

Supplementary Table 2
Mean Estimate and Relative Bias of the Lower Order Effects

Sample		Statistical		CPI		GAPI		UPI		LMS	
Size	Distribution	Power	α	E(α)	RB(α)	E(α)	RB(α)	E(α)	RB(α)	E(α)	RB(α)
100	Normal	0.7	10	9.830	-0.017 *	9.564	-0.044 *	9.662	-0.034 *	9.869	-0.013 *
100	Uniform	0.7	10	10.439	0.044 *	9.887	-0.011 *	9.914	-0.009 *	10.442	0.044 *
100	K1	0.7	10	9.406	-0.059 *	9.815	-0.018 *	9.916	-0.008 *	9.663	-0.034 *
100	K2	0.7	10	9.552	-0.045 *	10.080	0.008 *	10.092	0.009 *	9.751	-0.025 *
100	χ^2_1	0.7	10	8.882	-0.112	9.977	-0.002 *	10.091	0.009 *	8.895	-0.111
200	Normal	0.7	10	10.033	0.003 *	9.926	-0.007 *	9.980	-0.002 *	10.016	0.002 *
200	Uniform	0.7	10	10.214	0.021 *	9.917	-0.008 *	9.917	-0.008 *	10.199	0.020 *
200	K1	0.7	10	9.648	-0.035 *	10.019	0.002 *	10.059	0.006 *	9.836	-0.016 *
200	K2	0.7	10	9.525	-0.048 *	10.010	0.001 *	10.033	0.003 *	9.755	-0.024 *
200	χ^2_1	0.7	10	8.873	-0.113	9.975	-0.002 *	10.018	0.002 *	8.842	-0.116
500	Normal	0.7	10	9.950	-0.005 *	9.926	-0.007 *	9.930	-0.007 *	9.945	-0.005 *
500	Uniform	0.7	10	10.149	0.015 *	10.003	0.000 *	10.013	0.001 *	10.131	0.013 *
500	K1	0.7	10	9.720	-0.028 *	10.056	0.006 *	10.059	0.006 *	9.838	-0.016 *
500	K2	0.7	10	9.594	-0.041 *	9.978	-0.002 *	10.000	0.000 *	9.736	-0.026 *
500	χ^2_1	0.7	10	8.855	-0.114	9.971	-0.003 *	9.977	-0.002 *	8.823	-0.118
1000	Normal	0.7	10	9.991	-0.001 *	9.984	-0.002 *	9.991	-0.001 *	9.986	-0.001 *
1000	Uniform	0.7	10	10.045	0.004 *	9.958	-0.004 *	9.960	-0.004 *	10.036	0.004 *
1000	K1	0.7	10	9.723	-0.028 *	9.985	-0.002 *	9.984	-0.002 *	9.815	-0.019 *
1000	K2	0.7	10	9.695	-0.031 *	9.999	0.000 *	10.007	0.001 *	9.809	-0.019 *
1000	χ^2_1	0.7	10	8.968	-0.103	9.996	0.000 *	9.998	0.000 *	8.923	-0.108
5000	Normal	0.7	10	9.983	-0.002 *	9.982	-0.002 *	9.982	-0.002 *	9.982	-0.002 *
5000	Uniform	0.7	10	10.013	0.001 *	9.980	-0.002 *	9.980	-0.002 *	10.009	0.001 *
5000	K1	0.7	10	9.854	-0.015 *	9.991	-0.001 *	9.991	-0.001 *	9.910	-0.009 *
5000	K2	0.7	10	9.865	-0.014 *	10.015	0.002 *	10.017	0.002 *	9.914	-0.009 *
5000	χ^2_1	0.7	10	9.104	-0.090 *	9.987	-0.001 *	9.991	-0.001 *	9.034	-0.097 *
100	Normal	0.9	10	10.115	0.012 *	9.772	-0.023 *	9.923	-0.008 *	10.137	0.014 *
100	Uniform	0.9	10	10.312	0.031 *	9.590	-0.041 *	9.681	-0.032 *	10.198	0.020 *
100	K1	0.9	10	9.599	-0.040 *	10.071	0.007 *	10.150	0.015 *	9.858	-0.014 *
100	K2	0.9	10	9.367	-0.063 *	9.980	-0.002 *	10.042	0.004 *	9.648	-0.035 *
100	χ^2_1	0.9	10	9.009	-0.099 *	10.128	0.013 *	10.267	0.027 *	9.013	-0.099 *
200	Normal	0.9	10	9.926	-0.007 *	9.760	-0.024 *	9.799	-0.020 *	9.955	-0.005 *
200	Uniform	0.9	10	10.264	0.026 *	9.861	-0.014 *	9.855	-0.015 *	10.228	0.023 *
200	K1	0.9	10	9.381	-0.062 *	9.888	-0.011 *	9.942	-0.006 *	9.623	-0.038 *
200	K2	0.9	10	9.427	-0.057 *	9.993	-0.001 *	10.028	0.003 *	9.677	-0.032 *
200	χ^2_1	0.9	10	8.835	-0.116	10.104	0.010 *	10.095	0.010 *	8.862	-0.114
500	Normal	0.9	10	10.007	0.001 *	9.973	-0.003 *	9.981	-0.002 *	10.028	0.003 *
500	Uniform	0.9	10	10.107	0.011 *	9.947	-0.005 *	9.955	-0.005 *	10.071	0.007 *
500	K1	0.9	10	9.558	-0.044 *	9.980	-0.002 *	9.999	0.000 *	9.713	-0.029 *
500	K2	0.9	10	9.529	-0.047 *	10.046	0.005 *	10.055	0.006 *	9.745	-0.025 *
500	χ^2_1	0.9	10	8.862	-0.114	10.012	0.001 *	10.037	0.004 *	8.830	-0.117
1000	Normal	0.9	10	10.012	0.001 *	10.001	0.000 *	10.005	0.001 *	10.006	0.001 *
1000	Uniform	0.9	10	10.127	0.013 *	10.015	0.002 *	10.019	0.002 *	10.098	0.010 *
1000	K1	0.9	10	9.666	-0.033 *	10.013	0.001 *	10.019	0.002 *	9.807	-0.019 *
1000	K2	0.9	10	9.608	-0.039 *	10.017	0.002 *	10.013	0.001 *	9.765	-0.023 *
1000	χ^2_1	0.9	10	8.914	-0.109	9.996	0.000 *	9.995	-0.001 *	8.863	-0.114
5000	Normal	0.9	10	9.999	0.000 *	9.996	0.000 *	9.997	0.000 *	9.991	-0.001 *
5000	Uniform	0.9	10	10.026	0.003 *	9.978	-0.002 *	9.980	-0.002 *	10.015	0.002 *
5000	K1	0.9	10	9.843	-0.016 *	10.019	0.002 *	10.020	0.002 *	9.914	-0.009 *
5000	K2	0.9	10	9.787	-0.021 *	9.992	-0.001 *	9.990	-0.001 *	9.888	-0.011 *
5000	χ^2_1	0.9	10	9.104	-0.090 *	10.023	0.002 *	10.022	0.002 *	9.031	-0.097 *

