

Table 1: Result of SimExact x SimLNS x SimSA-VaR

Inst	$n$	$\delta$	SimExact		SimLNS		SimSA-VaR						GAP <sub>c×a</sub>	GAP <sub>c×b</sub>
			V-RPD <sup>a</sup>	T(s)	V-RPD <sup>b</sup>	T(s)	D-RPD	V-RPD <sup>c</sup>	SD	T(s)	$\rho_S$	$\rho_L$		
1	25	0.1	22.28	259.05	20.83	22.20	0.14	19.87	7020.50	7.37	356	3217	-10.83%	-4.60%
2	25	0.1	22.10	244.85	23.45	18.18	1.96	20.33	6132.15	7.83	354	3261	-8.00%	-13.28%
3	25	0.1	27.49	178.94	25.13	14.76	1.10	24.52	7436.79	8.68	391	3808	-10.79%	-2.40%
4	25	0.1	21.96	472.48	21.88	17.68	0.88	21.89	7785.56	7.87	452	3640	-0.29%	0.07%
5	25	0.1	22.20	342.72	22.40	14.86	1.00	21.11	7160.78	7.80	405	3436	-4.90%	-5.76%
6	25	0.1	27.46	304.41	22.12	18.00	1.08	22.22	6872.62	6.65	349	3438	-19.11%	0.42%
7	25	0.1	22.10	4480.63	22.13	15.84	0.36	20.56	7353.05	7.02	374	3392	-6.99%	-7.11%
8	25	0.1	21.26	482.83	22.51	16.22	1.11	19.72	7478.86	6.86	338	3514	-7.28%	-12.42%
9	25	0.1	25.68	446.01	20.21	15.85	0.29	20.48	7975.93	7.28	373	3431	-20.27%	1.33%
10	25	0.1	33.41	347.60	26.60	19.98	1.86	23.60	7262.66	7.97	391	3558	-29.37%	-11.30%
11	25	0.1	28.84	470.55	22.50	14.55	1.89	20.64	7385.18	7.30	427	3393	-28.41%	-8.23%
12	25	0.1	27.63	226.53	20.11	17.41	0.62	18.64	7232.86	6.59	374	3341	-32.54%	-7.31%
13	25	0.1	33.24	363.98	19.14	15.65	0.98	18.54	5557.89	6.79	265	2711	-44.22%	-3.13%
14	25	0.1	29.50	440.17	27.41	17.63	3.98	26.86	4566.47	9.08	456	3671	-8.95%	-2.01%
15	25	0.1	22.06	332.77	22.74	16.79	1.91	21.33	6013.25	7.08	331	3051	-3.33%	-6.20%
16	25	0.1	24.80	496.11	24.51	17.52	2.46	23.43	5441.35	7.47	350	3552	-5.52%	-4.41%
17	25	0.1	26.20	317.91	23.63	14.97	1.51	20.81	6894.14	6.27	330	3217	-20.57%	-11.93%
18	25	0.1	36.67	286.41	23.27	16.45	1.57	22.23	6612.78	8.09	454	3645	-39.38%	-4.47%
19	25	0.1	21.94	311.76	22.08	16.90	1.23	21.69	7036.68	7.31	410	3597	-1.15%	-1.75%
20	25	0.1	21.44	468.68	21.78	16.07	0.08	20.47	7724.96	7.51	387	3216	-4.54%	-6.05%
21	25	0.1	26.74	4484.27	19.02	16.33	0.60	20.07	7796.28	6.85	373	3269	-24.92%	5.55%
22	25	0.1	31.12	392.43	30.73	21.66	4.16	27.83	4885.45	9.19	489	4593	-10.56%	-9.43%
23	25	0.1	21.44	413.26	22.55	16.24	1.04	19.46	6426.99	6.87	330	3197	-9.24%	-13.70%
24	25	0.1	25.10	254.44	20.97	16.57	1.39	20.21	7127.25	6.59	369	3149	-19.47%	-3.60%
25	25	0.1	20.73	459.73	19.86	16.60	0.70	19.97	7337.85	6.59	319	3142	-3.65%	0.57%
26	25	0.5	48.63	311.55	45.48	104.76	0.31	44.74	15806.67	64.85	1632	15189	-8.00%	-1.63%
27	25	0.5	51.26	313.30	52.48	85.02	2.25	49.17	14481.46	81.35	1873	16388	-4.07%	-6.31%
28	25	0.5	51.90	221.73	53.17	37.13	1.76	49.66	16038.49	83.49	1798	16498	-4.32%	-6.60%
29	25	0.5	47.66	536.15	47.40	79.33	0.77	47.52	16856.09	69.31	1733	15740	-0.30%	0.26%
30	25	0.5	49.98	414.90	47.48	34.47	1.00	47.06	15829.10	65.22	1785	15492	-5.83%	-0.87%
31	25	0.5	55.45	387.04	49.57	108.42	1.36	49.83	15575.85	73.21	1832	16164	-10.14%	0.53%
32	25	0.5	46.77	4546.77	46.69	61.76	0.25	46.39	16368.64	64.26	1705	15401	-0.81%	-0.63%
33	25	0.5	48.32	551.90	47.39	91.35	0.99	45.91	16754.99	81.22	1815	16074	-4.99%	-3.12%
34	25	0.5	47.49	434.33	44.80	85.75	0.48	45.45	17400.49	68.82	1749	15146	-4.29%	1.45%
35	25	0.5	53.51	393.82	53.46	87.45	1.66	51.40	16172.84	75.59	1736	16094	-3.94%	-3.84%
36	25	0.5	51.36	528.79	49.83	34.45	1.97	46.16	16569.78	68.34	1729	15779	-10.12%	-7.37%
37	25	0.5	49.83	265.28	45.03	92.32	0.12	46.61	16765.49	72.27	1854	16291	-6.46%	3.52%
38	25	0.5	56.62	407.64	46.82	62.15	2.14	47.18	14110.03	71.92	1755	15993	-16.67%	0.77%
39	25	0.5	63.49	567.28	65.36	132.66	3.98	60.62	11114.26	111.76	2226	19812	-4.52%	-7.25%
