Right on target, or is it?
The role of distributional shape in variance targeting

Online Appendix

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August 4, 2015

Experiment	Volatility model	Fitted distribution	T	β	γ	η	λ
A	GARCH	Normal	2000	**vary**		**vary**	0
B	GARCH	Normal	2000	**vary**		4	**vary**
C	GARCH	Normal	**vary**	**vary**		4	0
D	GJR	Normal	2000	**vary**	0.1	**vary**	0
E	GARCH	Student	2000	**vary**		**vary**	0
F	GARCH	Skew Student	2000	**vary**		**vary**	0

Description of experiments
Simulations are performed from Skewed Student distribution in all experiments. Persistence parameter ρ is set to 0.99 everywhere.

1 Plots

A Experiment

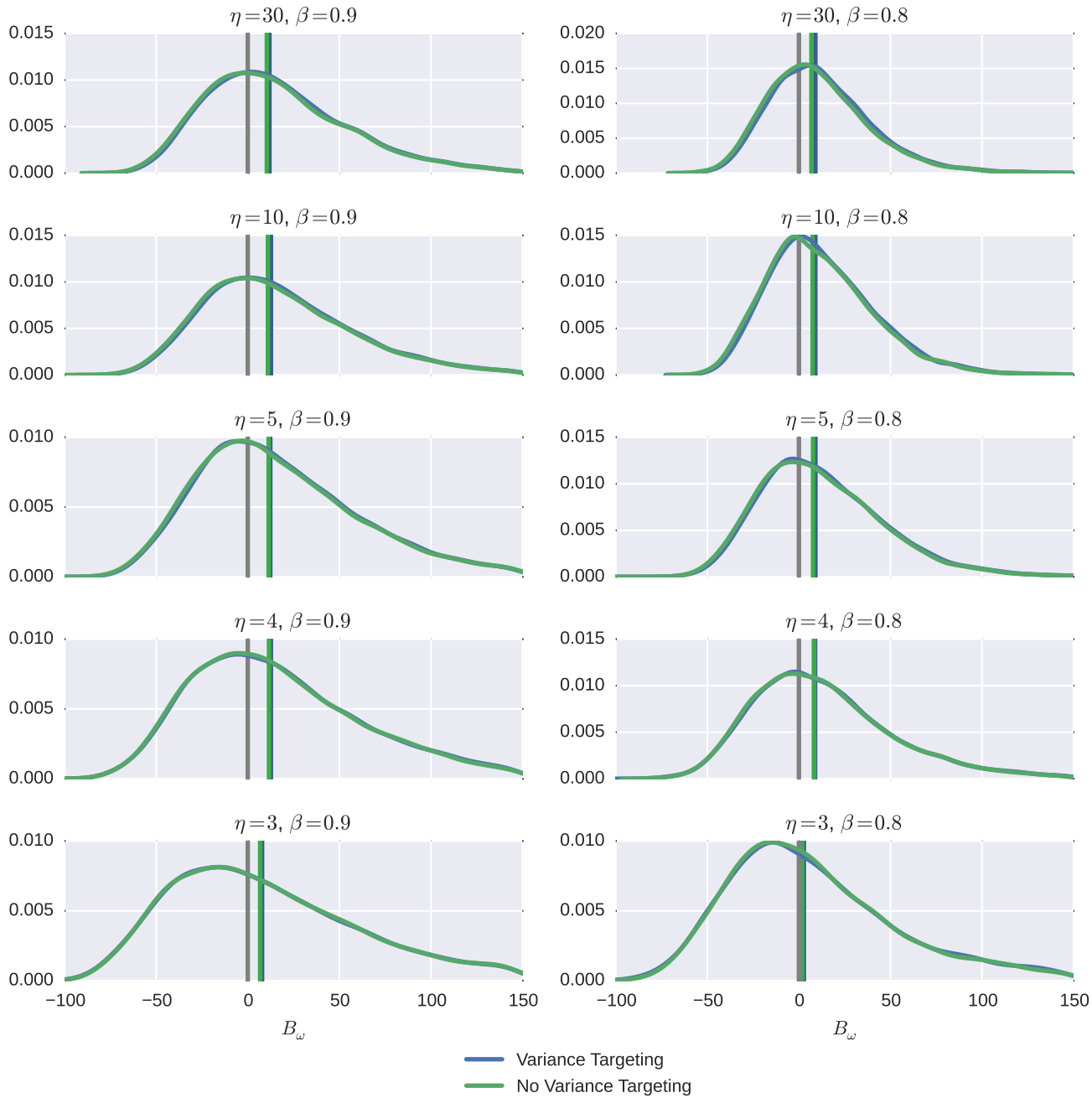

Figure A.1: Intercept bias, B_ω

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

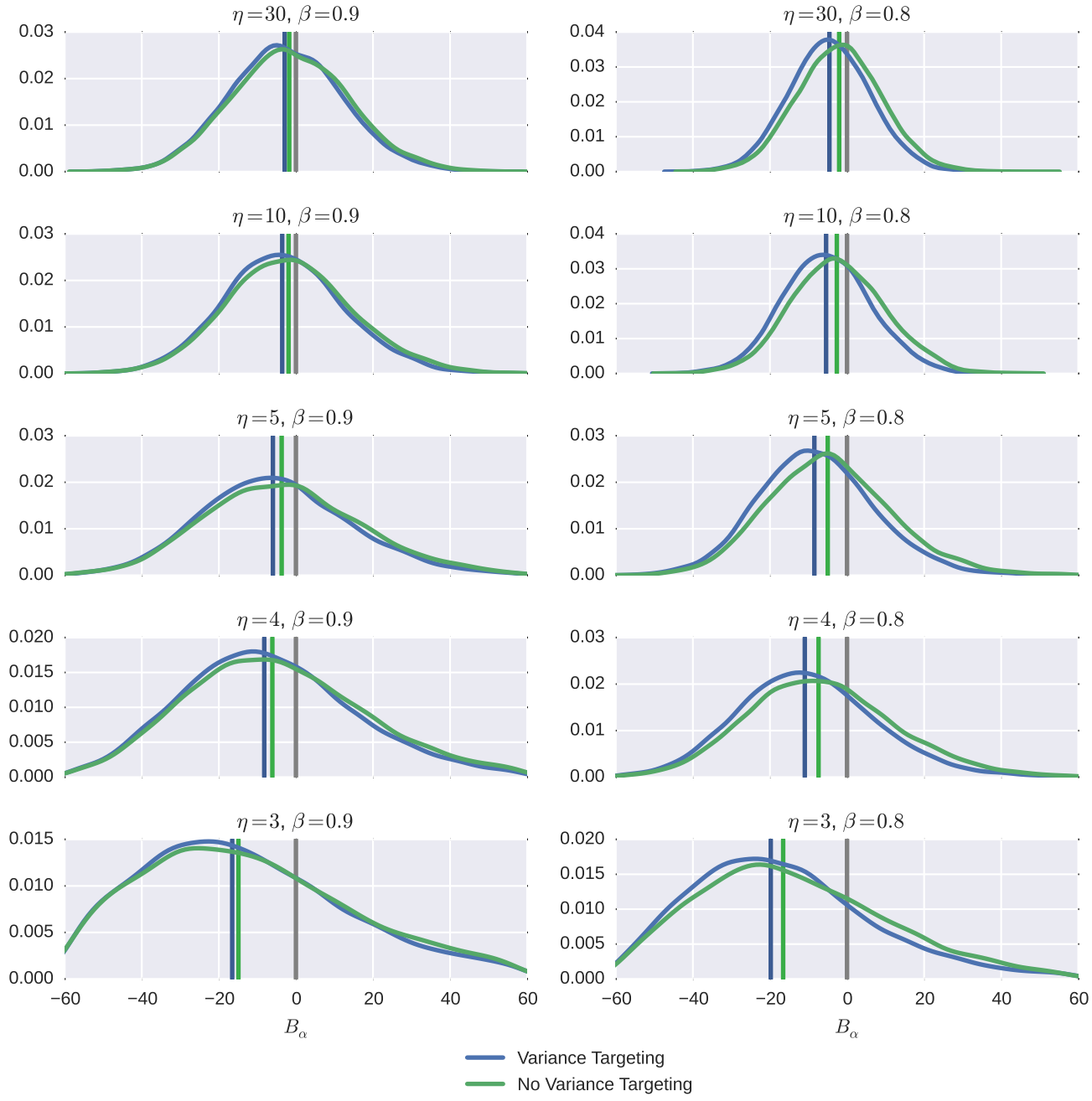

Figure A.2: News impact parameter bias, B_α

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

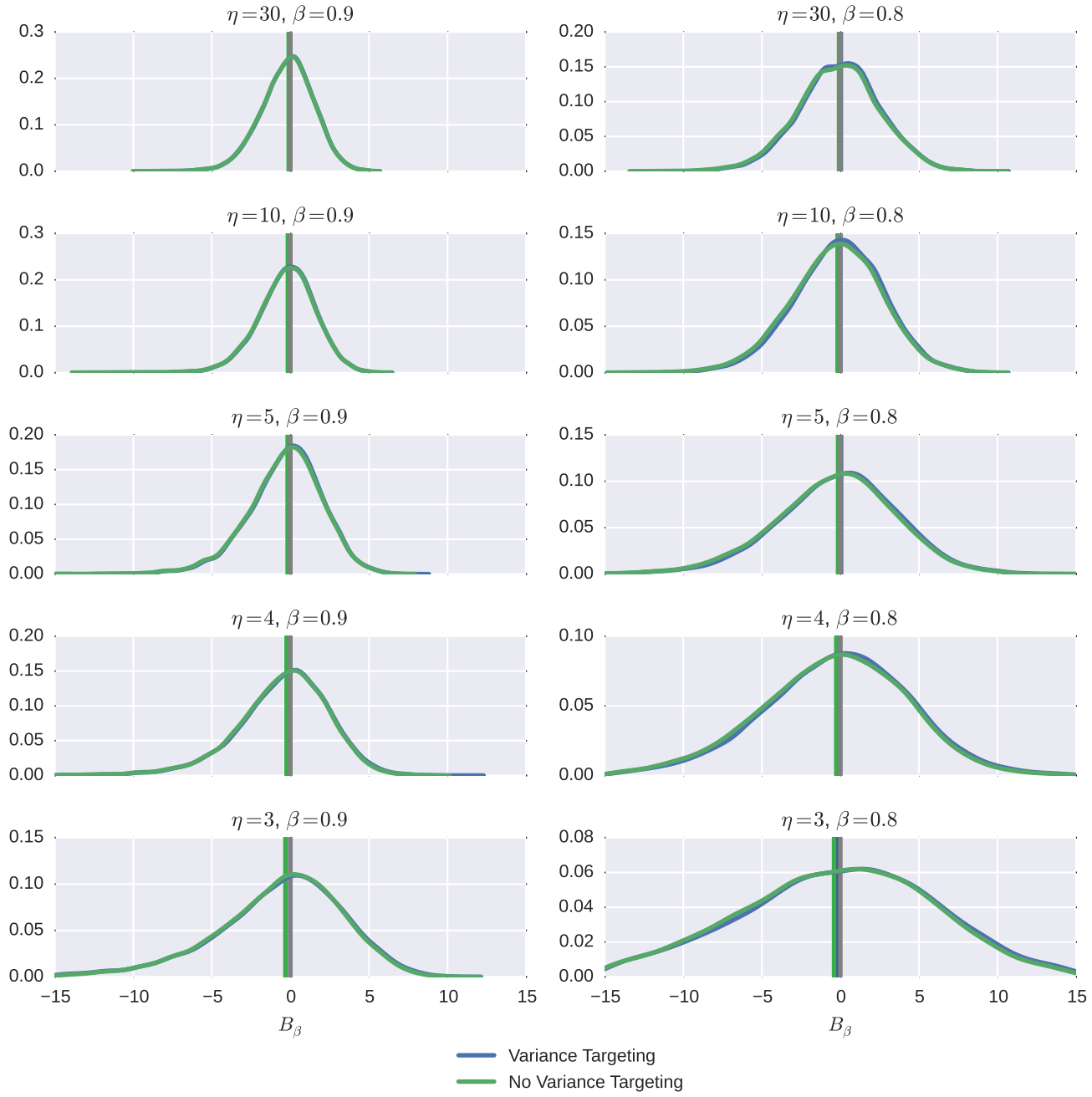