Note . E means the expected value (average) of the effects. RB means relative bias. * means relative bias $\leq |10\%|$ criterion met.

Supplementary Table 2 (Continued)

Mean Estimate and Relative Bias of the Lower Order Effects

Sample Size	Statistical Distribution	Power	γ_1	CPI		GAPI		UPI		LMS	
				$E(\gamma_1)$	RB(γ_1)	$E(\gamma_1)$	RB(γ_1)	$E(\gamma_1)$	RB(γ_1)	$E(\gamma_1)$	RB(γ_1)
100	Normal	0.7	7	6.879	-0.017 *	7.068	0.010 *	7.068	0.010 *	6.878	-0.017 *
100	Uniform	0.7	7	7.399	0.057 *	7.415	0.059 *	7.360	0.051 *	7.245	0.035 *
100	K1	0.7	7	6.545	-0.065 *	7.474	0.068 *	7.568	0.081 *	6.923	-0.011 *
100	K2	0.7	7	6.442	-0.080 *	7.524	0.075 *	7.785	0.112	6.978	-0.003 *
100	χ^2_1	0.7	7	6.896	-0.015 *	7.071	0.010 *	7.022	0.003 *	6.415	-0.084 *
200	Normal	0.7	7	7.106	0.015 *	7.185	0.026 *	7.181	0.026 *	7.128	0.018 *
200	Uniform	0.7	7	7.224	0.032 *	7.171	0.024 *	7.176	0.025 *	7.136	0.019 *
200	K1	0.7	7	6.538	-0.066 *	7.207	0.030 *	7.206	0.029 *	6.921	-0.011 *
200	K2	0.7	7	6.336	-0.095 *	7.177	0.025 *	7.155	0.022 *	6.913	-0.012 *
200	χ^2_1	0.7	7	6.475	-0.075 *	7.268	0.038 *	7.120	0.017 *	6.116	-0.126
500	Normal	0.7	7	7.051	0.007 *	7.067	0.010 *	7.078	0.011 *	7.054	0.008 *
500	Uniform	0.7	7	7.099	0.014 *	7.013	0.002 *	7.014	0.002 *	6.993	-0.001 *
500	K1	0.7	7	6.425	-0.082 *	7.085	0.012 *	7.044	0.006 *	6.912	-0.013 *
500	K2	0.7	7	6.311	-0.098 *	7.183	0.026 *	7.128	0.018 *	6.958	-0.006 *
500	χ^2_1	0.7	7	6.167	-0.119	7.211	0.030 *	7.145	0.021 *	6.048	-0.136
1000	Normal	0.7	7	7.013	0.002 *	7.021	0.003 *	7.025	0.004 *	7.016	0.002 *
1000	Uniform	0.7	7	7.112	0.016 *	7.021	0.003 *	7.022	0.003 *	7.008	0.001 *
1000	K1	0.7	7	6.375	-0.089 *	7.112	0.016 *	7.076	0.011 *	6.968	-0.005 *
1000	K2	0.7	7	6.118	-0.126	7.048	0.007 *	7.029	0.004 *	6.877	-0.018 *
1000	χ^2_1	0.7	7	5.906	-0.156	7.001	0.000 *	7.004	0.001 *	5.931	-0.153
5000	Normal	0.7	7	6.990	-0.001 *	6.993	-0.001 *	6.993	-0.001 *	6.993	-0.001 *
5000	Uniform	0.7	7	7.107	0.015 *	7.006	0.001 *	7.008	0.001 *	7.007	0.001 *