40	25	0.5	50.80	406.68	48.28	81.14	1.88	48.81	14222.46	73.38	1802	15716	-3.90%	1.11%
41	25	0.5	55.68	583.49	54.27	112.75	2.12	53.67	12897.46	85.00	1951	17977	-3.61%	-1.10%
42	25	0.5	49.59	364.33	48.05	56.82	1.92	46.79	15549.15	68.05	1740	14993	-5.66%	-2.62%
43	25	0.5	55.03	321.92	49.78	78.56	1.57	49.52	14746.00	77.68	1823	16458	-10.01%	-0.53%
44	25	0.5	49.37	380.80	48.99	68.68	1.27	48.75	15675.67	71.79	1750	16277	-1.26%	-0.49%
45	25	0.5	47.44	534.74	45.77	65.25	0.08	45.08	17193.35	67.31	1622	14887	-4.97%	-1.52%
46	25	0.5	48.94	4520.87	44.72	78.76	0.58	46.45	17530.82	62.22	1777	15217	-5.07%	3.87%
47	25	0.5	63.56	519.14	63.78	118.49	4.34	60.74	10938.49	133.89	2301	20598	-4.44%	-4.77%
48	25	0.5	48.37	482.05	46.26	79.29	1.23	44.80	14601.18	73.44	1862	15301	-7.38%	-3.17%
49	25	0.5	51.85	311.20	47.88	72.47	1.28	45.51	16222.22	65.61	1759	15234	-12.23%	-4.95%
50	25	0.5	46.92	526.07	46.43	63.77	0.65	46.48	16861.89	70.74	1726	15316	-0.93%	0.11%
51	25	2.0	91.24	1107.83	89.49	821.65	0.10	89.85	30647.28	812.21	5580	50722	-1.52%	0.40%
52	25	2.0	96.59	1308.60	97.70	1051.69	1.68	95.91	27915.25	934.54	6173	54516	-0.71%	-1.83%
53	25	2.0	95.76	936.16	95.06	234.37	0.86	95.39	30506.99	816.68	5940	52879	-0.38%	0.35%
54	25	2.0	90.92	1417.75	90.53	818.78	0.69	90.08	31566.11	880.62	5604	49754	-0.93%	-0.50%
55	25	2.0	92.32	1361.00	91.30	532.75	1.69	91.85	30244.34	739.75	5382	50276	-0.51%	0.60%
56	25	2.0	96.41	1363.07	95.21	996.17	1.33	92.97	29133.36	830.17	5676	50705	-3.56%	-2.35%
57	25	2.0	87.93	5464.84	87.93	652.78	0.46	87.28	30555.14	740.33	5276	48661	-0.74%	-0.74%
58	25	2.0	90.28	1488.45	91.65	614.90	1.08	90.04	31829.88	921.69	5857	52196	-0.27%	-1.76%

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Table 1: Result of SimExact x SimLNS x SimSA-VaR (continued)

Inst	$n$	$\delta$	SimExact		SimLNS		SimSA-VaR						GAP <sub>c×a</sub>	GAP <sub>c×b</sub>
			V-RPD <sup>a</sup>	T(s)	V-RPD <sup>b</sup>	T(s)	D-RPD	V-RPD <sup>c</sup>	SD	T(s)	$\rho_S$	$\rho_L$		
59	25	2.0	90.23	1070.69	89.31	620.01	0.07	89.78	33537.24	758.08	5389	49555	-0.50%	0.52%
60	25	2.0	94.85	1089.17	95.34	850.34	1.88	94.30	30030.01	799.48	5651	50504	-0.58%	-1.10%
61	25	2.0	94.30	1332.26	93.15	226.39	1.02	91.33	31787.40	823.41	5780	51793	-3.15%	-1.96%
62	25	2.0	93.99	964.11	89.26	804.00	0.10	90.20	31707.85	949.97	5612	52311	-4.03%	1.05%
63	25	2.0	96.22	1045.22	92.53	658.27	1.82	92.51	26837.56	850.33	5903	50982	-3.85%	-0.02%
64	25	2.0	123.18	2775.06	125.18	1857.26	3.98	122.43	23059.35	1755.35	8020	71840	-0.61%	-2.20%
65	25	2.0	98.47	1542.58	95.50	969.86	3.66	97.06	28320.35	928.76	6396	55394	-1.43%	1.63%
66	25	2.0	108.87	1995.46	106.89	1146.62	2.21	107.83	25408.69	1264.23	6466	60508	-0.95%	0.88%
67	25	2.0	92.72	1122.74	91.68	208.80	2.00	91.84	30169.65	781.64	5669	50402	-0.96%	0.16%
68	25	2.0	100.47	970.54	96.95	695.53	1.10	96.35	28154.36	865.14	6130	53474	-4.11%	-0.63%
69	25	2.0	96.33	1477.40	93.13	839.61	0.75	94.27	29939.22	819.18	5553	52357	-2.14%	1.22%
70	25	2.0	88.02	1391.97	86.70	187.86	0.04	86.27	32517.01	689.49	5384	48145	-1.99%	-0.50%
71	25	2.0	90.19	5087.40	86.57	694.37	0.71	84.34	32242.26	669.43	5361	46983	-6.48%	-2.58%
72	25	2.0	123.03	2597.16	126.07	1446.32	4.09	122.75	22157.42	1821.40	8044	71598	-0.23%	-2.63%
73	25	2.0	91.06	1447.12	90.05	775.61	0.88	89.78	28129.75	811.49	5478	50576	-1.41%	-0.30%
74	25	2.0	92.81	1112.03	91.94	977.13	1.20	89.20	31110.58	743.61	5563	50509	-3.89%	-2.98%
75	25	2.0	89.54	1432.91	87.80	679.46	0.42	88.92	31862.71	756.95	5237	49366	-0.69%	1.28%
76*	50	0.1	23.42	4497.95	22.46	38.83	2.24	21.12	6038.23	11.61	323	3028	-9.84%	-5.99%