Figure A.3: Feedback bias, B_β

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

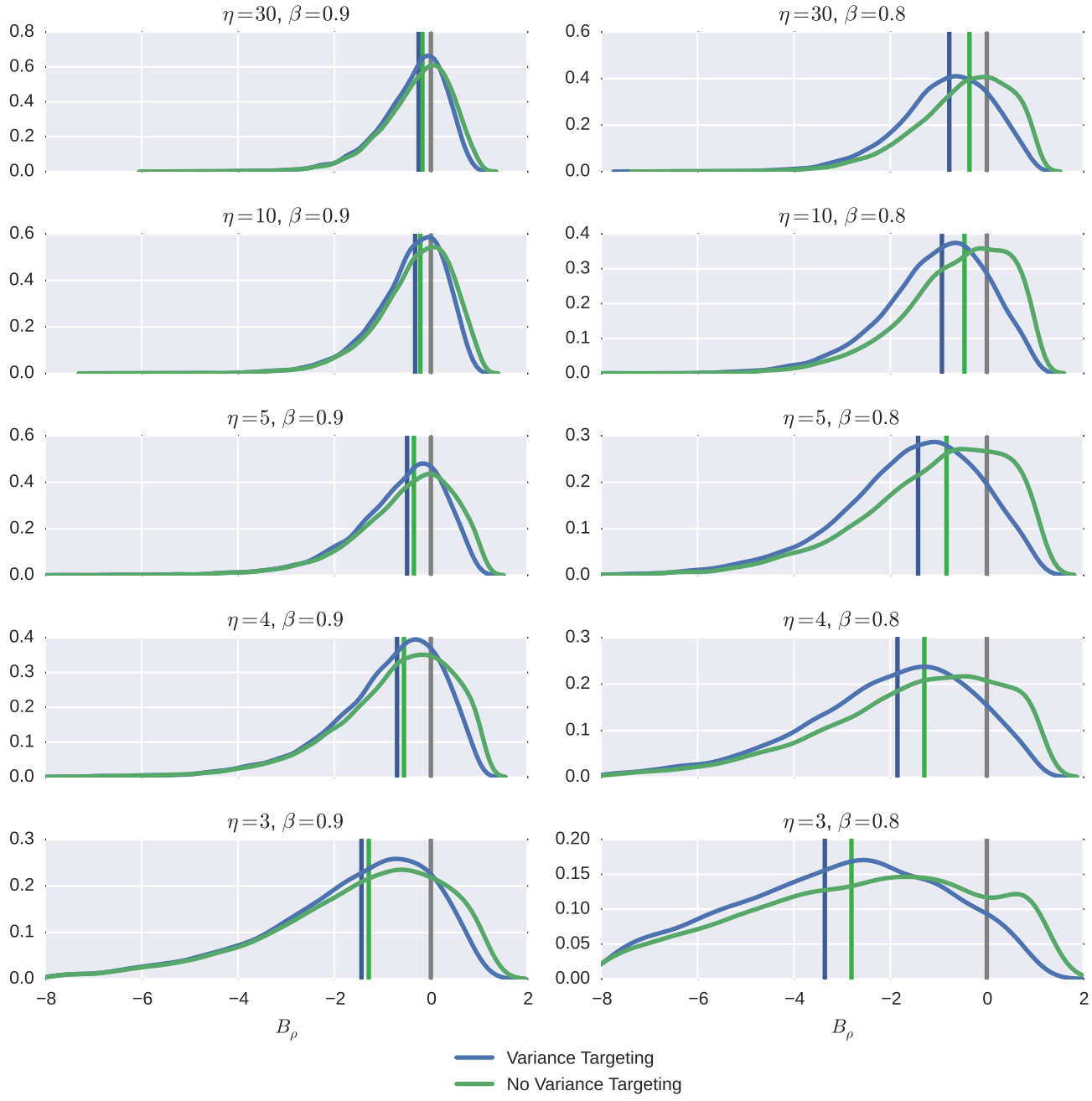

Figure A.4: Persistence bias, B_ρ

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

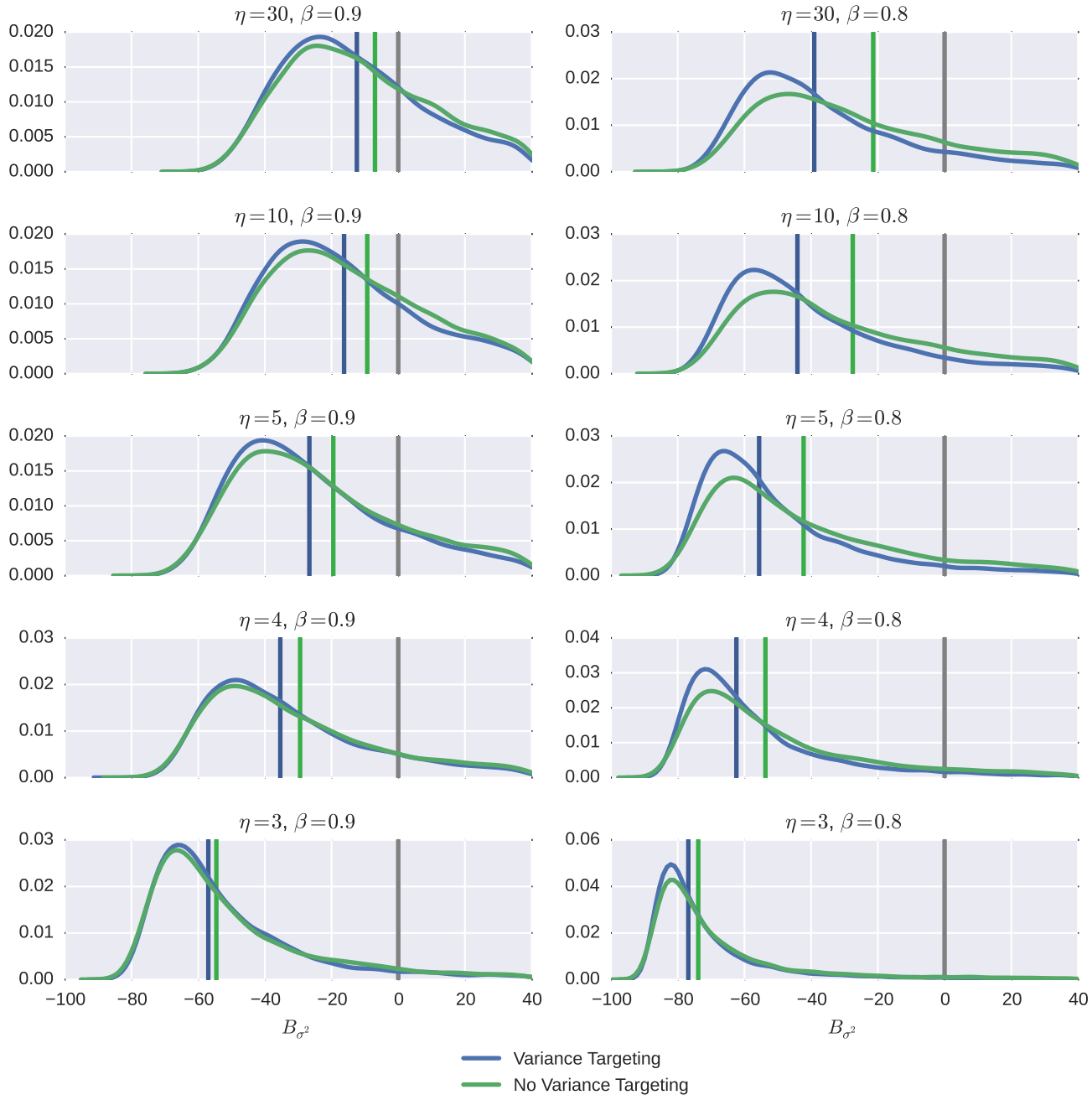

Figure A.5: Unconditional variance bias, B_{σ^2}

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

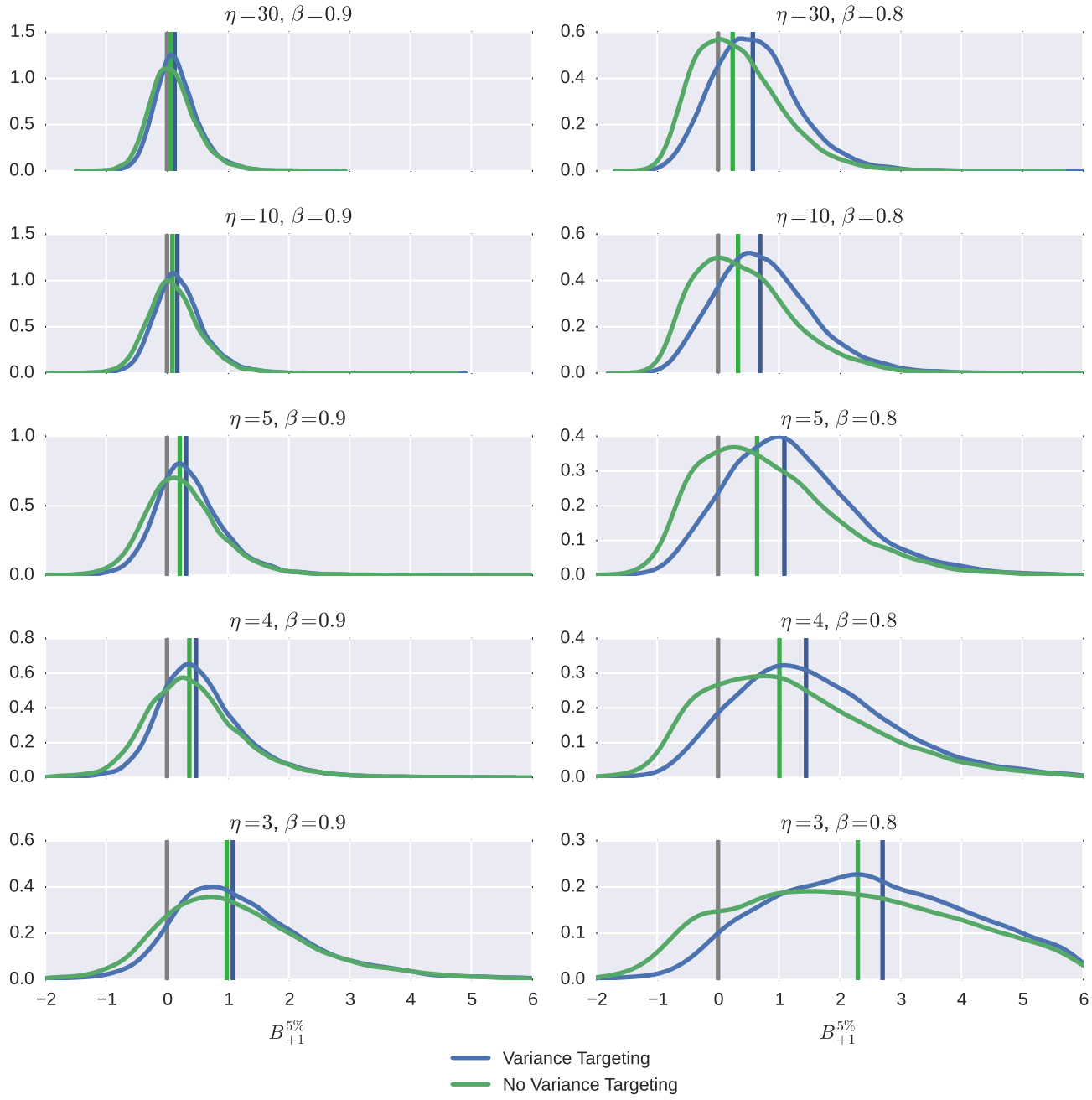

Figure A.6: One period in advance Value-at-Risk bias, $B_{+1}^{5\%}$
Horizontal axis is the difference between predicted and true VaRs which correspond to distribution of returns measured in percentages. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

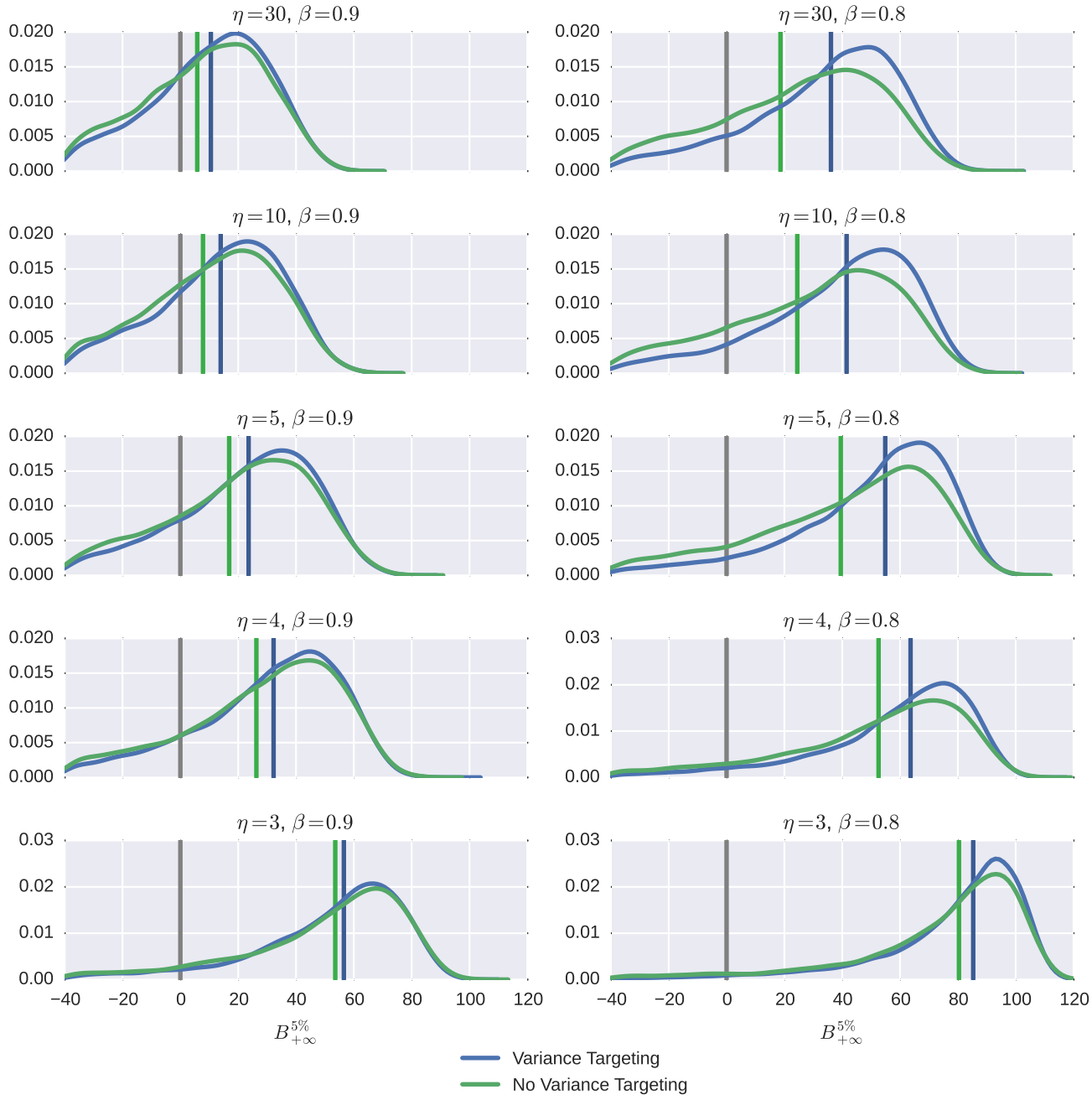

Figure A.7: Long-run Value-at-Risk bias, $B^{5\%}_{+\infty}$

Horizontal axis is the difference between predicted and true VaRs which correspond to distribution of returns measured in percentages. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