5000	K1	0.7	7	6.220	-0.111	7.043	0.006 *	7.025	0.004 *	6.981	-0.003 *
5000	K2	0.7	7	5.900	-0.157	7.024	0.003 *	7.014	0.002 *	6.957	-0.006 *
5000	χ^2_1	0.7	7	5.718	-0.183	6.986	-0.002 *	6.976	-0.003 *	5.868	-0.162
100	Normal	0.9	7	7.309	0.044 *	7.661	0.094 *	7.633	0.090 *	7.221	0.032 *
100	Uniform	0.9	7	7.410	0.059 *	7.471	0.067 *	7.455	0.065 *	7.294	0.042 *
100	K1	0.9	7	6.526	-0.068 *	7.169	0.024 *	7.477	0.068 *	6.968	-0.005 *
100	K2	0.9	7	6.548	-0.065 *	7.528	0.075 *	7.589	0.084 *	6.986	-0.002 *
100	χ^2_1	0.9	7	7.363	0.052 *	7.710	0.101	7.754	0.108	6.843	-0.022 *
200	Normal	0.9	7	7.156	0.022 *	7.236	0.034 *	7.240	0.034 *	7.134	0.019 *
200	Uniform	0.9	7	7.263	0.038 *	7.200	0.029 *	7.176	0.025 *	7.177	0.025 *
200	K1	0.9	7	6.518	-0.069 *	7.193	0.028 *	7.236	0.034 *	6.951	-0.007 *
200	K2	0.9	7	6.386	-0.088 *	7.227	0.032 *	7.177	0.025 *	6.983	-0.002 *
200	χ^2_1	0.9	7	6.489	-0.073 *	7.047	0.007 *	6.916	-0.012 *	5.961	-0.148
500	Normal	0.9	7	7.149	0.021 *	7.153	0.022 *	7.152	0.022 *	7.131	0.019 *
500	Uniform	0.9	7	7.051	0.007 *	6.980	-0.003 *	6.982	-0.003 *	6.959	-0.006 *
500	K1	0.9	7	6.389	-0.087 *	7.039	0.006 *	7.035	0.005 *	6.903	-0.014 *
500	K2	0.9	7	6.258	-0.106	7.138	0.020 *	7.111	0.016 *	6.938	-0.009 *
500	χ^2_1	0.9	7	6.194	-0.115	7.050	0.007 *	7.027	0.004 *	5.996	-0.143
1000	Normal	0.9	7	7.012	0.002 *	7.018	0.003 *	7.027	0.004 *	7.017	0.002 *
1000	Uniform	0.9	7	7.101	0.014 *	7.007	0.001 *	7.008	0.001 *	7.004	0.001 *
1000	K1	0.9	7	6.310	-0.099 *	7.025	0.004 *	7.015	0.002 *	6.916	-0.012 *
1000	K2	0.9	7	6.117	-0.126	7.040	0.006 *	7.018	0.003 *	6.857	-0.020 *
1000	χ^2_1	0.9	7	6.022	-0.140	7.092	0.013 *	7.057	0.008 *	5.962	-0.148
5000	Normal	0.9	7	7.023	0.003 *	7.026	0.004 *	7.025	0.004 *	7.022	0.003 *
5000	Uniform	0.9	7	7.086	0.012 *	6.986	-0.002 *	6.986	-0.002 *	6.985	-0.002 *
5000	K1	0.9	7	6.220	-0.111	7.006	0.001 *	6.994	-0.001 *	6.952	-0.007 *
5000	K2	0.9	7	5.929	-0.153	7.005	0.001 *	6.996	-0.001 *	6.962	-0.005 *
5000	χ^2_1	0.9	7	5.766	-0.176	7.013	0.002 *	7.005	0.001 *	5.894	-0.158