77*	50	0.1	23.26	4497.03	22.61	42.29	1.79	21.79	6925.01	14.01	440	3607	-6.29%	-3.62%
78*	50	0.1	20.80	4498.19	19.74	41.25	0.46	20.05	7708.82	12.90	413	3399	-3.62%	1.56%
79*	50	0.1	25.49	4497.70	20.93	41.13	2.73	20.15	5370.91	11.36	328	2776	-20.97%	-3.73%
80*	50	0.1	20.45	4499.46	19.96	41.98	0.55	20.29	7526.05	12.21	356	3304	-0.79%	1.65%
81*	50	0.1	21.09	4497.12	21.69	44.42	0.65	19.67	6833.40	13.50	402	3178	-6.70%	-9.32%
82*	50	0.1	20.57	4498.80	20.95	41.83	1.28	20.33	6565.18	12.36	378	3167	-1.20%	-2.95%
83*	50	0.1	20.81	4499.17	20.12	43.16	0.56	19.61	7146.15	12.94	391	3403	-5.79%	-2.54%
84*	50	0.1	22.16	4497.57	21.23	43.97	1.43	21.18	7338.04	11.90	374	3430	-4.43%	-0.27%
85*	50	0.1	25.37	4497.86	21.75	41.87	2.25	21.30	5958.44	12.44	308	3057	-16.05%	-2.07%
86*	50	0.1	21.02	4495.45	20.65	42.79	1.28	19.87	7474.66	11.28	349	3207	-5.50%	-3.78%
87*	50	0.1	22.97	4498.38	20.53	43.52	1.05	20.95	7543.59	31.07	372	3332	-8.81%	2.06%
88*	50	0.1	24.21	4496.62	21.07	44.73	1.76	21.72	6969.80	12.48	411	3478	-10.29%	3.10%
89*	50	0.1	20.69	4499.43	20.20	42.41	1.48	20.66	7293.63	11.79	332	3157	-0.15%	2.28%
90*	50	0.1	22.51	4498.84	22.84	41.94	1.68	22.28	6603.14	11.52	382	3431	-1.01%	-2.46%
91*	50	0.1	24.12	4498.29	20.99	43.68	1.44	21.01	7420.97	11.98	379	3231	-12.87%	0.10%
92*	50	0.1	22.25	4498.41	20.43	44.68	1.13	20.64	7263.39	13.69	364	3377	-7.20%	1.03%
93*	50	0.1	22.33	4497.34	20.25	41.67	1.58	19.79	7018.46	11.20	321	2989	-11.40%	-2.30%
94*	50	0.1	22.22	4499.35	20.46	41.84	1.79	20.74	6327.49	11.67	377	3131	-6.66%	1.37%
95*	50	0.1	19.46	4500.12	19.31	41.95	1.17	19.11	7693.56	12.70	326	3128	-1.83%	-1.03%
96*	50	0.1	23.23	4501.01	21.51	42.46	2.25	21.20	6590.15	12.31	318	3396	-8.74%	-1.41%
97*	50	0.1	21.31	4498.81	20.68	42.63	1.32	19.57	6742.73	10.61	371	3106	-8.16%	-5.36%
98*	50	0.1	21.78	4498.98	18.10	42.67	0.73	17.07	6483.44	12.14	337	3445	-21.62%	-5.65%
99*	50	0.1	20.68	4484.08	20.51	42.14	1.46	19.27	7041.86	11.91	396	3296	-6.81%	-6.05%
100*	50	0.1	22.59	4484.72	21.03	43.15	0.81	19.75	6953.71	13.22	371	3169	-12.54%	-6.08%
101*	50	0.5	49.69	4573.64	48.24	57.94	2.30	49.57	14419.38	75.38	1638	15725	-0.23%	2.77%
102*	50	0.5	51.00	4586.62	50.23	118.52	1.77	48.14	15287.89	83.58	1783	16158	-5.61%	-4.15%
103*	50	0.5	47.29	4575.77	47.36	99.90	0.53	44.88	17172.33	81.23	1804	15587	-5.09%	-5.22%
104*	50	0.5	51.37	4578.43	49.44	107.90	2.43	49.35	13481.73	83.53	1820	15950	-3.93%	-0.19%
105*	50	0.5	46.37	4582.45	45.33	122.83	0.47	43.49	16360.19	72.09	1674	14631	-6.21%	-4.05%
106*	50	0.5	47.73	4573.84	47.10	96.03	0.69	45.61	15468.96	82.48	1728	14953	-4.43%	-3.15%
107*	50	0.5	47.63	4586.28	46.71	92.85	1.47	46.06	15016.09	79.89	1445	15175	-3.29%	-1.39%
108*	50	0.5	47.78	4584.96	46.89	105.47	0.65	47.73	16559.09	91.53	1870	16493	-0.09%	1.80%
109*	50	0.5	47.56	4576.40	48.05	104.09	1.51	47.07	16243.01	80.56	1719	15429	-1.03%	-2.03%
110*	50	0.5	52.63	4578.49	51.37	130.71	2.33	50.03	14451.55	98.42	1813	16330	-4.93%	-2.60%
111*	50	0.5	47.35	4571.90	47.87	103.35	1.23	45.83	16965.09	75.15	1673	15242	-3.21%	-4.25%
112*	50	0.5	48.50	4569.20	46.85	97.97	1.16	47.27	16923.80	263.84	1726	15406	-2.54%	0.89%
113*	50	0.5	49.37	4569.43	48.85	129.54	1.82	48.55	15809.32	90.63	1741	16373	-1.66%	-0.61%
114*	50	0.5	48.31	4586.62	46.94	102.26	1.23	47.48	16733.69	73.67	1797	15296	-1.72%	1.14%
115*	50	0.5	50.13	4581.82	48.85	103.86	1.73	49.40	14985.40	79.81	1830	16022	-1.45%	1.13%
116*	50	0.5	50.51	4576.76	48.49	128.34	1.37	47.98	17037.27	72.08	1729	15610	-5.00%	-1.06%

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Table 1: Result of SimExact x SimLNS x SimSA-VaR (continued)