B Experiment

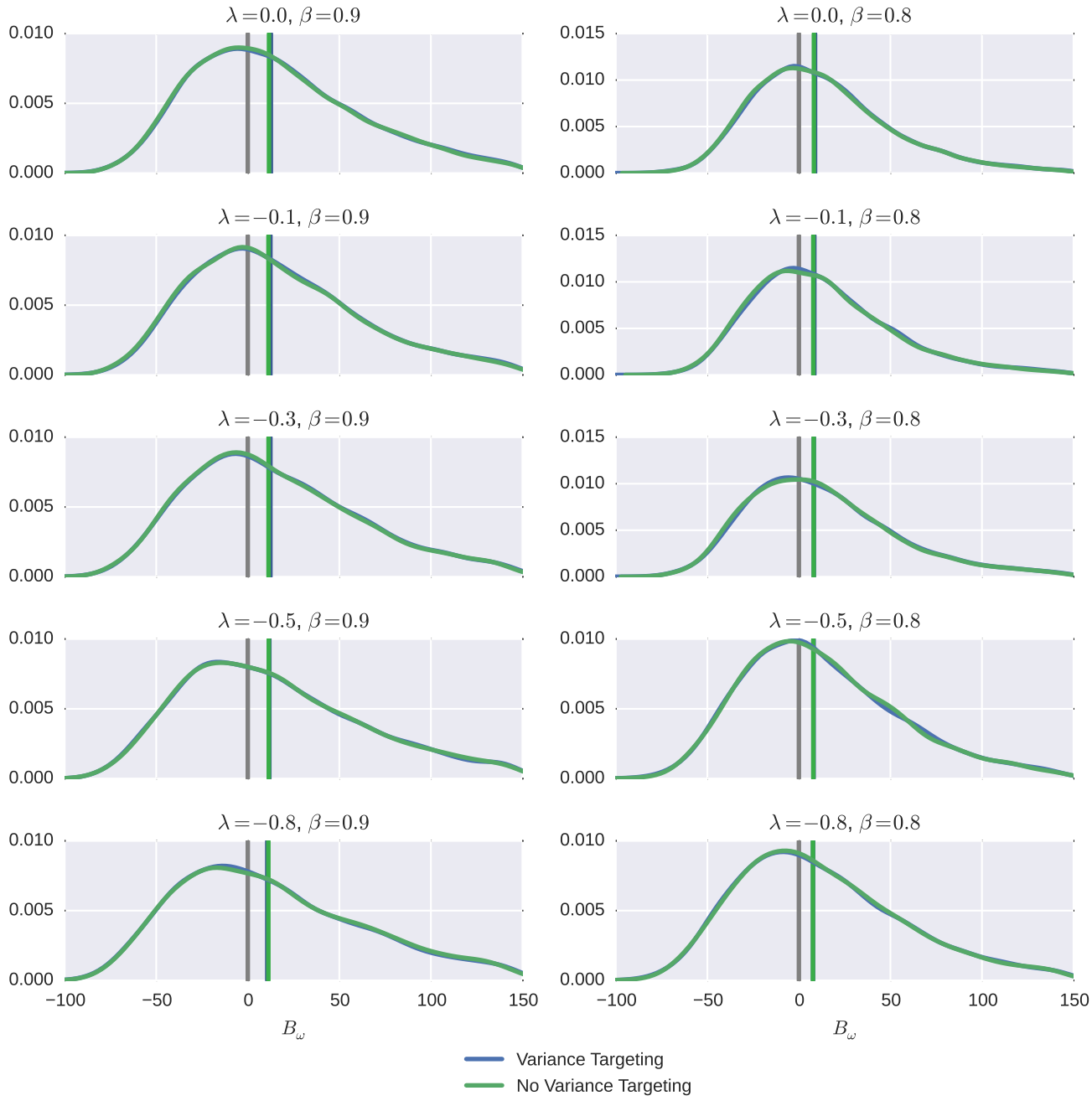

Figure B.1: Intercept bias, B_ω

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

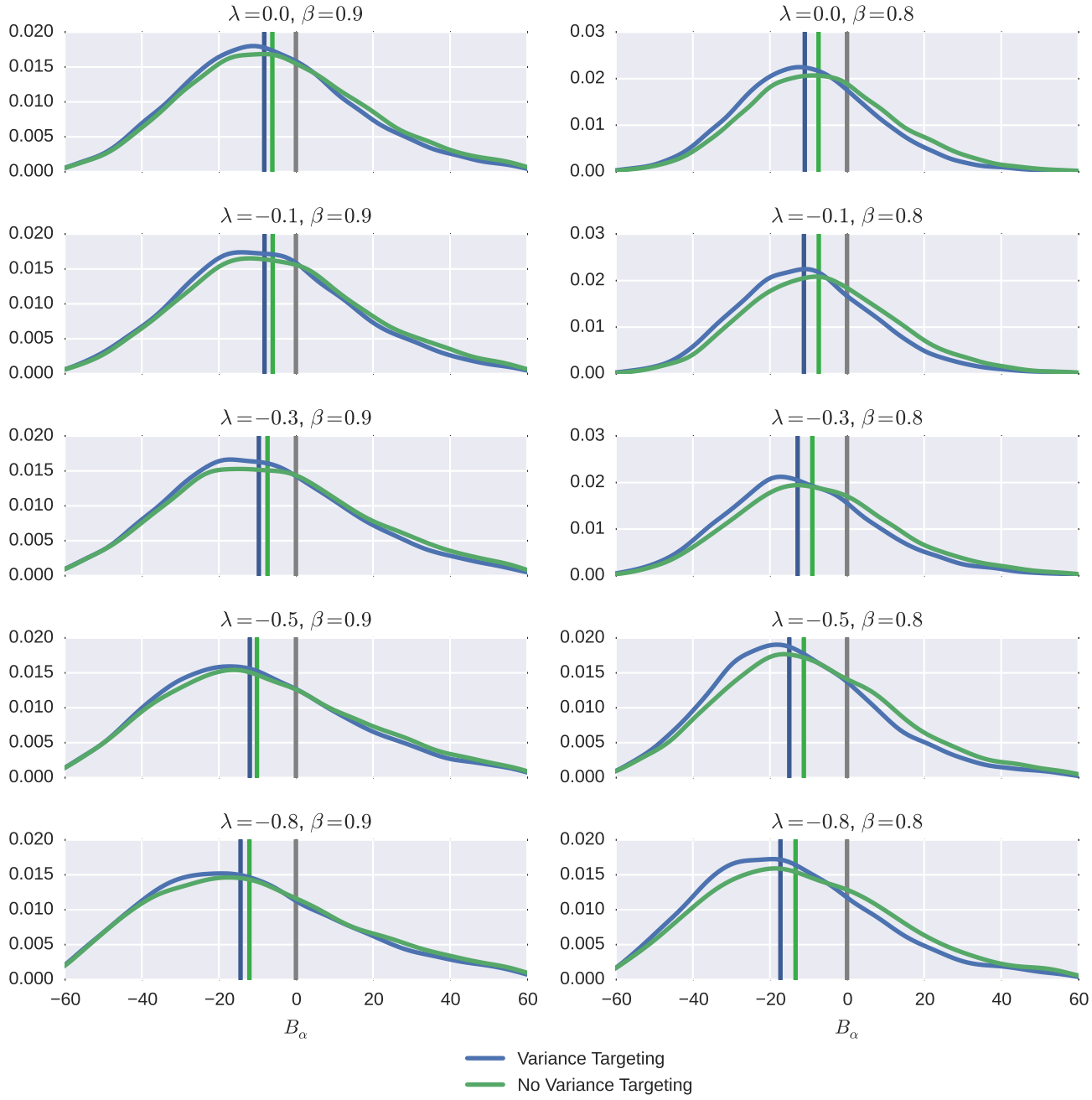

Figure B.2: News impact parameter bias, B_α

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

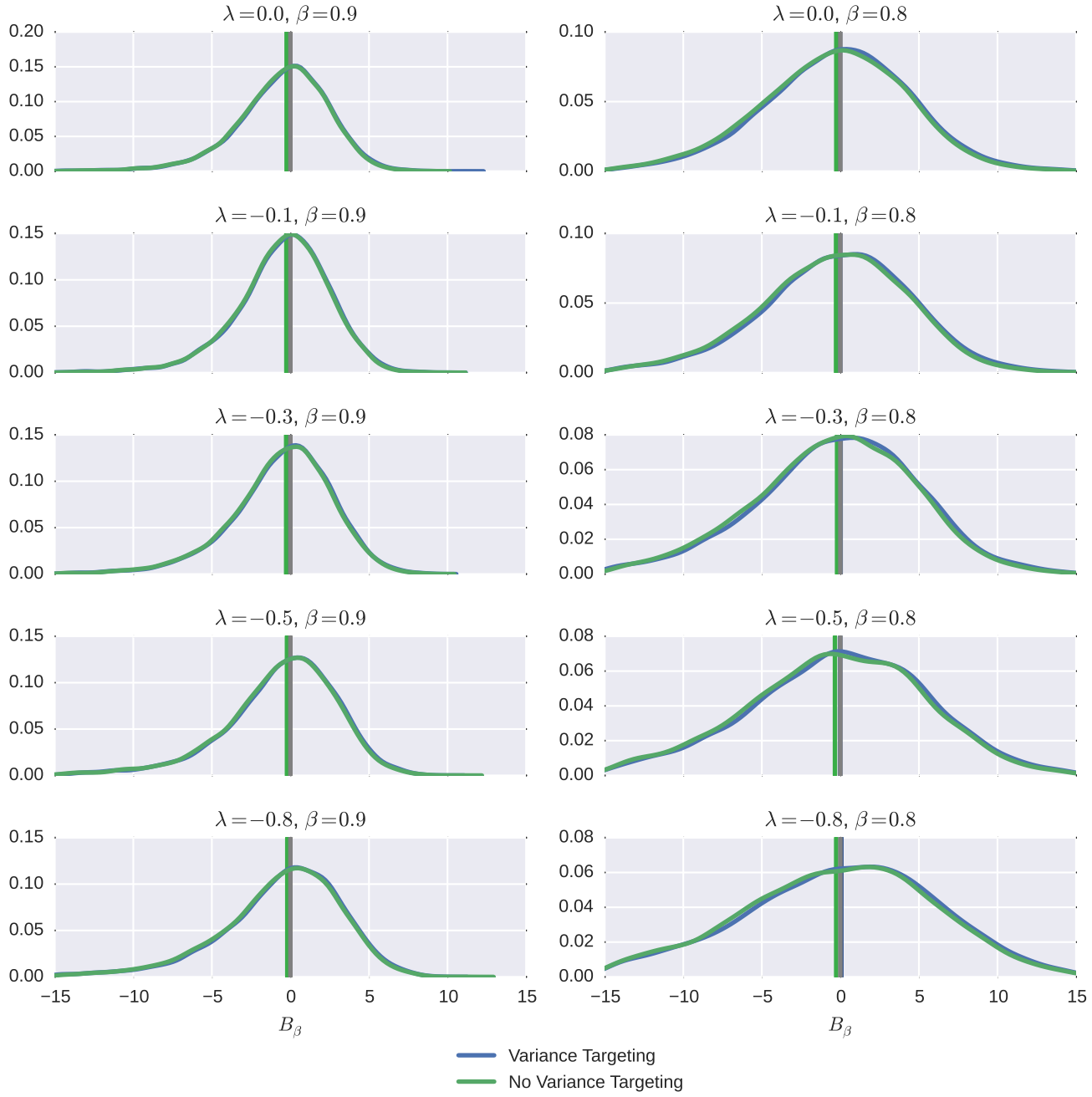

Figure B.3: Feedback bias, B_β

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

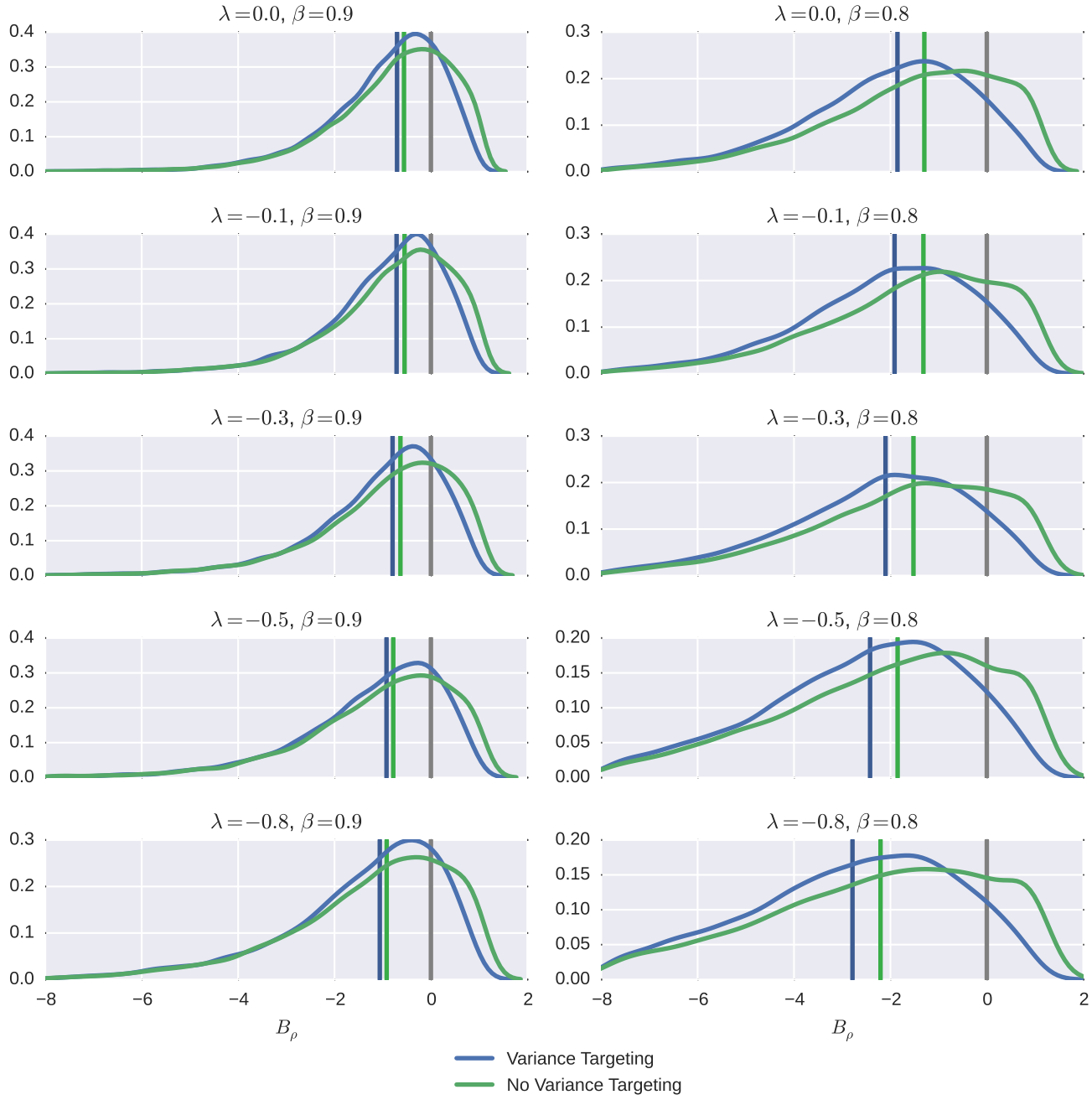

Figure B.4: Persistence bias, B_ρ

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

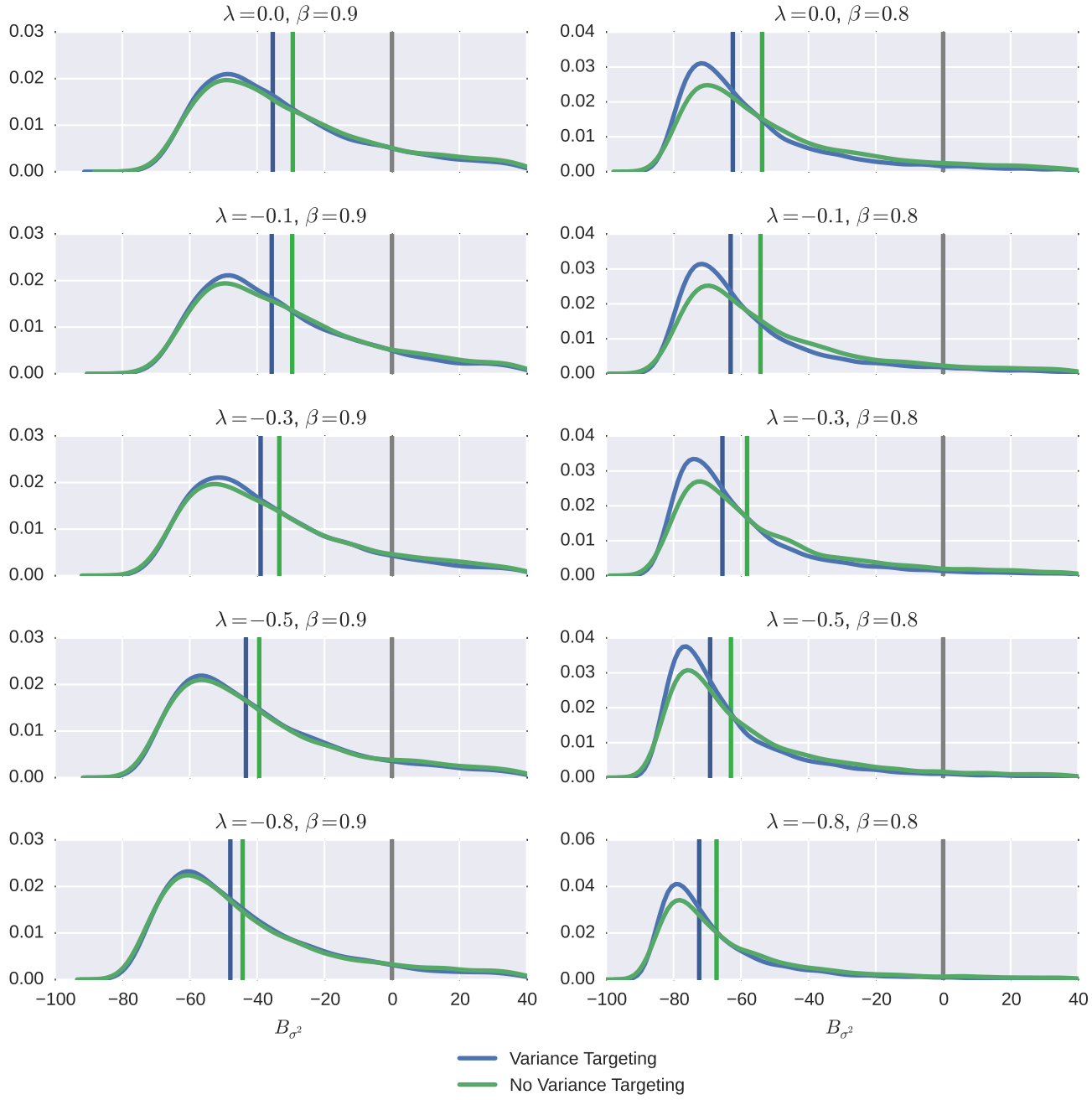

Figure B.5: Unconditional variance bias, B_{σ^2}

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

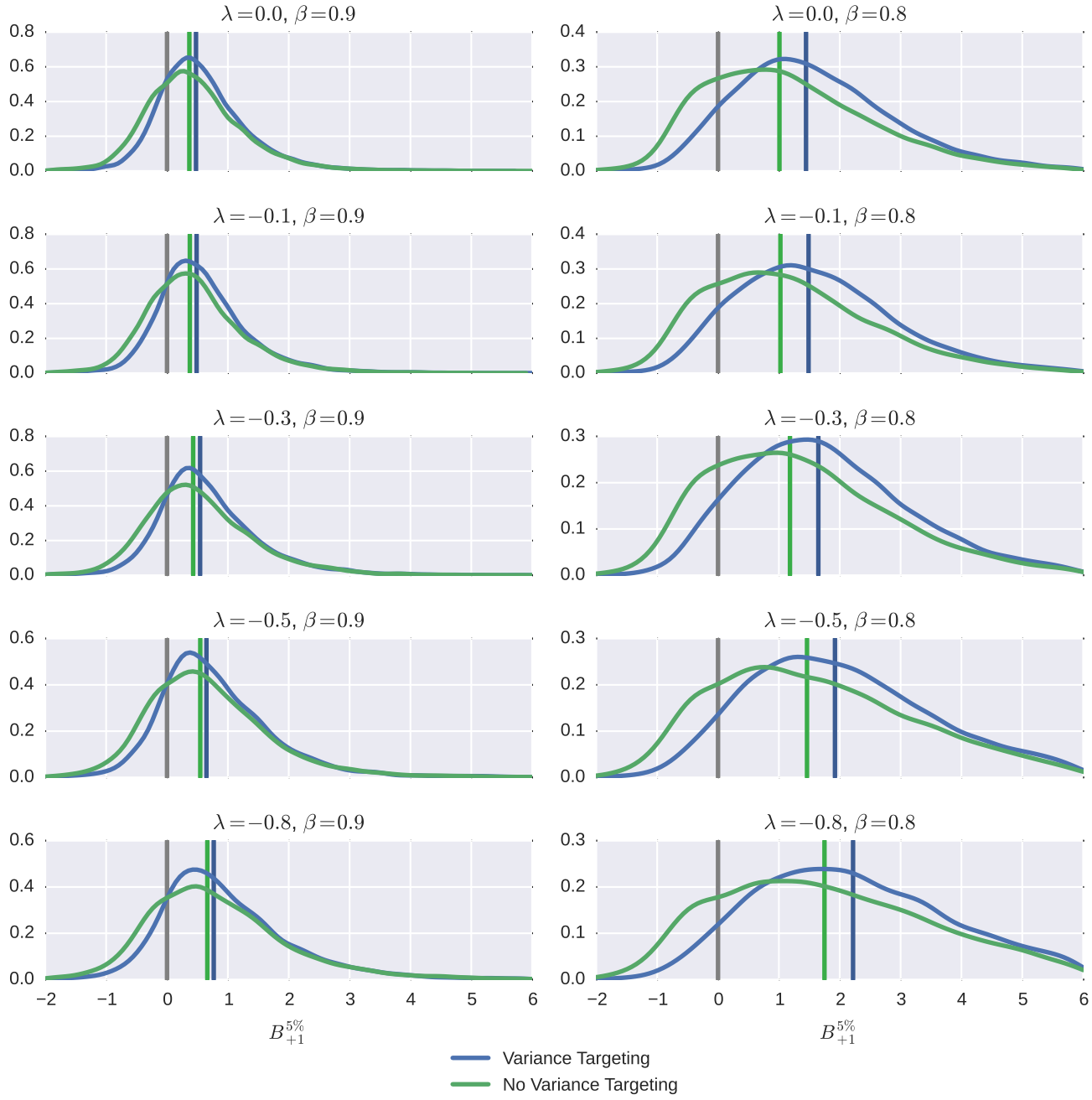

Figure B.6: One period in advance Value-at-Risk bias, $B_{+1}^{5\%}$
Horizontal axis is the difference between predicted and true VaRs which correspond to distribution of returns measured in percentages. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

