

Table 1. Bias and RMSE of Coefficient μ_γ in Scenario 1 (Sensitivity Analysis)

		Mean Group		Hierarchical Bayes		Mean Group		Hierarchical Bayes	
μ_γ		Percent Bias(%)	RMSE	Percent Bias(%)	RMSE	Percent Bias(%)	RMSE	Percent Bias(%)	RMSE
N=50,T=5					N=50,T=20				
1	0.3	-109.79	0.337	6.33	0.105	-31.50	0.105	2.26	0.059
2	0.3	-110.27	0.339	3.34	0.136	-31.35	0.104	0.70	0.054
3	0.6	-81.14	0.495	-1.80	0.090	-26.12	0.174	-1.06	0.081
4	0.6	-81.55	0.497	0.83	0.096	-25.84	0.173	-1.18	0.083
5	0.3	-108.44	0.333	0.11	0.082	-30.58	0.099	3.78	0.043
6	0.3	-109.81	0.337	5.67	0.120	-31.27	0.100	2.99	0.044
7	0.6	-78.56	0.478	-0.30	0.076	-23.95	0.151	-0.15	0.052
8	0.6	-77.24	0.470	5.73	0.119	-23.99	0.150	0.33	0.057
N=1000,T=5					N=1000,T=20				
1	0.3	-110.74	0.333	-0.01	0.021	-31.42	0.095	-0.03	0.012
2	0.3	-110.74	0.333	-0.40	0.024	-31.54	0.095	-0.12	0.013
3	0.6	-81.03	0.487	0.38	0.021	-26.44	0.160	0.27	0.020
4	0.6	-81.16	0.487	0.54	0.022	-26.53	0.160	0.26	0.020
5	0.3	-109.13	0.328	3.47	0.022	-30.54	0.092	0.69	0.010
6	0.3	-108.96	0.327	1.27	0.022	-30.57	0.092	0.51	0.009
7	0.6	-78.27	0.470	0.39	0.016	-23.98	0.144	0.06	0.011
8	0.6	-78.08	0.469	0.39	0.020	-23.97	0.144	0.17	0.012

Table 2. Bias and RMSE of Coefficient μ_η in Scenario 1 (Sensitivity Analysis)

		Mean Group		Hierarchical Bayes		Mean Group		Hierarchical Bayes	
μ_η		Percent Bias(%)	RMSE	Percent Bias(%)	RMSE	Percent Bias(%)	RMSE	Percent Bias(%)	RMSE
N=50,T=5					N=50,T=20				
1	0.2	18.65	4.928	0.86	0.061	1.62	0.112	0.92	0.042
2	2	-37.36	25.417	-0.31	0.278	0.36	0.277	0.29	0.274
3	0.1	99.42	9.996	-1.35	0.205	-988.48	37.883	1.87	0.143
4	1	-15.08	8.646	-0.11	0.495	22.92	8.360	-0.15	0.410
5	0.2	10.13	0.434	0.64	0.046	-0.19	0.028	0.67	0.026
6	2	1.32	1.140	0.38	0.145	0.21	0.142	-0.09	0.135
7	0.1	655.58	13.697	-4.08	0.102	-13.87	2.193	-1.56	0.069
8	1	-17.08	4.243	-0.22	0.142	-17.74	6.059	0.21	0.105
N=1000,T=5					N=1000,T=20				
1	0.2	48.00	2.275	0.52	0.012	0.99	0.080	-0.07	0.009
2	2	-12.25	6.622	0.04	0.065	-0.17	0.116	0.12	0.061
3	0.1	-289.94	9.503	-0.72	0.044	221.75	6.533	-0.25	0.025
4	1	16.30	4.475	-0.17	0.098	-45.15	10.161	-0.21	0.082
5	0.2	-50.61	3.374	0.28	0.011	-0.14	0.007	0.10	0.006
6	2	-0.21	0.953	0.05	0.033	-0.04	0.033	0.02	0.030
7	0.1	216.73	5.091	-0.85	0.023	-33.53	4.699	-0.26	0.016
8	1	-23.21	7.114	0.12	0.027	-11.02	2.369	0.12	0.022

Supplemental material

This supplemental material provides the sensitivity analyses performed by setting $\sigma_u = 0.5$ in Scenario 1 and $\sigma_u = 0.5, a = 0.5, b = -0.5$ in Scenario 2 with other parameters unchanged. Tables 1 to 5 report results from Scenario 1 and Table 6 provides the results from Scenario 2.