Inst	$n$	$\delta$	SimExact		SimLNS		SimSA-VaR						GAP <sub>c×a</sub>	GAP <sub>c×b</sub>
			V-RPD <sup>a</sup>	T(s)	V-RPD <sup>b</sup>	T(s)	D-RPD	V-RPD <sup>c</sup>	SD	T(s)	$\rho_S$	$\rho_L$		
117*	50	0.5	50.24	4574.11	48.66	122.59	1.41	46.70	16349.24	87.19	1759	15748	-7.05%	-4.02%
118*	50	0.5	48.64	4579.04	46.46	95.86	1.39	46.95	16618.64	53.89	1571	15342	-3.49%	1.05%
119*	50	0.5	50.19	4587.51	47.55	121.46	2.06	47.95	14661.25	77.63	1728	15323	-4.46%	0.85%
120*	50	0.5	45.39	4572.78	45.28	99.24	1.12	44.95	17706.59	78.40	1674	15220	-0.97%	-0.73%
121*	50	0.5	50.43	4590.81	49.29	99.96	1.78	49.35	15314.58	86.64	1853	16710	-2.13%	0.13%
122*	50	0.5	48.14	4579.62	46.96	97.56	1.91	46.68	15786.74	79.68	1616	15474	-3.02%	-0.59%
123*	50	0.5	49.59	4573.25	43.63	130.53	1.01	44.72	15004.30	97.09	1927	16856	-9.82%	2.51%
124*	50	0.5	48.79	4518.42	48.13	107.53	1.65	47.53	16234.58	75.46	1733	15909	-2.57%	-1.24%
125*	50	0.5	47.11	4512.43	45.99	119.19	0.64	47.00	16341.11	81.03	1786	16022	-0.24%	2.18%
126*	50	2.0	95.49	5568.60	93.85	247.01	2.06	93.90	27594.92	799.93	5810	51842	-1.67%	0.06%
127*	50	2.0	95.18	5720.70	96.66	716.41	1.50	94.94	29592.80	886.94	5885	53578	-0.25%	-1.78%
128*	50	2.0	90.59	5560.47	89.88	977.22	0.46	90.40	33246.72	824.41	5718	51858	-0.22%	0.57%
129*	50	2.0	103.60	5642.49	95.75	1079.51	2.54	97.64	26459.76	979.69	5889	54293	-5.75%	1.97%
130*	50	2.0	87.51	5548.79	85.46	776.70	0.48	86.89	31819.13	815.26	5478	49460	-0.70%	1.67%
131*	50	2.0	89.56	5546.15	89.10	847.05	0.76	88.69	30024.45	916.27	5542	50752	-0.97%	-0.45%
132*	50	2.0	91.96	5698.33	92.42	809.53	1.61	91.83	29467.31	893.80	5968	52211	-0.14%	-0.64%
133*	50	2.0	95.27	5752.30	91.79	742.70	0.54	92.96	31744.20	906.48	5990	54015	-2.43%	1.28%
134*	50	2.0	89.27	5582.01	87.55	630.66	1.60	88.79	30878.36	943.88	5735	50209	-0.54%	1.42%
135*	50	2.0	99.22	5734.17	99.00	899.43	2.29	99.06	28223.77	1046.28	6106	55256	-0.16%	0.06%
136*	50	2.0	89.52	5524.11	87.76	756.16	1.29	88.02	32037.25	1777.40	5479	49047	-1.68%	0.29%
137*	50	2.0	89.68	5523.06	88.99	625.97	1.00	88.42	31769.49	794.71	5698	49799	-1.41%	-0.64%
138*	50	2.0	96.44	5642.95	93.37	865.18	1.74	95.79	30519.29	1019.10	6242	53915	-0.68%	2.59%
139*	50	2.0	90.66	5646.83	91.19	889.41	1.18	90.64	32107.86	858.35	5612	50797	-0.02%	-0.61%
140*	50	2.0	96.46	5768.14	96.44	567.39	1.67	95.18	28729.93	854.46	5697	52928	-1.33%	-1.30%
141*	50	2.0	94.66	5551.85	91.43	864.20	1.49	92.37	32765.29	867.07	5819	51426	-2.41%	1.03%
142*	50	2.0	94.71	5668.47	94.63	843.45	1.27	92.94	31749.88	935.24	5738	52095	-1.87%	-1.79%
143*	50	2.0	92.93	5636.68	92.31	509.46	1.24	92.08	32196.22	912.59	5625	51506	-0.91%	-0.25%
144*	50	2.0	97.60	5825.90	96.80	1017.64	2.06	96.47	29525.33	1009.55	5879	55229	-1.15%	-0.34%
145*	50	2.0	88.48	5425.86	86.19	781.52	0.78	87.60	33719.82	787.04	5685	49746	-0.99%	1.64%
146*	50	2.0	97.57	5769.41	98.35	812.95	1.92	97.28	29402.35	1038.52	6075	54637	-0.30%	-1.09%
147*	50	2.0	92.33	5628.70	91.25	794.94	2.63	91.71	30060.15	800.97	5658	50298	-0.67%	0.50%
148*	50	2.0	93.70	4970.25	90.42	1244.89	1.37	90.88	28718.64	1110.95	6282	54758	-3.01%	0.51%
149*	50	2.0	92.41	4810.62	91.11	721.51	1.61	91.41	30768.96	976.56	5763	51711	-1.09%	0.33%
150*	50	2.0	88.99	4757.95	88.23	630.28	0.85	87.55	30231.09	868.40	5562	49506	-1.63%	-0.77%
151*	75	0.1	22.49	4494.21	19.33	81.18	1.65	20.45	7108.74	16.59	371	3191	-9.08%	5.80%
152*	75	0.1	21.97	4489.05	21.06	82.60	1.72	20.51	6320.43	17.36	341	3230	-6.67%	-2.64%
153*	75	0.1	21.71	4491.80	22.89	82.96	1.07	20.69	6611.60	19.23	337	3301	-4.66%	-9.58%