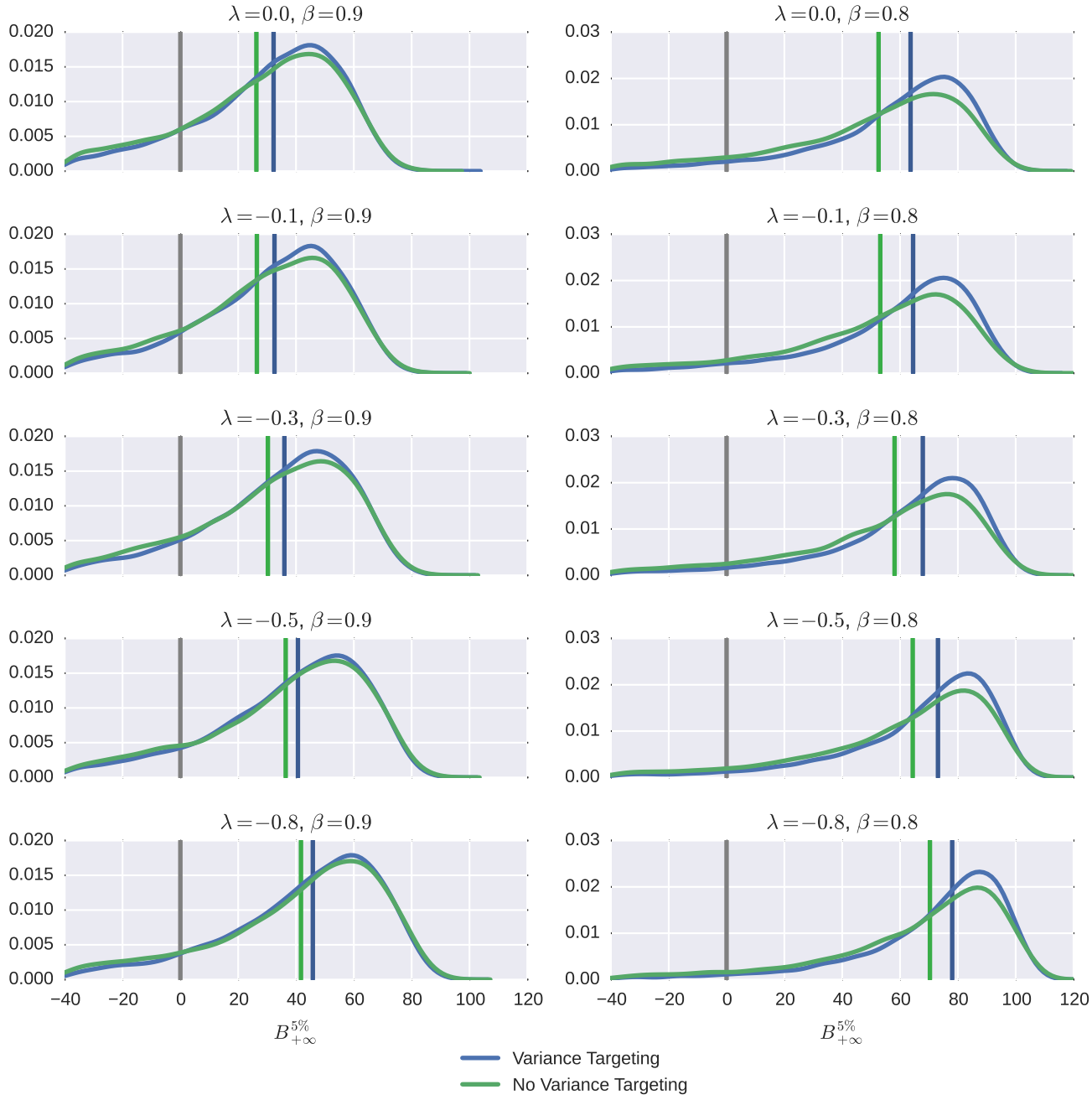

Figure B.7: Long-run Value-at-Risk bias, $B^{5\%}_{+\infty}$

Horizontal axis is the difference between predicted and true VaRs which correspond to distribution of returns measured in percentages. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