Table 3. Bias and RMSE of Coefficient σ_γ in Scenario 1 (Sensitivity Analysis)

		Swamy		Hierarchical Bayes		Swamy		Hierarchical Bayes	
σ_γ		Percent Bias(%)	RMSE	Percent Bias(%)	RMSE	Percent Bias(%)	RMSE	Percent Bias(%)	RMSE
					N=50,T=5				
					N=50,T=20				
1	0.3	66.17	0.212	-23.91	0.137	8.71	0.040	-0.40	0.048
2	0.3	67.68	0.219	-43.38	0.177	8.29	0.039	0.12	0.055
3	0.6	1.98	0.080	1.14	0.070	-11.31	0.092	0.72	0.066
4	0.6	2.76	0.082	-1.57	0.085	-11.52	0.094	0.52	0.067
5	0.15	226.93	0.354	-26.35	0.078	62.61	0.097	-20.49	0.065
6	0.15	222.06	0.343	-25.69	0.078	63.92	0.099	-40.51	0.085
7	0.3	76.92	0.268	-7.49	0.098	5.36	0.041	0.91	0.049
8	0.3	75.72	0.243	-33.05	0.153	5.57	0.039	0.04	0.056
					N=1000,T=5				
					N=1000,T=20				
1	0.3	72.13	0.218	0.32	0.016	10.34	0.032	0.63	0.010
2	0.3	71.84	0.217	-0.29	0.025	10.29	0.032	0.76	0.010
3	0.6	3.95	0.031	0.35	0.017	-9.73	0.060	0.40	0.016
4	0.6	4.14	0.034	0.19	0.018	-9.71	0.060	0.41	0.016
5	0.15	228.52	0.344	-12.64	0.043	65.44	0.098	0.27	0.010
6	0.15	228.07	0.343	-26.30	0.068	65.33	0.098	-0.17	0.011
7	0.3	80.27	0.242	0.42	0.016	7.07	0.023	0.49	0.010
8	0.3	80.04	0.241	-0.27	0.018	7.06	0.023	0.74	0.011

Table 4. Bias and RMSE of Coefficient σ_η in Scenario 1 (Sensitivity Analysis)

σ_η		Percent Bias(%)	RMSE	Percent Bias(%)	RMSE	Percent Bias(%)	RMSE	Percent Bias(%)	RMSE
		N=50,T=5		N=50,T=20		N=1000,T=5		N=1000,T=20	
1	0.2	-15.36	0.095	-6.98	0.055	-2.35	0.021	-0.29	0.008
2	2.0	1.24	0.231	1.98	0.209	-0.04	0.048	0.10	0.045
3	0.1	39.08	0.094	23.12	0.066	-8.91	0.029	1.72	0.008
4	1.0	11.62	0.929	11.31	0.274	0.30	0.049	0.55	0.044
5	0.1	13.31	0.055	-13.47	0.041	-23.77	0.043	-2.12	0.010
6	1.0	1.27	0.127	1.98	0.113	0.25	0.024	0.03	0.024
7	0.05	133.60	0.131	40.07	0.037	-10.01	0.026	-27.43	0.023
8	0.5	-13.88	0.246	-1.92	0.108	-0.28	0.035	0.21	0.019

Table 5. Coverage Rate of the Estimates of μ_γ and μ_η in Scenario 1 (Sensitivity Analysis)