Note . E means the expected value (average) of the effects. RB means relative bias. * means relative bias $\leq |10\%|$ criterion met.

Supplementary Table 2 (Continued)

Mean Estimate and Relative Bias of the Lower Order Effects

Sample	Statistical		γ_2	CPI		GAPI		UPI		LMS	
	Size	Distribution		Power	$E(\gamma_2)$	RB(γ_2)	$E(\gamma_2)$	RB(γ_2)	$E(\gamma_2)$	RB(γ_2)	$E(\gamma_2)$
100	Normal	0.7	7	7.289	0.041 *	7.419	0.060 *	7.576	0.082 *	7.318	0.045 *
100	Uniform	0.7	7	7.467	0.067 *	7.535	0.076 *	7.589	0.084 *	7.412	0.059 *
100	K1	0.7	7	6.637	-0.052 *	7.217	0.031 *	7.264	0.038 *	6.919	-0.012 *
100	K2	0.7	7	6.407	-0.085 *	7.302	0.043 *	7.065	0.009 *	6.826	-0.025 *
100	χ^2_1	0.7	7	7.141	0.020 *	7.455	0.065 *	7.652	0.093 *	6.630	-0.053 *
200	Normal	0.7	7	7.163	0.023 *	7.210	0.030 *	7.226	0.032 *	7.143	0.020 *
200	Uniform	0.7	7	7.338	0.048 *	7.318	0.045 *	7.316	0.045 *	7.239	0.034 *
200	K1	0.7	7	6.526	-0.068 *	7.198	0.028 *	7.161	0.023 *	7.003	0.000 *
200	K2	0.7	7	6.248	-0.107 *	7.191	0.027 *	7.175	0.025 *	6.829	-0.024 *
200	χ^2_1	0.7	7	6.596	-0.058 *	7.328	0.047 *	7.269	0.038 *	6.233	-0.110
500	Normal	0.7	7	7.047	0.007 *	7.059	0.008 *	7.066	0.009 *	7.046	0.007 *
500	Uniform	0.7	7	7.157	0.022 *	7.080	0.011 *	7.084	0.012 *	7.050	0.007 *
500	K1	0.7	7	6.479	-0.074 *	7.200	0.029 *	7.128	0.018 *	7.016	0.002 *
500	K2	0.7	7	6.178	-0.117 *	7.089	0.013 *	7.042	0.006 *	6.869	-0.019 *
500	χ^2_1	0.7	7	6.078	-0.132 *	7.098	0.014 *	7.041	0.006 *	5.947	-0.150
1000	Normal	0.7	7	7.045	0.006 *	7.058	0.008 *	7.056	0.008 *	7.034	0.005 *
1000	Uniform	0.7	7	7.154	0.022 *	7.060	0.009 *	7.057	0.008 *	7.055	0.008 *
1000	K1	0.7	7	6.363	-0.091 *	7.066	0.009 *	7.038	0.005 *	6.961	-0.006 *
1000	K2	0.7	7	6.104	-0.128 *	7.057	0.008 *	7.020	0.003 *	6.930	-0.010 *
1000	χ^2_1	0.7	7	5.863	-0.162 *	6.976	-0.003 *	6.960	-0.006 *	5.875	-0.161
5000	Normal	0.7	7	7.020	0.003 *	7.023	0.003 *	7.025	0.004 *	7.023	0.003 *
5000	Uniform	0.7	7	7.092	0.013 *	6.990	-0.001 *	6.992	-0.001 *	6.992	-0.001 *
5000	K1	0.7	7	6.176	-0.118 *	6.987	-0.002 *	6.972	-0.004 *	6.917	-0.012 *