C Experiment

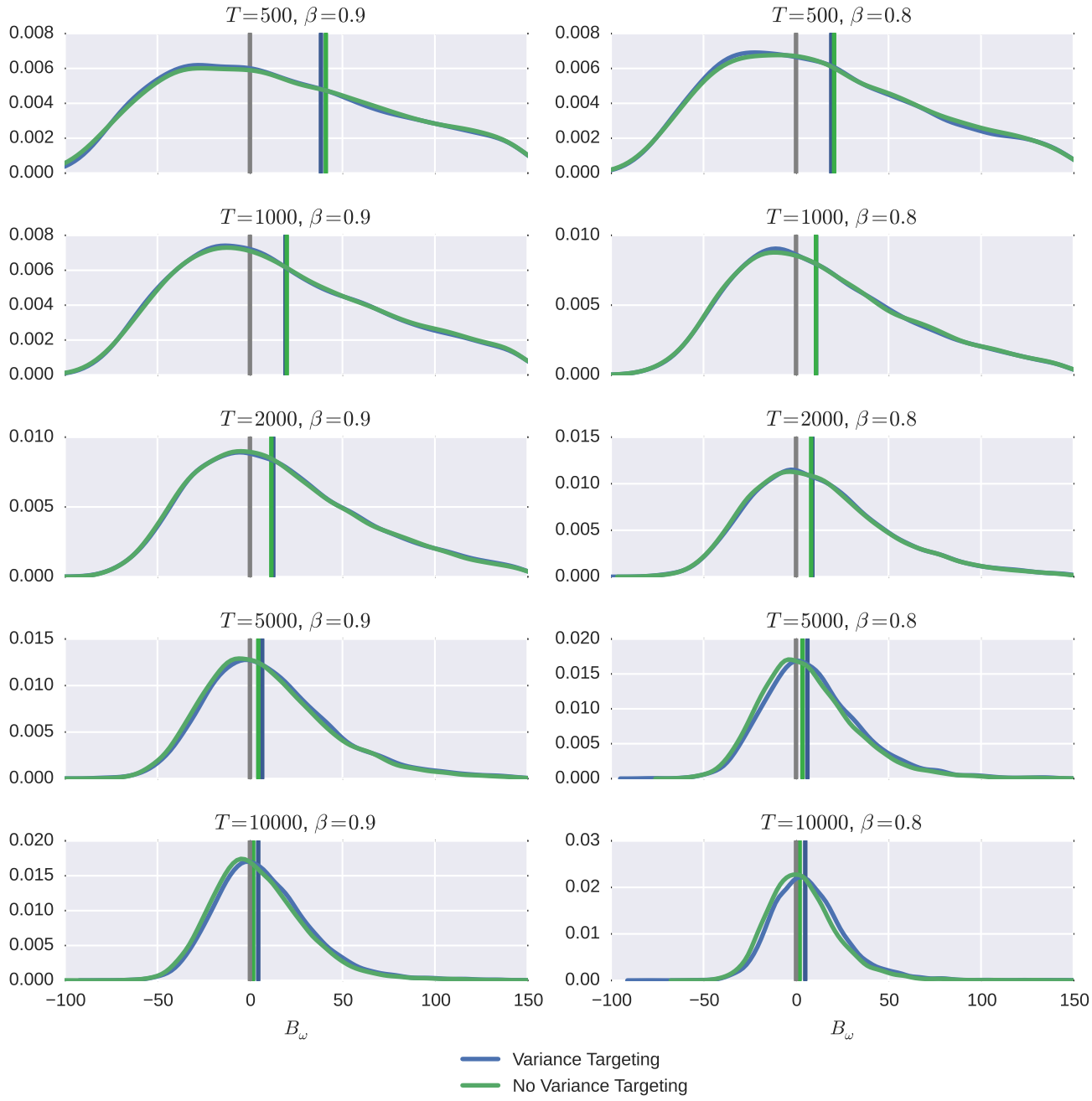

Figure C.1: Intercept bias, B_ω

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

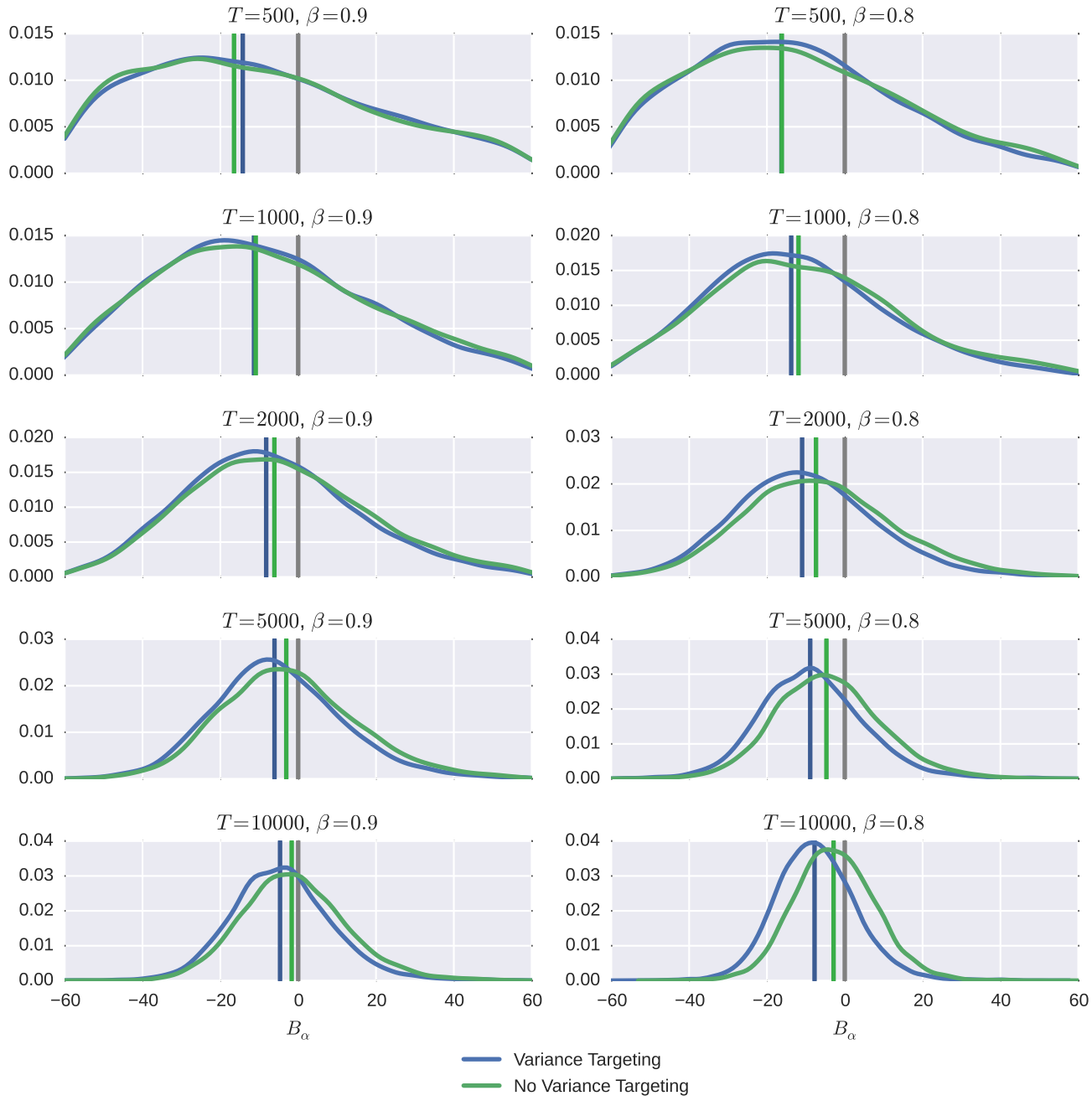

Figure C.2: News impact parameter bias, B_α

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

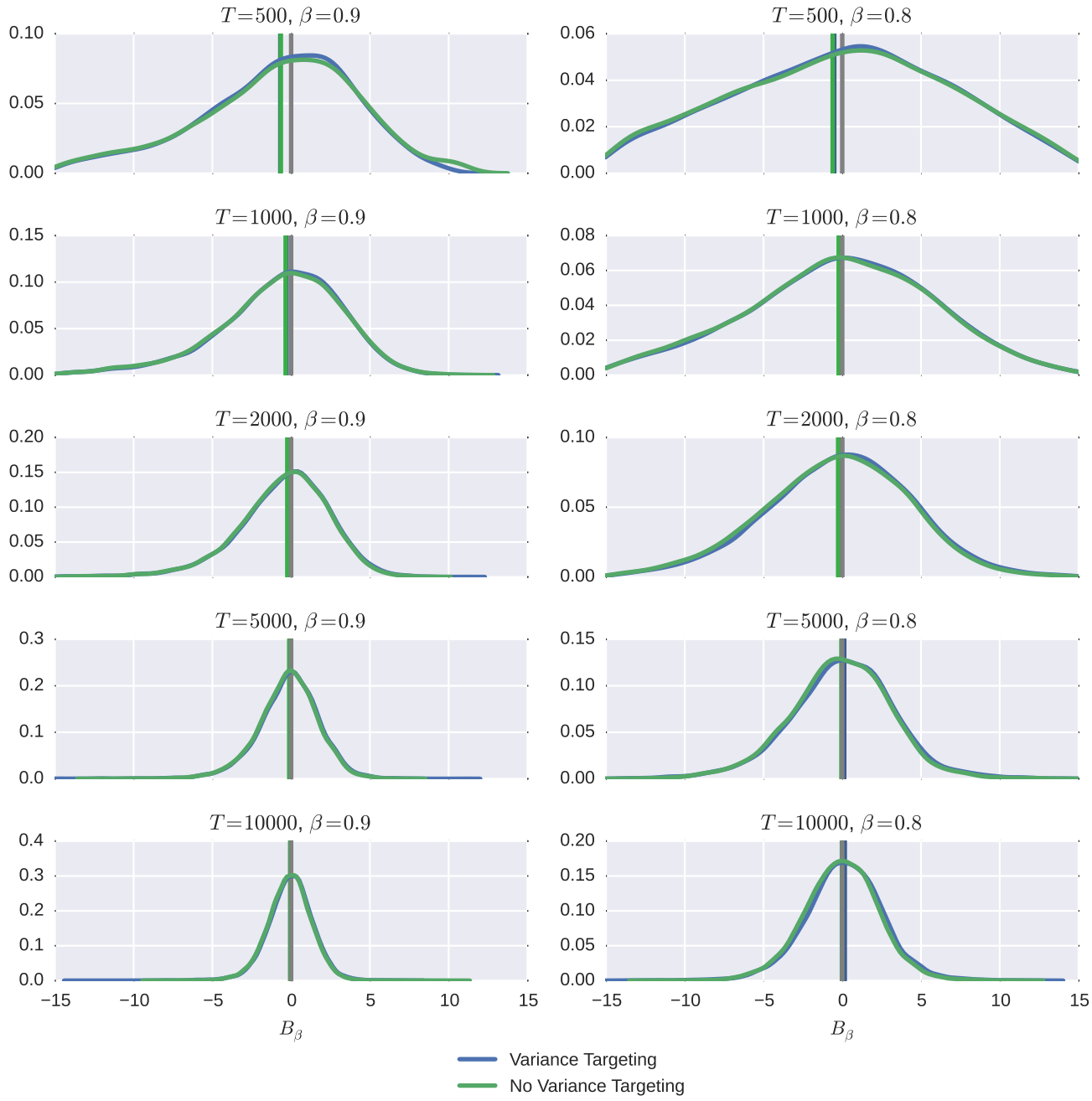

Figure C.3: Feedback bias, B_β

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

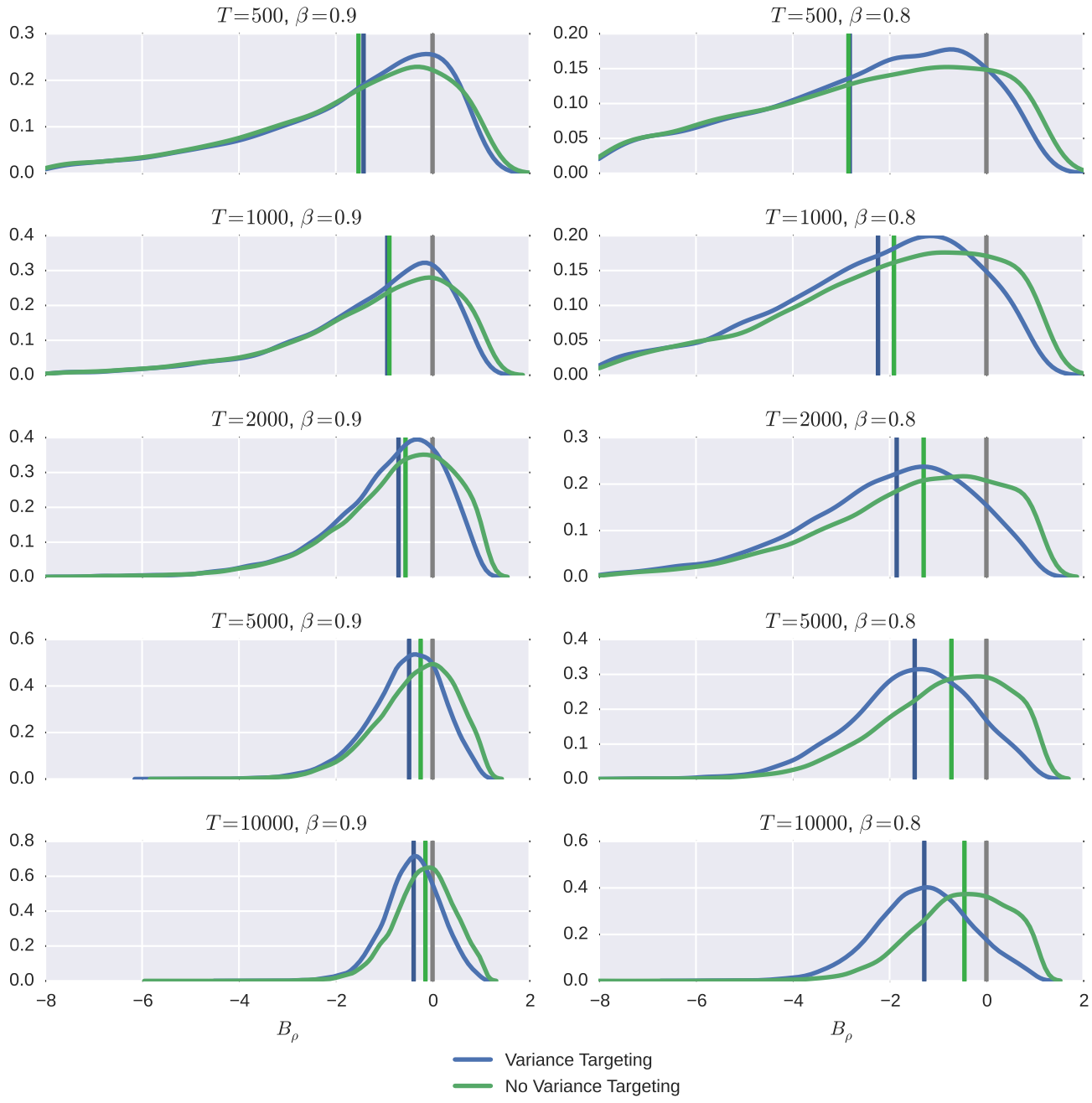

Figure C.4: Persistence bias, B_ρ

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

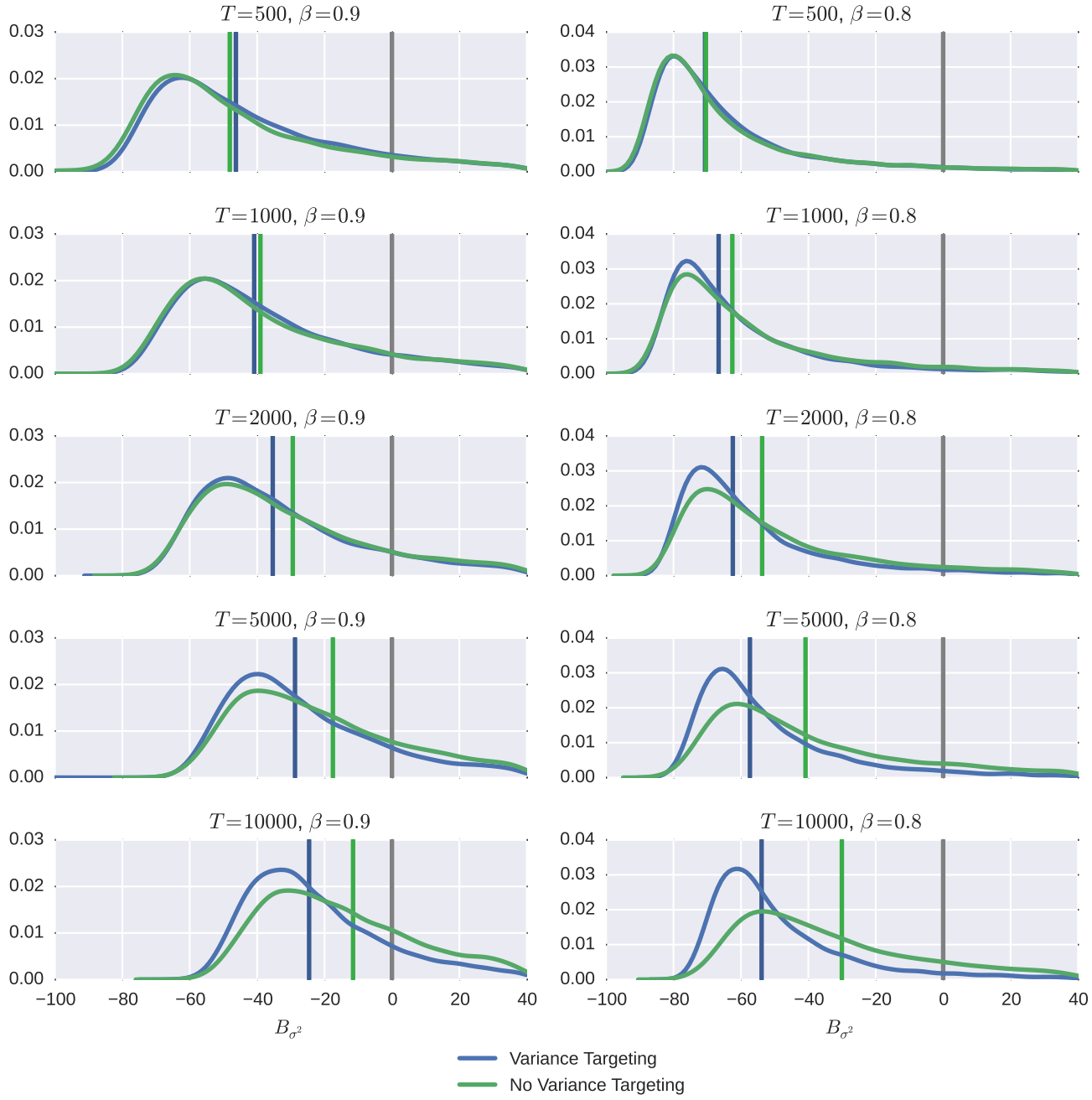

Figure C.5: Unconditional variance bias, B_{σ^2}

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

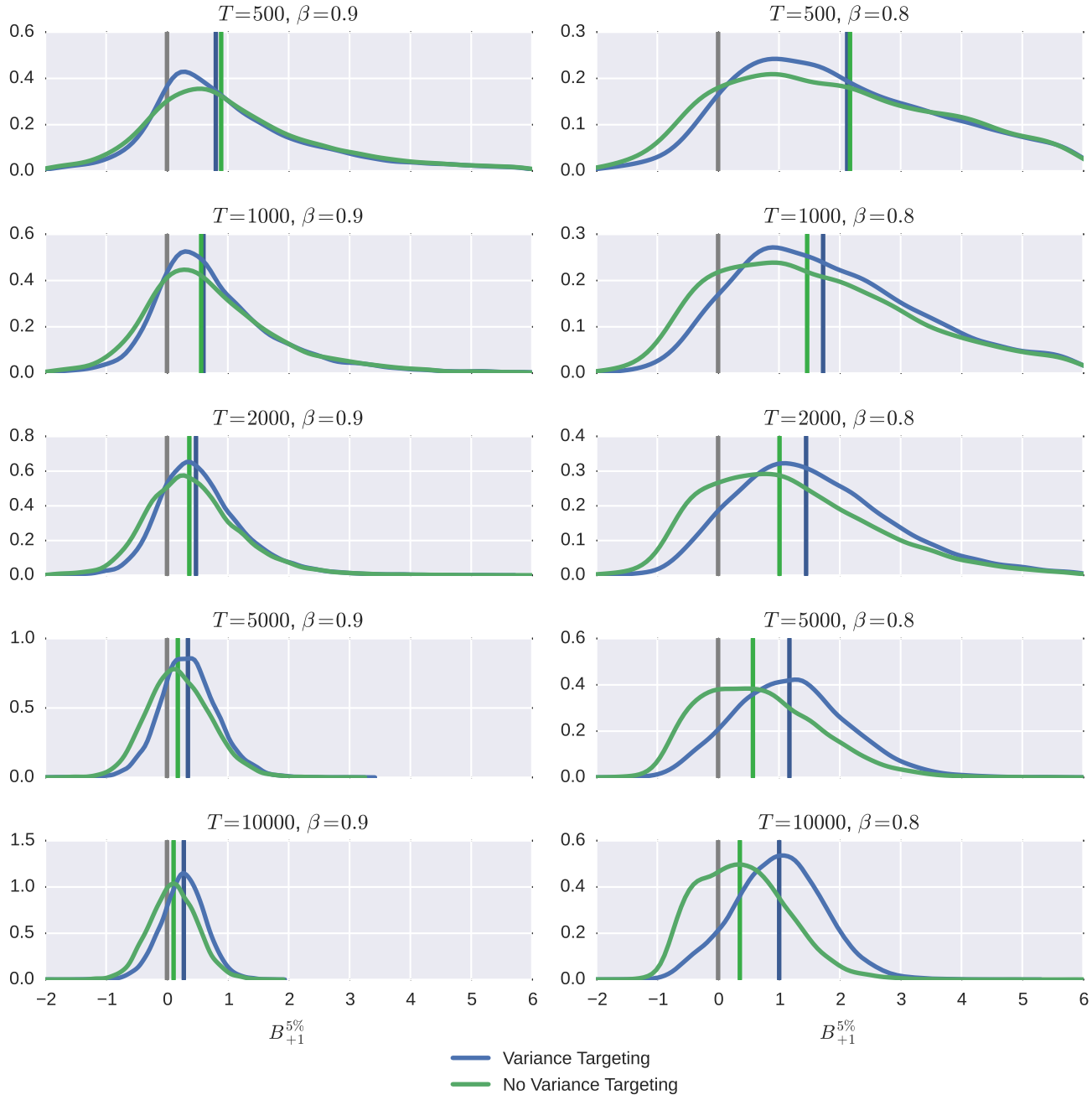

Figure C.6: One period in advance Value-at-Risk bias, $B_{+1}^{5\%}$
Horizontal axis is the difference between predicted and true VaRs which correspond to distribution of returns measured in percentages. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

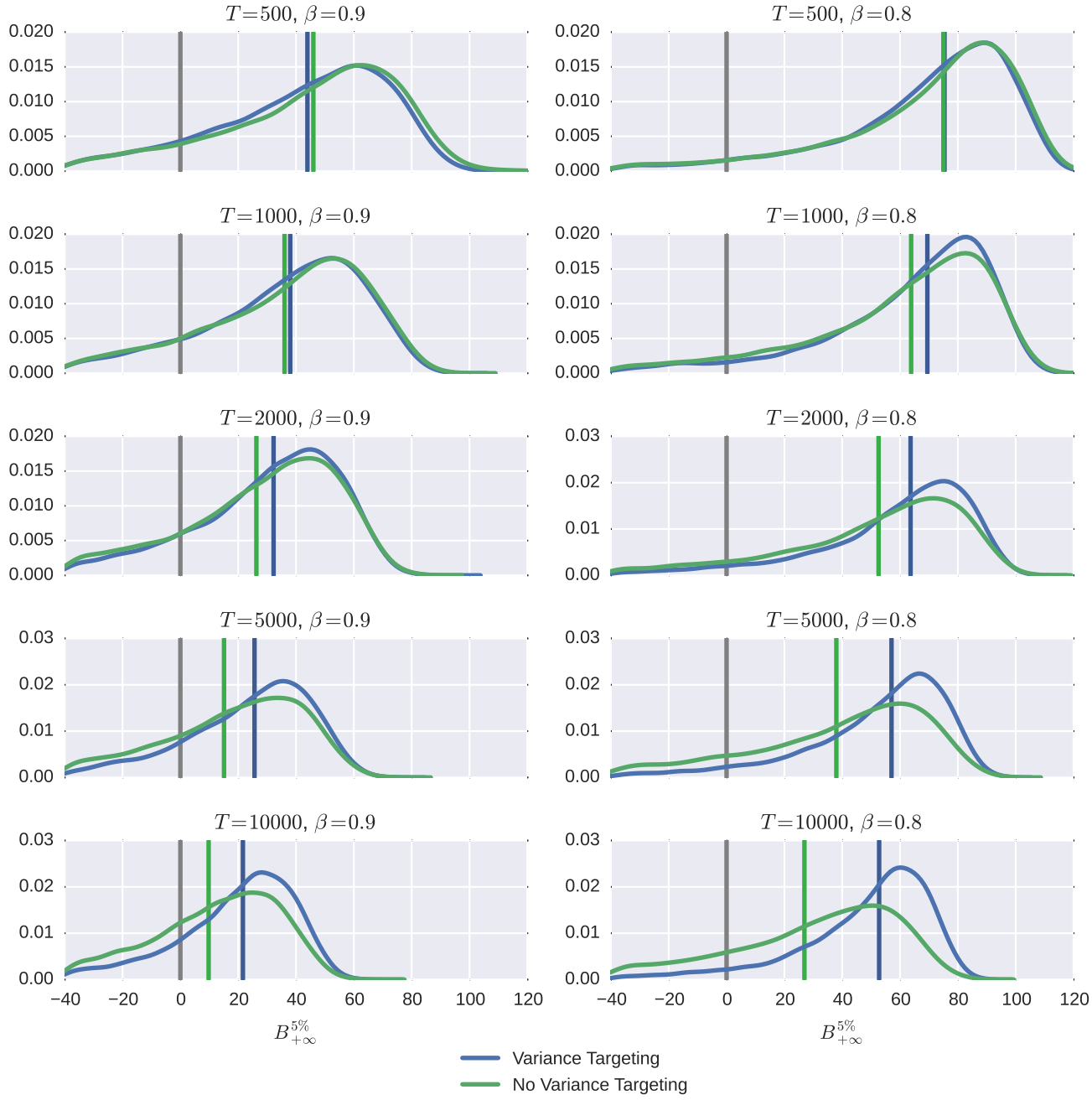

Figure C.7: Long-run Value-at-Risk bias, $B^{5\%}_{+\infty}$

Horizontal axis is the difference between predicted and true VaRs which correspond to distribution of returns measured in percentages. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