		μ_γ		μ_η		μ_γ		μ_η		μ_γ		μ_η		μ_γ		μ_η			
		90%	95%	90%	95%	90%	95%	90%	95%	90%	95%	90%	95%	90%	95%	90%	95%		
				N=50,T=5				N=50,T=20				N=1000,T=5				N=1000,T=20			
1	0.72	0.80	0.81	0.87	0.86	0.92	0.87	0.93	0.90	0.94	0.91	0.95	0.90	0.94	0.91	0.95			
2	0.50	0.58	0.91	0.95	0.90	0.95	0.91	0.96	0.87	0.93	0.89	0.95	0.88	0.94	0.91	0.96			
3	0.89	0.96	0.53	0.58	0.91	0.96	0.67	0.71	0.88	0.95	0.77	0.84	0.91	0.94	0.85	0.92			
4	0.87	0.93	0.81	0.87	0.90	0.94	0.85	0.92	0.91	0.94	0.87	0.94	0.90	0.94	0.90	0.96			
5	0.71	0.79	0.82	0.89	0.82	0.87	0.88	0.92	0.73	0.82	0.84	0.87	0.87	0.93	0.91	0.95			
6	0.49	0.56	0.89	0.94	0.76	0.83	0.92	0.97	0.79	0.85	0.88	0.95	0.91	0.95	0.92	0.96			
7	0.86	0.90	0.67	0.74	0.89	0.95	0.72	0.79	0.90	0.95	0.58	0.64	0.90	0.94	0.70	0.75			
8	0.52	0.60	0.73	0.81	0.87	0.93	0.89	0.95	0.90	0.94	0.90	0.95	0.91	0.95	0.91	0.95			

Table 6. Percent Bias of Parameters in Scenario 2 (Sensitivity Analysis)

	μ_γ	μ_η	σ_γ	σ_η	a	b		μ_γ	μ_η	σ_γ	σ_η	a	b
	N=50,T=5							N=50,T=20					
1	14.34	-5.10	-43.37	-23.52	49.46	51.15		2.19	-2.05	-1.76	-2.88	14.25	22.67
2	1.42	1.03	1.40	2.63	1.97	5.86		-0.33	-0.19	2.13	1.00	0.44	1.56
3	8.14	-64.32	4.91	-5.86	88.82	110.77		1.34	-30.90	3.45	10.72	30.54	-0.17
4	7.48	43.54	4.08	34.42	1.10	2.95		1.99	-2.75	3.55	20.57	-0.12	1.58
5	2.53	-6.51	-46.22	-6.11	61.57	91.54		3.55	-1.48	-41.00	-14.91	-1.17	18.36
6	5.01	-0.14	-40.26	-0.10	9.05	28.11		2.17	-0.38	-17.87	1.43	11.32	36.51
7	7.03	-48.32	-33.30	66.85	2.14	-66.69		0.65	-30.30	-0.35	6.36	16.42	25.63
8	6.91	1.57	-28.79	-9.47	32.07	44.91		0.84	0.89	1.07	1.88	8.00	10.84
	N=1000,T=5							N=1000,T=20					
1	0.39	0.18	-1.59	-0.92	2.55	4.50		-0.01	0.12	0.44	0.02	0.52	-0.15
2	-0.13	0.03	0.84	0.21	-0.01	0.01		-0.32	-0.14	0.61	0.19	0.05	0.17
3	0.65	-24.84	0.72	0.89	5.09	2.31		0.07	-9.56	0.81	2.87	1.39	-2.18
4	0.26	0.61	0.67	1.20	0.04	0.25		0.33	-0.52	0.56	0.61	0.00	0.00
5	3.56	-0.63	-24.55	-16.04	9.92	18.24		0.81	-0.14	0.05	-0.46	0.44	1.25
6	0.77	0.14	-0.49	0.00	0.63	1.91		0.53	0.05	0.42	0.15	0.27	0.81
7	0.28	-8.57	-0.26	-9.38	13.38	4.87		0.38	-2.64	0.39	-25.27	2.47	-0.76
8	0.05	-0.15	-0.54	-0.01	0.74	1.24		0.16	-0.02	0.34	0.12	0.45	0.67