5000	K2	0.7	7	5.892	-0.158 *	7.007	0.001 *	6.992	-0.001 *	6.933	-0.010 *
5000	χ^2_1	0.7	7	5.732	-0.181 *	7.003	0.000 *	6.991	-0.001 *	5.887	-0.159
100	Normal	0.9	7	7.221	0.032 *	7.295	0.042 *	7.344	0.049 *	7.213	0.030 *
100	Uniform	0.9	7	7.257	0.037 *	7.277	0.040 *	7.290	0.041 *	7.177	0.025 *
100	K1	0.9	7	6.686	-0.045 *	7.465	0.066 *	7.388	0.055 *	6.972	-0.004 *
100	K2	0.9	7	6.303	-0.100 *	7.212	0.030 *	7.189	0.027 *	6.864	-0.019 *
100	χ^2_1	0.9	7	6.987	-0.002 *	7.159	0.023 *	7.409	0.058 *	6.458	-0.077 *
200	Normal	0.9	7	6.971	-0.004 *	7.020	0.003 *	7.017	0.002 *	6.968	-0.005 *
200	Uniform	0.9	7	7.235	0.034 *	7.213	0.030 *	7.239	0.034 *	7.147	0.021 *
200	K1	0.9	7	6.562	-0.063 *	7.223	0.032 *	7.189	0.027 *	7.013	0.002 *
200	K2	0.9	7	6.254	-0.107 *	7.199	0.028 *	7.126	0.018 *	6.727	-0.039 *
200	χ^2_1	0.9	7	6.628	-0.053 *	7.226	0.032 *	7.187	0.027 *	6.218	-0.112
500	Normal	0.9	7	6.939	-0.009 *	6.961	-0.006 *	6.964	-0.005 *	6.927	-0.010 *
500	Uniform	0.9	7	7.198	0.028 *	7.108	0.015 *	7.116	0.017 *	7.107	0.015 *
500	K1	0.9	7	6.436	-0.081 *	7.112	0.016 *	7.080	0.011 *	6.974	-0.004 *
500	K2	0.9	7	6.229	-0.110 *	7.090	0.013 *	7.047	0.007 *	6.847	-0.022 *
500	χ^2_1	0.9	7	6.142	-0.123 *	6.971	-0.004 *	6.957	-0.006 *	5.940	-0.151
1000	Normal	0.9	7	7.087	0.012 *	7.104	0.015 *	7.108	0.015 *	7.085	0.012 *
1000	Uniform	0.9	7	7.123	0.018 *	7.027	0.004 *	7.026	0.004 *	7.019	0.003 *
1000	K1	0.9	7	6.330	-0.096 *	7.062	0.009 *	7.038	0.005 *	6.949	-0.007 *
1000	K2	0.9	7	6.129	-0.124 *	7.042	0.006 *	7.012	0.002 *	6.924	-0.011 *
1000	χ^2_1	0.9	7	5.959	-0.149 *	7.003	0.000 *	6.994	-0.001 *	5.906	-0.156
5000	Normal	0.9	7	7.007	0.001 *	7.010	0.001 *	7.010	0.001 *	7.006	0.001 *
5000	Uniform	0.9	7	7.114	0.016 *	7.012	0.002 *	7.013	0.002 *	7.012	0.002 *
5000	K1	0.9	7	6.233	-0.110 *	7.025	0.004 *	7.009	0.001 *	6.956	-0.006 *
5000	K2	0.9	7	5.945	-0.151 *	7.017	0.002 *	7.009	0.001 *	6.926	-0.011 *
5000	χ^2_1	0.9	7	5.749	-0.179 *	6.993	-0.001 *	6.986	-0.002 *	5.873	-0.161

Note . E means the expected value (average) of the effects. RB means relative bias. * means relative bias $\leq |10\%|$ criterion met.