D Experiment

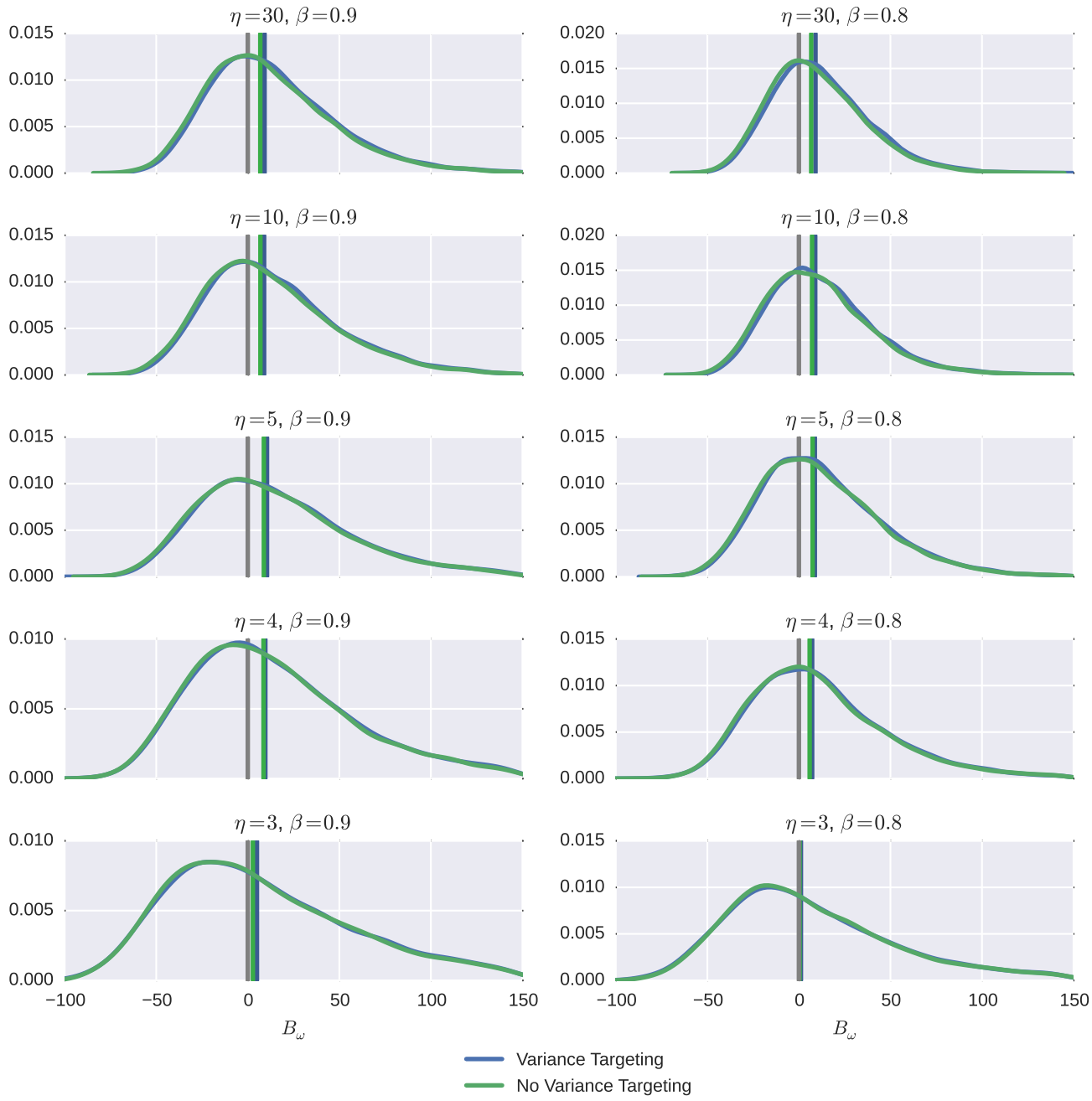

Figure D.1: Intercept bias, B_ω

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

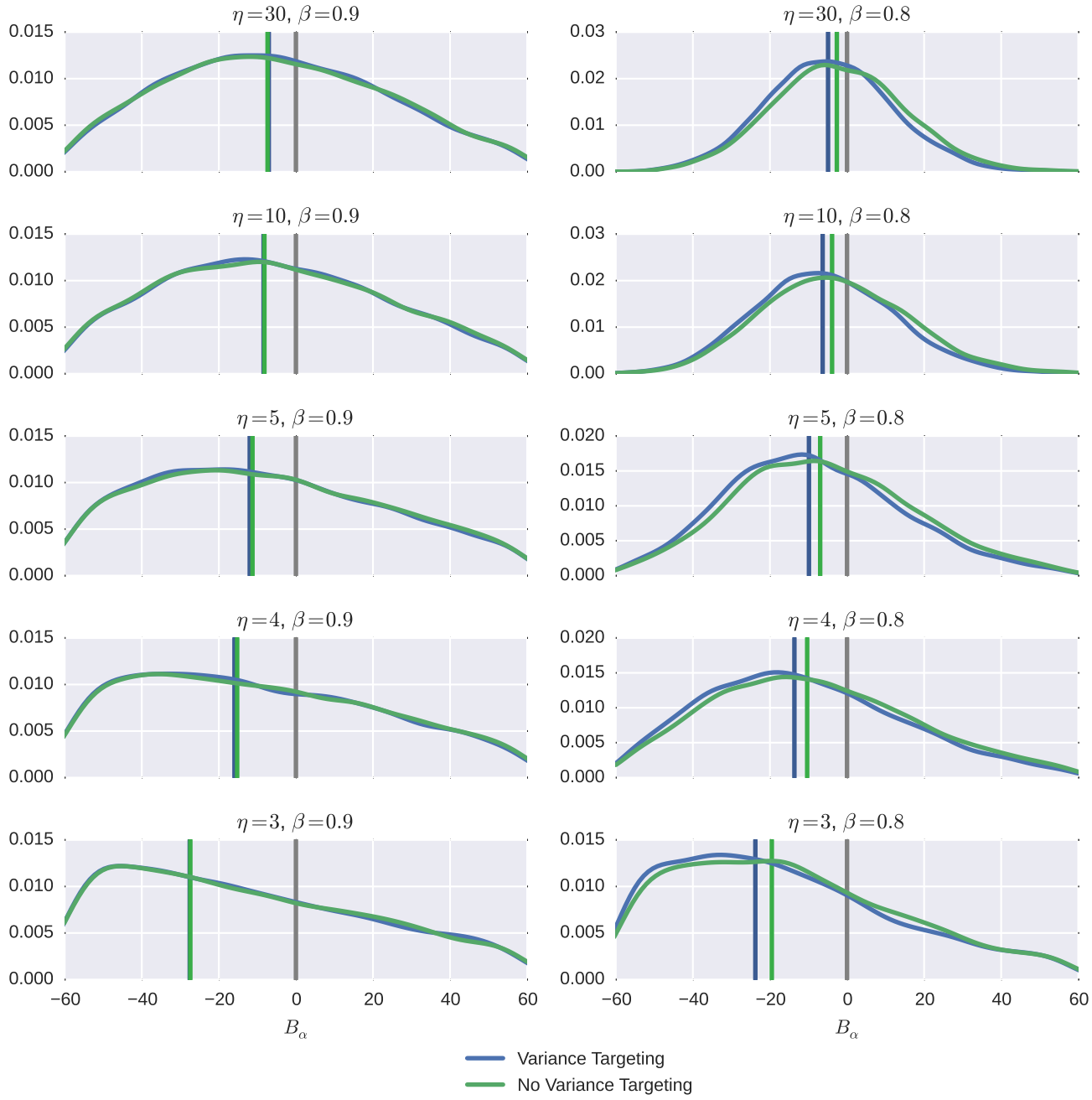

Figure D.2: News impact parameter bias, B_α

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

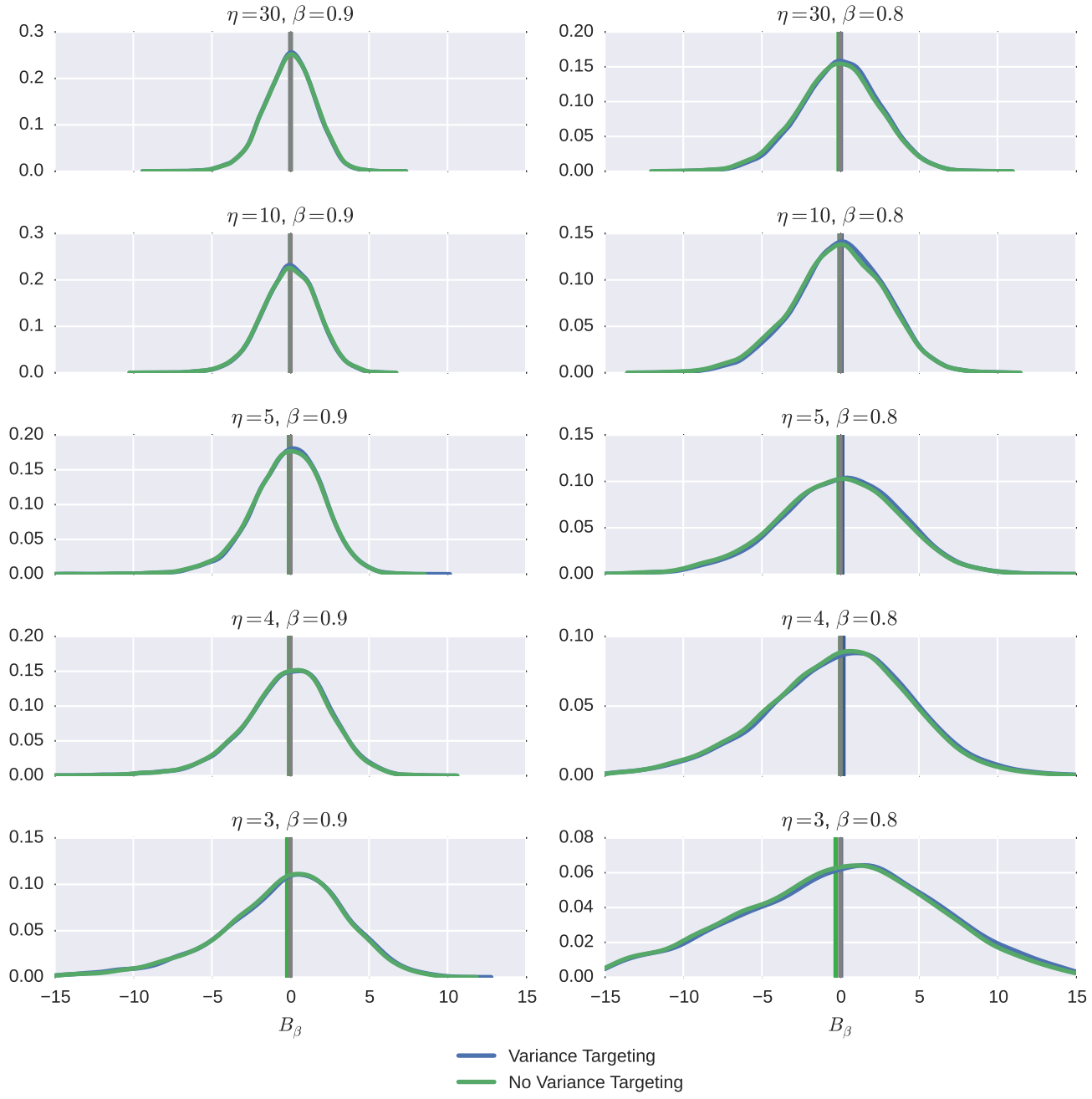

Figure D.3: Feedback bias, B_β

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

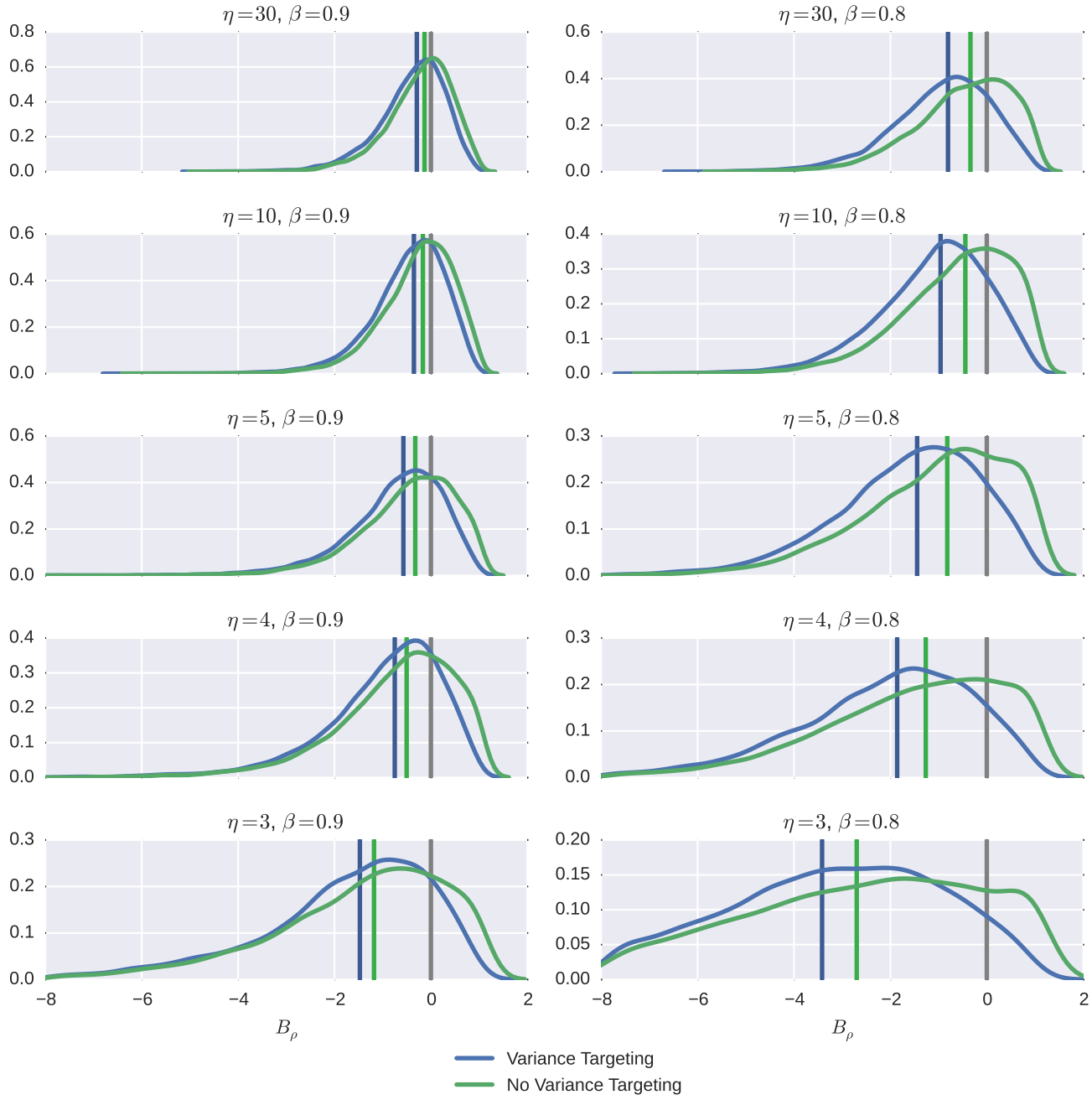

Figure D.4: Persistence bias, B_ρ

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

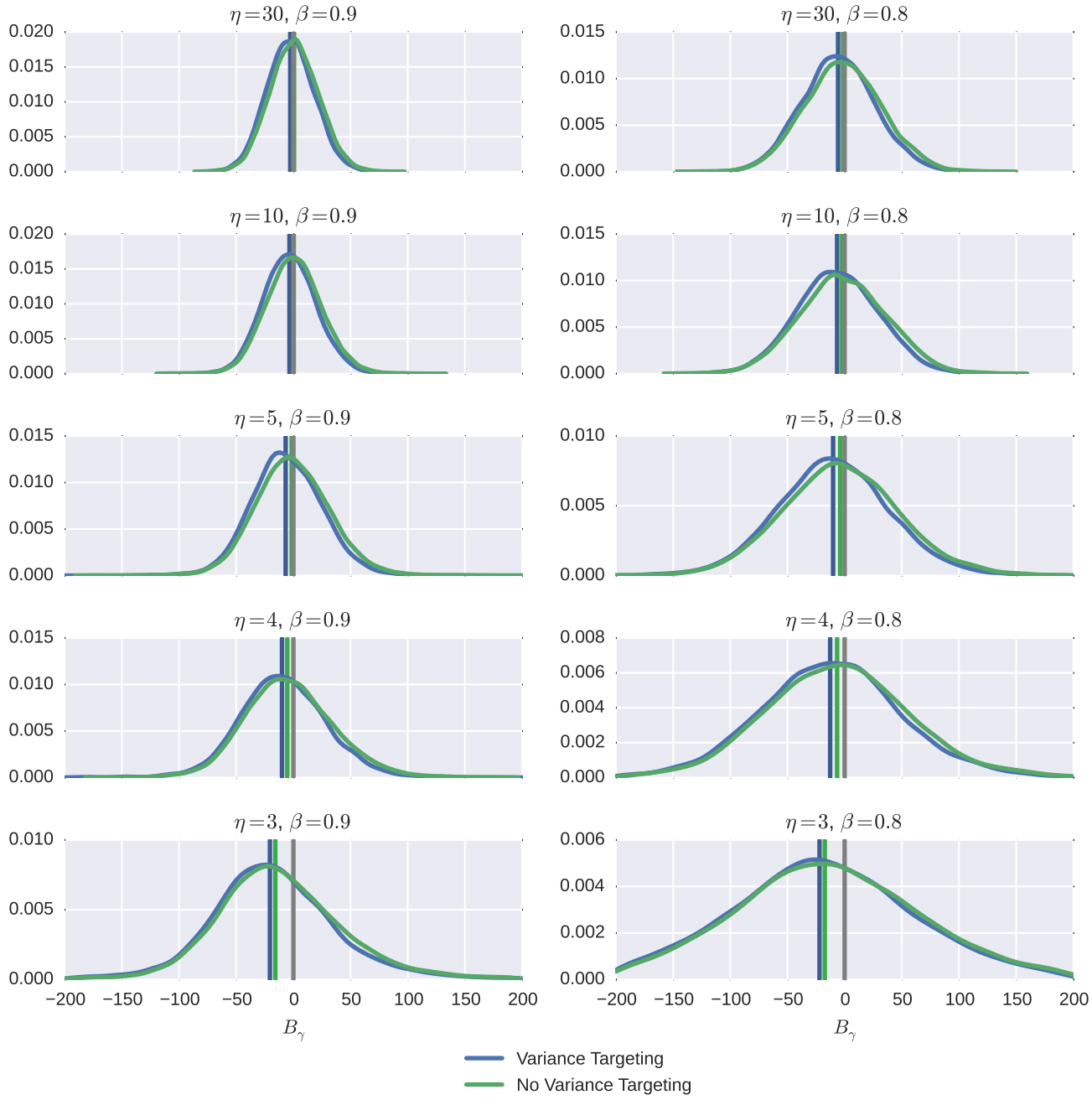

Figure D.5: Leverage bias, B_γ

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

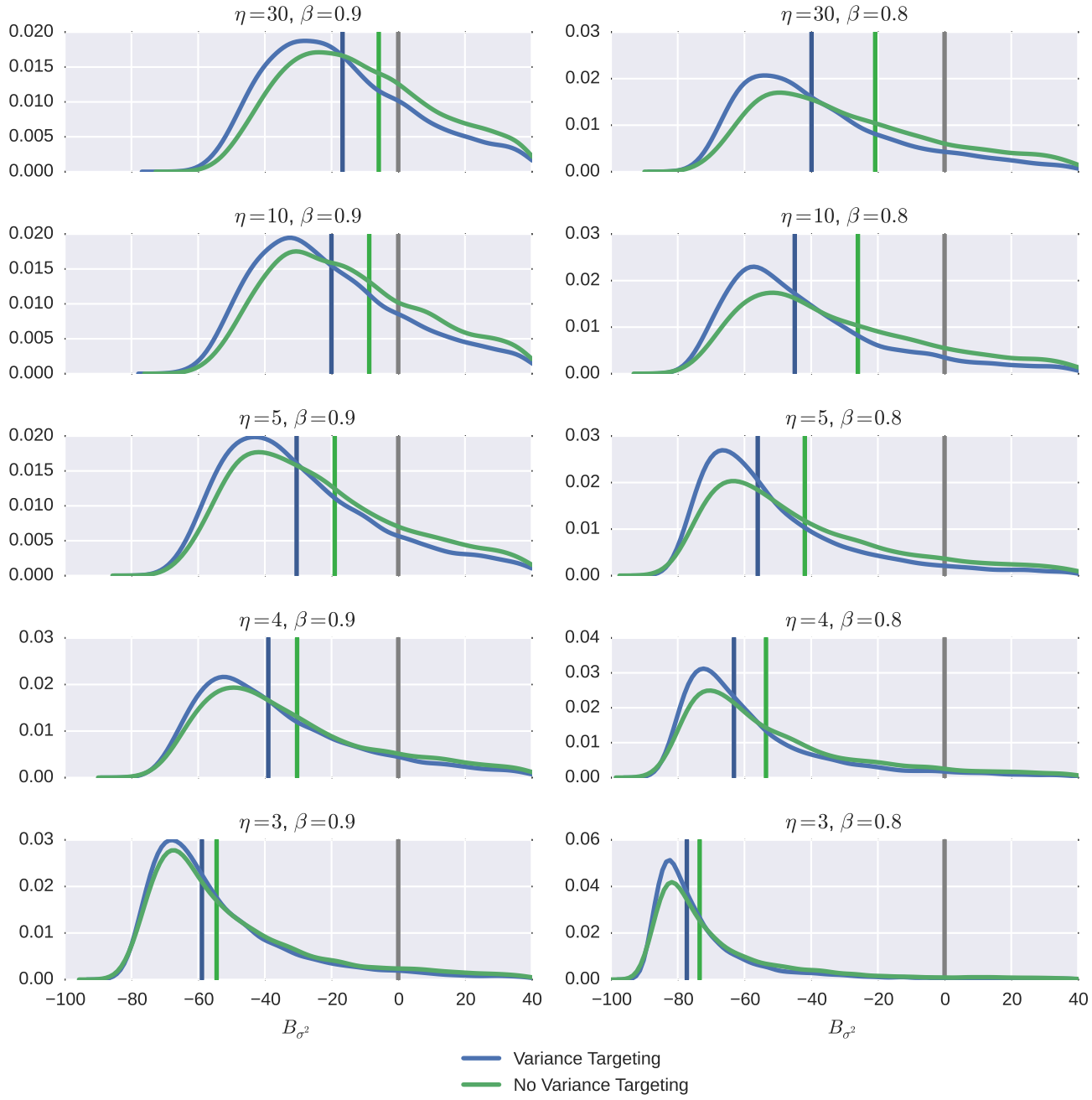

Figure D.6: Unconditional variance bias, B_{σ^2}

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

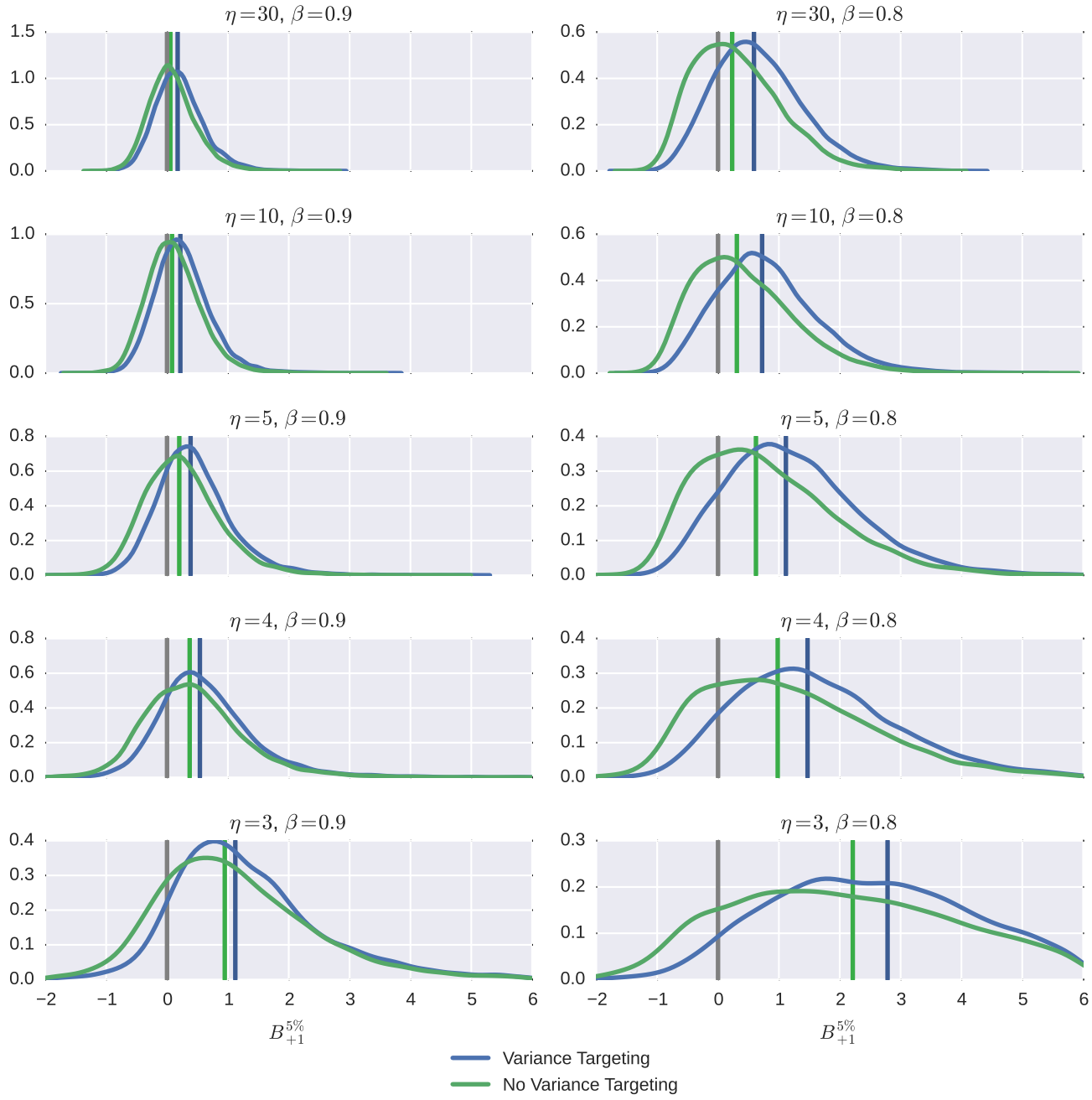