154*	75	0.1	19.90	4490.85	18.32	82.42	0.01	18.90	6907.41	18.09	385	3376	-5.01%	3.13%
155*	75	0.1	20.29	4492.05	19.45	82.66	1.67	19.60	6575.33	17.23	309	2939	-3.41%	0.77%
156*	75	0.1	19.75	4491.46	19.95	86.64	0.80	19.31	7003.98	18.65	331	3302	-2.23%	-3.25%
157*	75	0.1	23.15	4490.76	20.32	85.05	1.66	19.35	6613.48	17.46	341	3134	-16.42%	-4.80%
158*	75	0.1	21.02	4491.67	20.27	82.66	1.80	19.65	6109.05	17.87	308	2968	-6.50%	-3.05%
159*	75	0.1	20.66	4491.79	20.86	83.17	1.94	20.58	7378.45	18.07	368	3249	-0.39%	-1.34%
160*	75	0.1	21.23	4491.94	20.30	80.33	2.12	20.67	6313.40	17.91	360	3161	-2.64%	1.83%
161*	75	0.1	21.62	4489.75	21.50	87.50	1.89	20.66	6133.68	18.44	358	3245	-4.45%	-3.92%
162*	75	0.1	22.26	4491.53	20.92	76.97	0.99	19.33	6910.52	21.51	362	3189	-13.16%	-7.59%
163*	75	0.1	20.00	4489.80	19.25	80.16	0.57	19.07	6891.25	20.00	341	3065	-4.66%	-0.95%
164*	75	0.1	22.31	4491.98	19.64	95.53	1.21	20.39	6941.02	26.66	372	3270	-8.59%	3.82%
165*	75	0.1	22.90	4492.03	22.50	81.16	2.47	22.12	6331.56	27.87	370	3260	-3.43%	-1.70%
166*	75	0.1	22.03	4490.98	21.06	81.42	1.64	19.94	6841.69	26.57	328	3077	-9.53%	-5.32%
167*	75	0.1	22.75	4492.46	22.70	82.04	1.80	22.54	7179.13	26.94	412	3585	-0.92%	-0.69%
168*	75	0.1	21.33	4493.10	21.13	87.88	2.12	20.51	6545.32	27.69	370	3191	-3.85%	-2.92%
169*	75	0.1	24.78	4491.09	20.64	85.95	1.05	19.87	6843.96	27.20	338	3357	-19.81%	-3.74%
170*	75	0.1	24.43	4492.54	21.90	81.04	1.92	21.65	6770.14	24.30	386	3260	-11.38%	-1.16%
171*	75	0.1	21.49	4492.77	21.18	85.73	2.35	20.84	6780.63	22.82	374	3173	-3.00%	-1.62%
172*	75	0.1	20.78	4489.54	19.64	82.40	1.48	20.12	7142.48	31.08	326	3039	-3.19%	2.45%
173*	75	0.1	21.87	4492.95	21.06	85.04	1.96	20.96	6709.09	17.64	377	3320	-4.16%	-0.47%
174*	75	0.1	22.24	4491.81	20.25	80.50	1.06	20.58	7419.87	18.89	394	3291	-7.48%	1.62%

Continued on the next page

Table 1: Result of SimExact x SimLNS x SimSA-VaR (continued)

Inst	$n$	$\delta$	SimExact		SimLNS		SimSA-VaR						GAP <sub>c×a</sub>	GAP <sub>c×b</sub>
			V-RPD <sup>a</sup>	T(s)	V-RPD <sup>b</sup>	T(s)	D-RPD	V-RPD <sup>c</sup>	SD	T(s)	$\rho_S$	$\rho_L$		
175*	75	0.1	21.05	4490.49	21.53	83.08	1.30	20.99	6161.75	40.07	331	3304	-0.27%	-2.48%
176*	75	0.5	47.58	4522.78	47.05	141.20	1.78	47.28	16346.81	91.55	1668	15496	-0.63%	0.47%
177*	75	0.5	50.63	4526.83	49.09	178.75	1.71	49.36	15037.49	102.41	1771	16723	-2.50%	0.55%
178*	75	0.5	49.23	4534.28	49.22	157.46	1.13	48.89	15439.79	104.97	1761	16345	-0.69%	-0.68%
179*	75	0.5	46.65	4529.26	44.86	161.27	0.15	45.43	15704.57	90.62	1707	15906	-2.61%	1.27%
180*	75	0.5	47.74	4535.02	46.75	138.95	1.62	47.13	15691.92	85.66	1813	15455	-1.27%	0.82%
181*	75	0.5	48.16	4533.80	48.00	154.21	0.86	46.94	16023.76	94.76	1705	15747	-2.53%	-2.21%
182*	75	0.5	50.16	4526.85	47.09	119.09	1.66	49.29	15721.92	98.18	1808	16140	-1.73%	4.67%
183*	75	0.5	47.93	4533.23	46.22	142.41	1.46	47.11	14565.69	90.64	1713	15486	-1.71%	1.94%
184*	75	0.5	47.79	4530.61	46.84	170.25	1.07	47.46	16963.59	86.96	1720	15709	-0.68%	1.32%
185*	75	0.5	49.72	4532.65	48.14	145.65	2.12	48.58	14769.15	69.41	1803	15797	-2.29%	0.91%
186*	75	0.5	51.18	4538.02	48.85	187.14	1.97	49.78	14681.88	117.75	1838	16788	-2.72%	1.92%
187*	75	0.5	49.63	4536.46	48.26	100.34	1.00	47.61	16192.78	109.94	1850	15954	-4.06%	-1.35%
188*	75	0.5	46.35	4528.64	45.81	143.48	0.87	46.32	16284.45	93.88	1679	15551	-0.08%	1.11%
189*	75	0.5	49.39	4533.40	48.86	117.67	1.06	46.07	15667.02	115.49	1601	15373	-6.74%	-5.71%
190*	75	0.5	50.32	4535.88	48.92	184.16	3.04	48.63	14419.75	141.26	1813	15308	-3.35%	-0.58%
