.454
0.010	0.419

CFI/TLI

CFI

Mean	0.987
Std Dev	0.018
Number of successful computations	1000

Cumulative Distribution Function

Value	Function Value
0.990	0.415
0.980	0.282
0.950	0.048
0.900	0.001
0.800	0.000
0.700	0.000
0.500	0.000
0.300	0.000
0.200	0.000
0.100	0.000
0.050	0.000
0.020	0.000
0.010	0.000

TLI

Mean	0.983
Std Dev	0.023
Number of successful computations	1000

Cumulative Distribution Function

Value	Function Value
0.990	0.458
0.980	0.332
0.950	0.108
0.900	0.006
0.800	0.000
0.700	0.000
0.500	0.000
0.300	0.000
0.200	0.000
0.100	0.000
0.050	0.000
0.020	0.000
0.010	0.000

SRMR (Standardized Root Mean Square Residual)

Mean	0.042
Std Dev	0.006
Number of successful computations	1000

Cumulative Distribution Function

Value	Function Value
0.990	1.000
0.980	1.000
0.950	1.000
0.900	1.000
0.800	1.000
0.700	1.000
0.500	1.000
0.300	1.000
0.200	1.000
0.100	1.000
0.050	0.921
0.020	0.000
0.010	0.000

MODEL RESULTS

		ESTIMATES		S. E.	M. S. E.	95% Cover	% Sig Coeff
Population		Average	Std. Dev.	Average			
F1	BY						
Y1		1.000	0.6957	0.1001	0.0987	0.1026	0.154 1.000
Y2		1.000	0.6995	0.1010	0.0988	0.1005	0.156 1.000
Y3		1.000	0.6930	0.1012	0.0987	0.1045	0.154 1.000
Y4		1.000	0.6947	0.1011	0.0990	0.1034	0.154 1.000
Y5		1.000	0.6922	0.1003	0.0991	0.1048	0.141 1.000
Y6		1.000	0.6968	0.1008	0.0989	0.1021	0.143 1.000
Y7		1.000	0.6958	0.1021	0.0990	0.1029	0.155 1.000
Y8		1.000	0.6919	0.0995	0.0993	0.1048	0.141 1.000
Y9		1.000	0.6926	0.1012	0.0989	0.1047	0.146 1.000
Y10		1.000	0.6937	0.1007	0.0984	0.1039	0.142 1.000
Intercepts							
Y1		0.000	-0.0018	0.1110	0.1095	0.0123	0.935 0.065
Y2		0.000	0.0032	0.1107	0.1097	0.0122	0.943 0.057
Y3		0.000	-0.0017	0.1079	0.1093	0.0116	0.947 0.053
Y4		0.000	-0.0017	0.1116	0.1096	0.0125	0.935 0.065
Y5		0.000	0.0007	0.1084	0.1096	0.0117	0.949 0.051
Y6		0.000	0.0035	0.1069	0.1096	0.0114	0.952 0.048
Y7		0.000	0.0021	0.1050	0.1097	0.0110	0.960 0.040
Y8		0.000	-0.0007	0.1098	0.1097	0.0120	0.945 0.055
Y9		0.000	0.0032	0.1074	0.1095	0.0115	0.960 0.040
Y10		0.000	-0.0019	0.1094	0.1091	0.0120	0.945 0.055
Variances							
F1		1.000	1.0000	0.0000	0.0000	0.0000	1.000 0.000
Residual Variances							

Y1	0.500	0.4947	0.0861	0.0862	0.0074	0.932	1.000
Y2	0.500	0.4926	0.0890	0.0860	0.0080	0.928	1.000
Y3	0.500	0.4959	0.0857	0.0863	0.0073	0.938	1.000
Y4	0.500	0.4991	0.0897	0.0868	0.0080	0.927	1.000
Y5	0.500	0.5022	0.0889	0.0872	0.0079	0.940	1.000
Y6	0.500	0.4956	0.0900	0.0863	0.0081	0.920	1.000
Y7	0.500	0.4981	0.0874	0.0867	0.0076	0.926	1.000
Y8	0.500	0.5047	0.0912	0.0876	0.0083	0.937	1.000
Y9	0.500	0.4986	0.0878	0.0867	0.0077	0.935	1.000
Y10	0.500	0.4905	0.0868	0.0855	0.0076	0.921	1.000

QUALITY OF NUMERICAL RESULTS

Average Condition Number for the Information Matrix 0.612E-01
(ratio of smallest to largest eigenvalue)