Figure D.7: One period in advance Value-at-Risk bias, $B_{+1}^{5\%}$

Horizontal axis is the difference between predicted and true VaRs which correspond to distribution of returns measured in percentages. Vertical solid lines are medians and zero (gray). Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

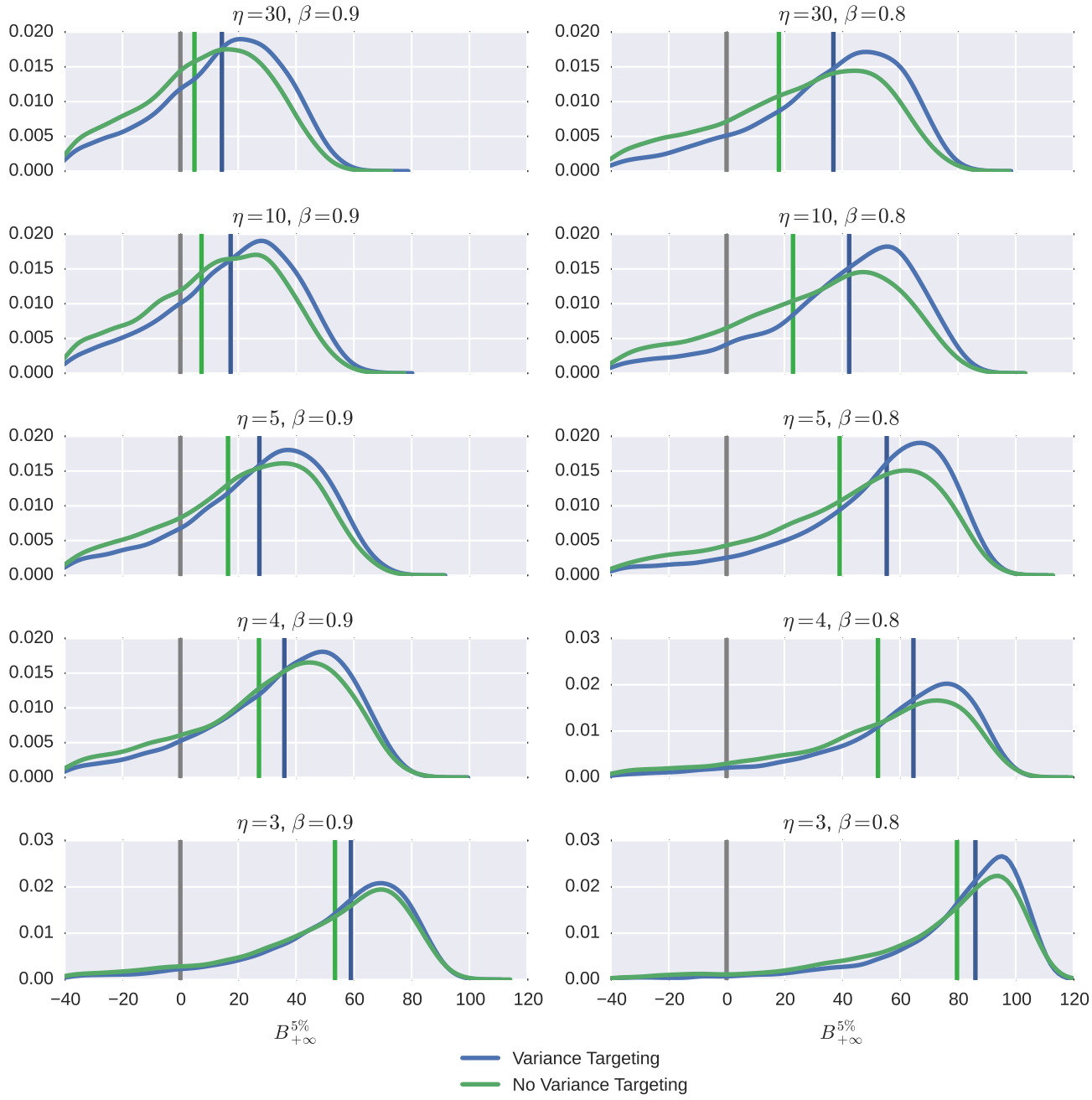

Figure D.8: Long-run Value-at-Risk bias, $B^{5\%}_{+\infty}$

Horizontal axis is the difference between predicted and true VaRs which correspond to distribution of returns measured in percentages. Vertical solid lines are medians and zero (gray). Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

E Experiment

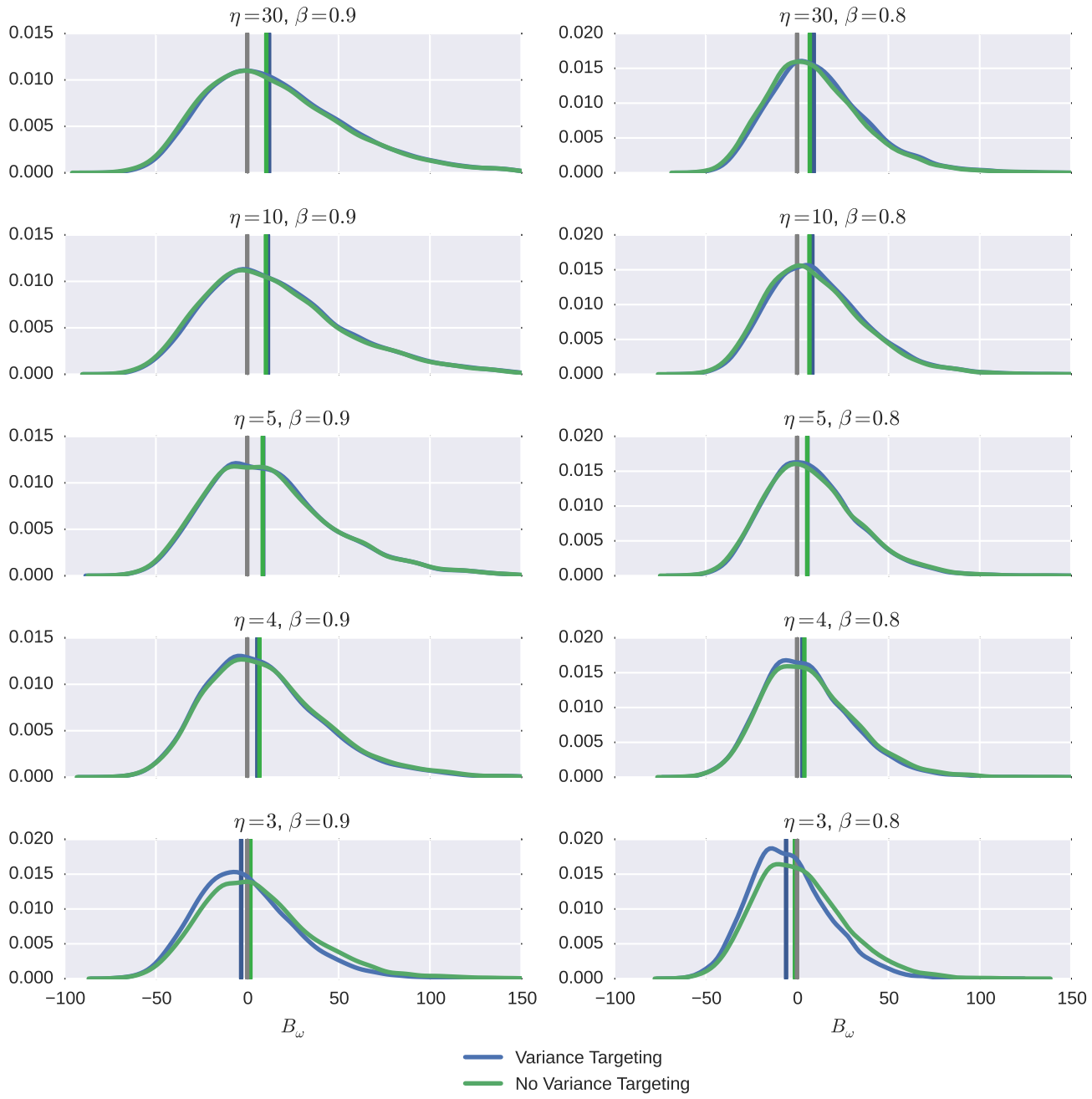

Figure E.1: Intercept bias, B_ω

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on symmetric Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