191*	75	0.5	48.28	4529.91	47.69	142.54	1.33	47.47	16129.67	127.78	1644	15698	-1.68%	-0.47%
192*	75	0.5	49.93	4536.05	49.61	172.24	1.84	48.94	15881.24	142.19	1832	16291	-1.99%	-1.37%
193*	75	0.5	48.28	4534.42	48.34	178.94	2.12	46.59	14973.89	144.24	1766	15470	-3.51%	-3.62%
194*	75	0.5	51.56	4530.29	47.36	163.87	1.20	46.91	15748.19	157.85	1892	16226	-9.02%	-0.94%
195*	75	0.5	51.26	4535.54	49.11	185.12	2.18	48.88	15620.46	135.70	1741	15866	-4.63%	-0.46%
196*	75	0.5	50.49	4537.22	48.28	158.17	1.93	49.43	15989.43	110.61	1829	16197	-2.10%	2.40%
197*	75	0.5	47.87	4531.54	48.06	167.65	1.40	47.48	17019.32	313.37	1856	15827	-0.80%	-1.19%
198*	75	0.5	50.88	4539.02	48.49	134.41	2.19	48.49	15482.98	95.23	1804	16084	-4.70%	-0.01%
199*	75	0.5	47.38	4533.15	46.58	119.84	1.03	45.81	16679.78	87.76	1599	15224	-3.32%	-1.66%
200*	75	0.5	50.52	4534.14	124.37	718.67	1.49	50.38	14574.37	273.04	1899	16820	-0.27%	-59.49%
201*	75	2.0	92.08	4773.49	74.37	1078.55	1.36	89.01	30852.93	805.10	5624	50126	-3.34%	19.67%
202*	75	2.0	97.59	4827.19	100.77	814.50	1.72	96.74	28974.81	1075.36	6231	54897	-0.87%	-4.00%
203*	75	2.0	94.71	4898.71	97.79	895.09	1.09	92.90	29207.56	962.04	5746	52913	-1.91%	-5.00%
204*	75	2.0	89.49	4811.57	92.91	1007.23	0.12	88.10	29767.19	853.01	5440	51468	-1.55%	-5.17%
205*	75	2.0	92.50	4857.72	92.44	751.22	1.57	91.90	30343.53	868.23	5601	51330	-0.65%	-0.59%
206*	75	2.0	92.70	4840.08	84.84	667.96	0.80	89.67	30549.40	894.96	5664	51767	-3.28%	5.69%
207*	75	2.0	92.28	4808.45	79.75	666.36	1.47	91.79	29913.66	882.18	5683	52845	-0.54%	15.09%
208*	75	2.0	89.37	4824.77	117.89	771.62	1.42	88.98	27358.20	829.28	5416	49902	-0.44%	-24.53%
209*	75	2.0	88.88	4789.65	66.32	522.44	1.51	88.37	31979.95	875.81	5357	50442	-0.57%	33.24%
210*	75	2.0	94.29	4850.71	87.76	1107.32	2.12	93.27	28459.66	923.77	5580	52874	-1.09%	6.28%
211*	75	2.0	96.68	4929.55	121.62	309.98	1.45	96.24	28256.03	1199.62	6220	55392	-0.46%	-20.87%
212*	75	2.0	95.60	4836.51	91.14	961.97	1.05	91.26	30897.10	1169.74	5982	52747	-4.54%	0.13%
213*	75	2.0	90.40	4828.50	84.54	484.80	1.07	88.43	30737.15	1476.87	5588	50239	-2.18%	4.60%
214*	75	2.0	92.21	4823.23	74.51	869.14	1.01	91.09	30209.49	970.98	5645	51329	-1.22%	22.24%
215*	75	2.0	94.26	4863.72	114.99	727.34	2.51	92.52	27592.69	1506.54	5667	51146	-1.85%	-19.54%
216*	75	2.0	92.23	4813.42	85.20	730.32	1.32	91.61	31047.73	1601.18	5650	52014	-0.67%	7.52%
217*	75	2.0	93.80	4853.00	86.48	732.99	1.77	93.63	30111.62	1549.23	5580	51978	-0.18%	8.27%
218*	75	2.0	91.72	4829.50	99.41	911.48	2.11	91.09	28776.10	1572.07	5500	51339	-0.68%	-8.37%
219*	75	2.0	95.20	4831.48	91.76	1058.93	1.18	92.62	30115.08	1817.35	5952	52912	-2.70%	0.94%
220*	75	2.0	95.29	4850.26	94.71	1006.18	1.91	94.99	30230.57	814.28	6127	53179	-0.31%	0.30%
221*	75	2.0	91.55	4850.31	105.90	917.74	2.26	90.61	29418.13	1068.59	5614	49771	-1.02%	-14.44%
222*	75	2.0	91.02	4834.34	73.83	861.04	1.80	90.87	31967.58	1699.16	5376	49563	-0.16%	23.07%
223*	75	2.0	95.98	4900.25	110.25	674.52	1.96	93.06	29654.87	972.87	5853	53094	-3.04%	-15.59%
224*	75	2.0	90.47	4836.64	5.25	136.26	1.37	88.68	31753.84	2299.05	5265	50209	-1.98%	1587.66%
225*	75	2.0	97.30	4882.21	31.17	131.87	1.24	96.39	27989.96	3701.19	6139	55005	-0.93%	209.25%
226*	100	0.1	22.30	4495.50	24.38	134.93	2.42	21.36	6330.50	56.91	331	3135	-4.23%	-12.38%
227*	100	0.1	22.03	4495.67	26.31	136.44	1.89	21.00	6662.17	53.09	411	3309	-4.69%	-20.18%
228*	100	0.1	21.91	4497.49	35.62	135.09	1.20	20.04	6574.01	55.35	372	3230	-8.55%	-43.74%
229*	100	0.1	21.08	4497.65	18.13	136.50	2.40	20.49	6766.31	58.48	335	3120	-2.79%	13.01%