TECHNICAL OUTPUT

PARAMETER SPECIFICATION

NU

Y1	Y2	Y3	Y4	Y5
1	2	3	4	5

NU

Y6	Y7	Y8	Y9	Y10
6	7	8	9	10

LAMBDA

F1

Y1	11
Y2	12
Y3	13
Y4	14
Y5	15
Y6	16
Y7	17
Y8	18
Y9	19
Y10	20

THETA					
	Y1	Y2	Y3	Y4	Y5
Y1	21				
Y2	0	22			
Y3	0	0	23		
Y4	0	0	0	24	
Y5	0	0	0	0	25
Y6	0	0	0	0	0
Y7	0	0	0	0	0
Y8	0	0	0	0	0
Y9	0	0	0	0	0
Y10	0	0	0	0	0

THETA					
	Y6	Y7	Y8	Y9	Y10
Y6	26				
Y7	0	27			
Y8	0	0	28		
Y9	0	0	0	29	
Y10	0	0	0	0	30

ALPHA	
F1	
	0

BETA	
F1	
F1	0

PSI	
F1	
F1	0

STARTING VALUES

NU					
	Y1	Y2	Y3	Y4	Y5
	0.000	0.000	0.000	0.000	0.000

	NU					507
	Y6	Y7	Y8	Y9	Y10	508
						509
						510
	0.000	0.000	0.000	0.000	0.000	511
						512
	LAMBDA					513
	F1					514
						515
						516
Y1	0.689					517
Y2	0.627					518
Y3	0.676					519
Y4	0.829					520
Y5	0.698					521
Y6	0.569					522
Y7	0.676					523
Y8	0.639					524
Y9	0.685					525
Y10	0.567					526
						527
						528
	THETA					529
	Y1	Y2	Y3	Y4	Y5	530
						531
Y1	0.500					532
Y2	0.000	0.500				533
Y3	0.000	0.000	0.500			534
Y4	0.000	0.000	0.000	0.500		535
Y5	0.000	0.000	0.000	0.000	0.500	536
Y6	0.000	0.000	0.000	0.000	0.000	537
Y7	0.000	0.000	0.000	0.000	0.000	538
Y8	0.000	0.000	0.000	0.000	0.000	539
Y9	0.000	0.000	0.000	0.000	0.000	540
Y10	0.000	0.000	0.000	0.000	0.000	541
						542
						543
	THETA					544
	Y6	Y7	Y8	Y9	Y10	545
						546
Y6	0.500					547
Y7	0.000	0.500				548
Y8	0.000	0.000	0.500			549
Y9	0.000	0.000	0.000	0.500		550
Y10	0.000	0.000	0.000	0.000	0.500	551
						552
						553
	ALPHA					554
	F1					555
						556
	0.000					557

[illegible]

Y5	0.000	0.000	0.000	0.000	0.510
Y6	0.000	0.000	0.000	0.000	0.000
Y7	0.000	0.000	0.000	0.000	0.000
Y8	0.000	0.000	0.000	0.000	0.000
Y9	0.000	0.000	0.000	0.000	0.000
Y10	0.000	0.000	0.000	0.000	0.000

THETA

	Y6	Y7	Y8	Y9	Y10
Y6	0.510				
Y7	0.000	0.510			
Y8	0.000	0.000	0.510		
Y9	0.000	0.000	0.000	0.510	
Y10	0.000	0.000	0.000	0.000	0.510

ALPHA

F1

0.000

BETA

F1

F1 0.000

PSI

F1

F1 1.000

TECHNICAL 9 OUTPUT

Error messages for each replication (if any)

RESULTS SAVING INFORMATION

Order of data

Replication number

Parameter estimates

(saved in order shown in Technical 1 output)

Standard errors

(saved in order shown in Technical 1 output)

Number of Free Parameters 660
H0 Loglikelihood 661
H1 Loglikelihood 662
Akaike (AIC) 663
Bayesian (BIC) 664
Sample-Size Adjusted BIC 665
Chi-square : Value 666
Chi-square : Degrees of Freedom 667
Chi-square : P-Value 668
CFI 669
TLI 670
RMSEA : Estimate 671
SRMR 672
Condition Number 673

Save file 675
mc_1factor_true.dat 676

Save file format Free 678

DIAGRAM INFORMATION 681

Mplus diagrams are currently not available for Monte Carlo analysis. 683
No diagram output was produced. 684

Beginning Time: 17:17:10 687
Ending Time: 17:17:23 688
Elapsed Time: 00:00:13 689

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703