230*	100	0.1	21.83	4498.39	9.15	130.49	1.86	20.29	7304.49	57.60	333	3146	-7.05%	121.70%
231*	100	0.1	20.62	4496.17	23.18	135.68	1.00	20.15	6827.06	51.13	370	3290	-2.30%	-13.06%
232*	100	0.1	21.66	4499.04	27.01	131.22	1.92	21.60	6835.76	29.17	410	3340	-0.26%	-20.03%

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Table 1: Result of SimExact x SimLNS x SimSA-VaR (continued)

Inst	$n$	$\delta$	SimExact		SimLNS		SimSA-VaR						GAP <sub>c<math>\times</math>a</sub>	GAP <sub>c<math>\times</math>b</sub>
			V-RPD <sup>a</sup>	T(s)	V-RPD <sup>b</sup>	T(s)	D-RPD	V-RPD <sup>c</sup>	SD	T(s)	$\rho_S$	$\rho_L$		
233*	100	0.1	20.32	4498.73	22.91	136.64	1.93	20.17	6910.40	27.36	341	3217	-0.74%	-11.96%
234*	100	0.1	21.35	4499.01	8.23	131.60	1.93	20.95	6965.44	28.88	349	3141	-1.89%	154.47%
235*	100	0.1	21.06	4499.03	22.90	136.47	1.91	19.09	6885.19	27.88	357	3095	-9.37%	-16.64%
236*	100	0.1	21.57	4497.94	33.14	135.80	1.17	20.50	6401.28	28.16	356	3366	-4.97%	-38.15%
237*	100	0.1	20.99	4497.56	18.81	142.47	1.59	19.45	7024.53	28.46	350	3089	-7.35%	3.40%
238*	100	0.1	23.26	4499.76	16.86	132.65	1.67	20.84	6964.62	26.92	374	3227	-10.42%	23.58%
239*	100	0.1	21.79	4497.47	8.77	135.52	2.21	21.78	7238.84	27.89	364	3374	-0.05%	148.36%
240*	100	0.1	21.08	4497.40	16.81	134.93	1.68	21.07	6753.18	27.11	370	3173	-0.03%	25.34%
241*	100	0.1	21.43	4495.84	31.93	133.90	2.50	21.06	6171.71	28.53	314	3064	-1.75%	-34.04%
242*	100	0.1	21.94	4497.84	24.55	132.00	1.73	20.37	6402.56	29.00	355	3064	-7.17%	-17.02%
243*	100	0.1	22.12	4498.30	15.69	140.80	2.24	20.63	6612.34	29.65	377	2988	-6.73%	31.45%
244*	100	0.1	22.52	4498.14	13.90	134.51	2.21	21.89	6973.65	30.18	360	3354	-2.78%	57.47%
245*	100	0.1	22.23	4497.42	30.95	135.04	1.61	21.40	6481.64	28.09	341	3205	-3.74%	-30.85%
246*	100	0.1	20.88	4498.07	21.97	135.65	2.30	20.59	6235.65	27.99	333	3006	-1.40%	-6.30%
247*	100	0.1	20.14	4496.82	24.43	133.70	1.34	20.05	7028.72	29.19	375	3211	-0.41%	-17.92%
248*	100	0.1	23.27	4497.84	33.68	136.55	2.12	22.15	6743.44	27.67	353	3482	-4.81%	-34.22%
249*	100	0.1	20.14	4497.10	23.41	145.78	1.37	20.00	7473.05	29.35	368	3340	-0.68%	-14.59%
250*	100	0.1	20.92	4496.38	33.58	202.46	1.75	20.62	7142.67	28.31	349	3280	-1.40%	-38.59%
251*	100	0.5	50.99	4548.04	53.18	202.90	2.46	49.84	15080.57	286.12	1754	16370	-2.25%	-6.28%
252*	100	0.5	49.49	4546.62	47.39	169.05	1.83	47.45	15188.91	240.37	1745	15750	-4.12%	0.12%
253*	100	0.5	48.32	4542.60	53.87	203.49	1.23	46.57	15036.93	259.03	1593	15514	-3.63%	-13.56%
254*	100	0.5	49.08	4549.14	57.80	198.80	2.19	47.28	15622.34	247.90	1612	15282	-3.66%	-18.20%
255*	100	0.5	48.13	4548.76	34.60	205.71	1.88	46.92	16814.91	272.75	1812	15283	-2.50%	35.60%
256*	100	0.5	47.29	4546.30	46.19	202.67	0.96	46.32	15425.41	261.16	1781	15600	-2.06%	0.27%
257*	100	0.5	50.26	4554.62	53.27	199.27	1.94	49.76	15847.64	128.77	1808	16402	-0.99%	-6.58%
258*	100	0.5	49.24	4551.08	50.27	198.68	1.94	47.95	15995.45	122.05	1744	15777	-2.62%	-4.61%
259*	100	0.5	49.82	4553.64	49.08	228.74	2.16	49.77	16636.69	135.87	1756	16460	-0.10%	1.40%
260*	100	0.5	48.45	4553.91	33.26	207.55	2.06	46.78	16169.51	127.35	1754	15558	-3.45%	40.67%
261*	100	0.5	50.35	4548.92	67.44	201.87	0.96	49.09	14898.99	140.86	1804	16557	-2.50%	-27.20%
262*	100	0.5	48.73	4549.31	43.17	225.79	1.50	47.09	16488.44	131.52	1702	15576	-3.35%	9.08%
263*	100	0.5	50.88	4551.98	50.39	192.72	1.67	49.72	16419.88	122.84	1760	16388	-2.28%	-1.32%
264*	100	0.5	48.80	4547.48	44.61	148.35	2.00	48.13	16265.56	121.68	1827	15654	-1.36%	7.89%
265*	100	0.5	49.47	4549.85	40.18	227.79	1.66	48.53	15755.03	128.32	1745	15900	-1.88%	20.80%
266*	100	0.5	50.00	4545.56	55.83	212.95	2.38	49.87	15042.39	138.88	1905	16586	-0.27%	-10.68%
267*	100	0.5	49.45	4559.86	54.57	194.61	1.54	49.00	15547.61	135.98	1728	16401	-0.91%	-10.19%
268*	100	0.5	49.94	4550.41	48.16	204.70	2.08	48.57	15799.72	127.58	1698	15609	-2.76%	0.84%
269*	100	0.5	49.17	4548.13	41.35	206.71	2.21	48.86	16002.94	130.33	1891	16064	-0.63%	18.15%
270*	100	0.5	49.42	4548.32	47.97	205.28	1.55	48.47	15153.78	118.57	1737	16116	-1.93%	1.05%
271*	100	0.5	49.50	4548.53	61.93	211.51	2.28	49.18	15175.64	135.87	1776	16173	-0.63%	-20.58%
272*	100	0.5	47.99	4548.13	35.15	217.82	1.66	47.74	16418.80	127.10	1701	15909	-0.52%	35.80%
273*	100	0.5	51.16	4549.55	67.42	183.34	1.90	50.26	15328.63	127.35	1678	16504	-1.77%	-25.46%
274*	100	0.5	47.80	4543.77	41.60	211.50	1.25	46.98	16912.83	124.96	1808	15663	-1.72%	12.94%
275*	100	0.5	47.55	4545.01	69.93	861.00	1.72	47.39	16272.86	131.25	1839	15690	-0.33%	-32.23%
276*	100	2.0	98.25	4894.01	96.96	655.45	2.34	97.64	29112.55	3559.52	5805	53747	-0.62%	0.70%
277*	100	2.0	92.05	4865.05	91.34	901.38	2.55	92.03	29566.98	2438.37	5663	53280	-0.02%	0.76%
278*	100	2.0	91.40	4842.57	89.70	810.04	1.21	91.20	29206.67	3528.99	5838	52780	-0.22%	1.67%
279*	100	2.0	91.11	4863.30	90.15	783.50	2.13	90.89	30070.65	3466.42	6202	50798	-0.25%	0.82%
280*	100	2.0	89.37	4851.83	88.03	1061.69	1.90	89.26	32010.95	3261.40	5657	49838	-0.12%	1.40%
281*	100	2.0	91.92	4861.97	90.44	934.33	0.97	91.61	29811.03	1899.49	5986	51852	-0.33%	1.30%
282*	100	2.0	93.68	4944.96	93.83	1185.73	1.91	93.12	30425.20	1304.04	6066	54522	-0.60%	-0.76%
283*	100	2.0	91.92	4896.42	91.91	989.69	1.98	91.56	30532.89	1212.35	5650	52251	-0.39%	-0.39%
284*	100	2.0	94.89	4912.16	93.42	915.89	2.19	94.35	31217.26	1210.46	5724	52029	-0.57%	1.00%
285*	100	2.0	89.24	4923.95	90.16	1099.10	1.95	89.15	30497.01	1120.46	5529	50090	-0.10%	-1.12%
286*	100	2.0	96.18	4932.51	95.95	895.56	1.00	96.04	29160.86	1523.19	6280	56341	-0.14%	0.10%
287*	100	2.0	89.67	4887.47	90.57	1159.06	1.51	89.40	31666.60	1295.00	6028	52423	-0.30%	-1.29%
288*	100	2.0	94.65	4897.83	94.70	1070.55	1.83	93.62	31313.49	1296.92	5736	53561	-1.08%	-1.14%
289*	100	2.0	92.92	4857.50	91.67	822.17	2.24	92.71	30934.79	1233.52	5494	50742	-0.23%	1.14%
290*	100	2.0	92.32	4910.24	92.83	379.55	1.68	91.93	30101.18	1166.07	5871	52295	-0.43%	-0.97%

Continued on the next page

Table 1: Result of SimExact x SimLNS x SimSA-VaR (continued)

Inst	$n$	$\delta$	SimExact		SimLNS		SimSA-VaR						$\text{GAP}_{c \times a}$	$\text{GAP}_{c \times b}$
			V-RPD <sup>a</sup>	T(s)	V-RPD <sup>b</sup>	T(s)	D-RPD	V-RPD <sup>c</sup>	SD	T(s)	$\rho_S$	$\rho_L$		
291*	100	2.0	96.97	4885.83	95.04	1124.71	2.39	96.18	29285.97	1501.95	6003	55948	-0.82%	1.20%
292*	100	2.0	91.52	4870.97	90.06	1051.83	1.63	90.55	29784.96	1297.04	6396	54597	-1.06%	0.54%
293*	100	2.0	94.24	4867.31	91.59	782.33	1.98	92.93	30311.71	1227.71	5989	51653	-1.40%	1.45%
294*	100	2.0	94.27	4889.40	93.45	990.62	2.06	92.66	30782.29	1243.64	5921	53630	-1.71%	-0.84%
295*	100	2.0	93.99	4865.36	91.90	966.28	1.90	93.54	29268.00	1235.75	5875	53543	-0.48%	1.78%
296*	100	2.0	92.98	4888.11	92.87	911.75	2.28	92.61	28716.86	1247.77	5702	52264	-0.40%	-0.28%
297*	100	2.0	90.29	4870.32	87.42	811.04	1.37	90.22	31188.26	1180.60	6192	51769	-0.09%	3.20%
298*	100	2.0	96.09	4900.46	94.86	1316.11	1.92	96.04	29609.91	1422.10	6032	55057	-0.05%	1.25%
299*	100	2.0	89.04	4872.60	87.12	747.31	1.28	88.91	32211.96	1340.36	5514	51351	-0.15%	2.04%
300*	100	2.0	90.05	4858.85	89.25	1123.54	1.78	88.78	30358.32	1082.22	5493	49261	-1.41%	-0.53%