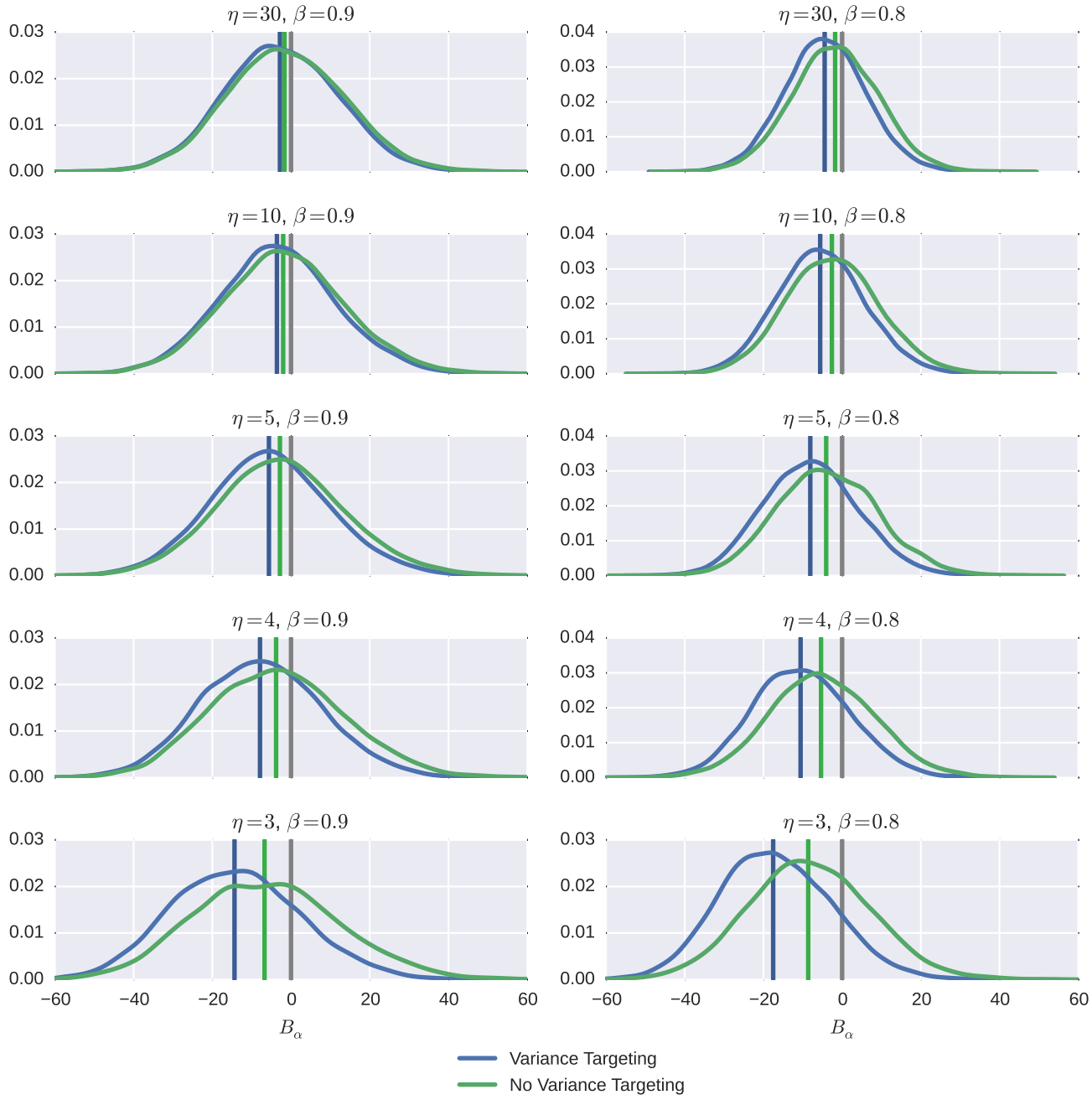

Figure E.2: News impact parameter bias, B_α

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on symmetric Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

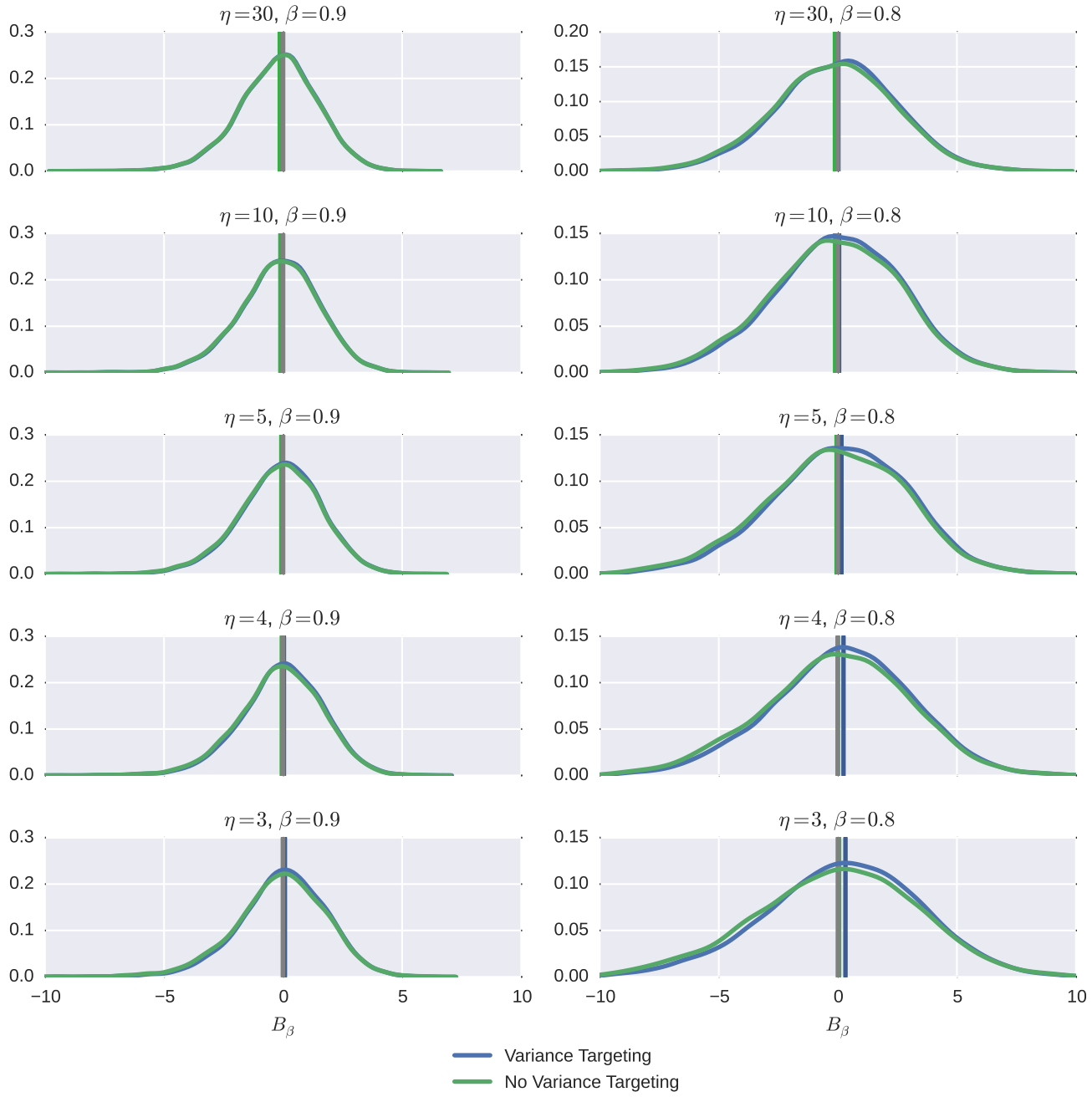

Figure E.3: Feedback bias, B_β

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on symmetric Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

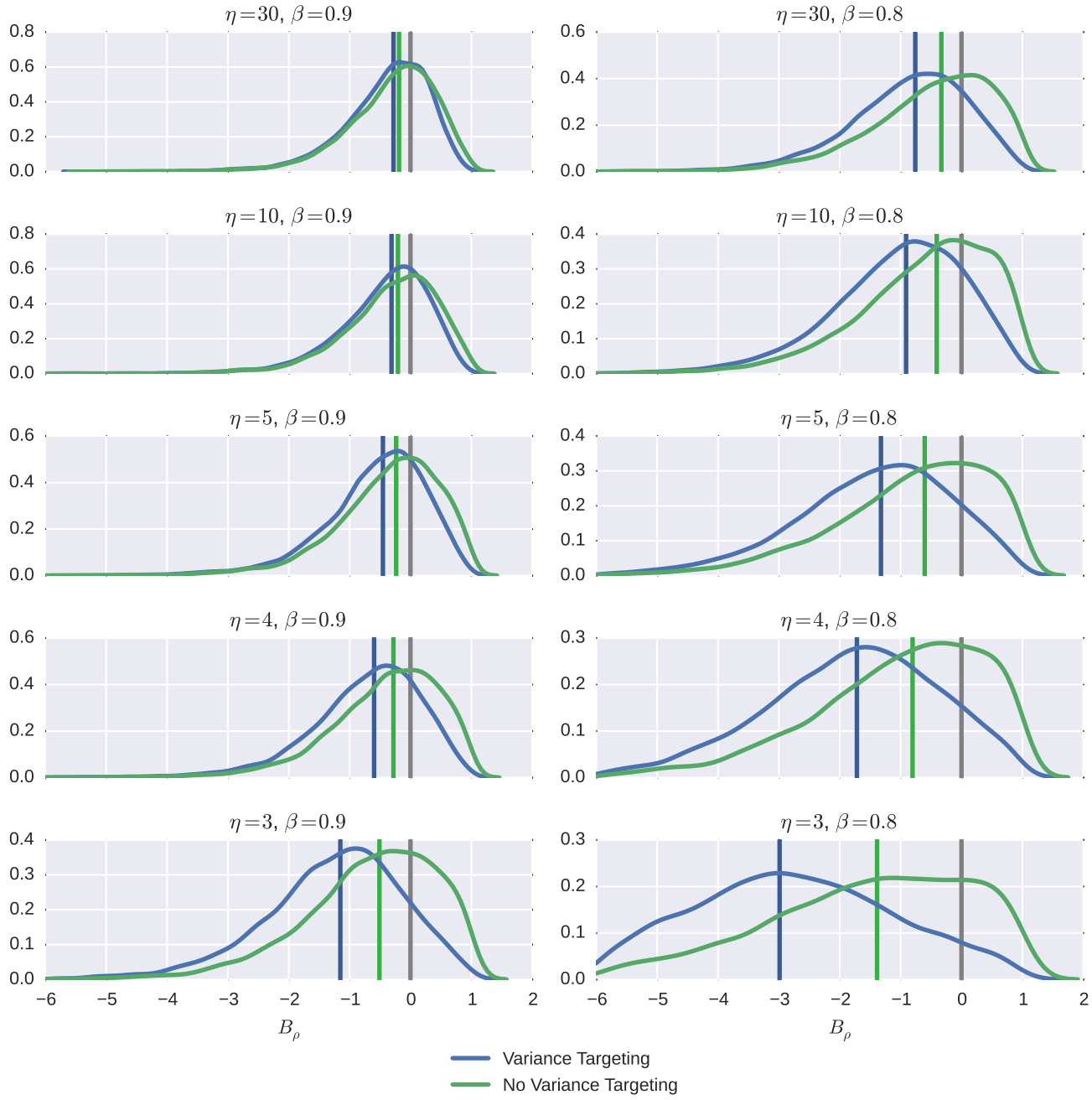

Figure E.4: Persistence bias, B_ρ

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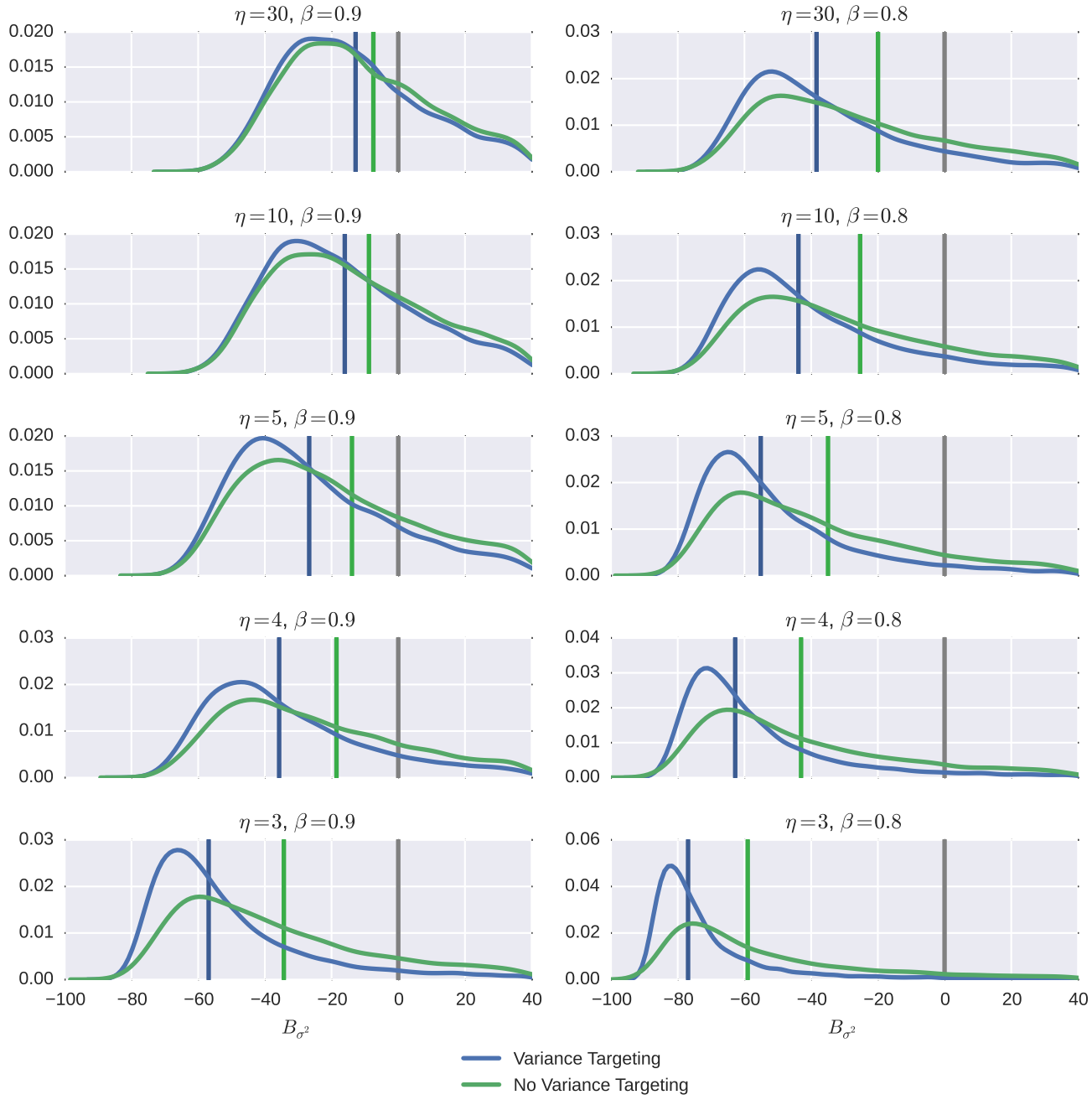

Figure E.5: Unconditional variance bias, B_{σ^2}

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on symmetric Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

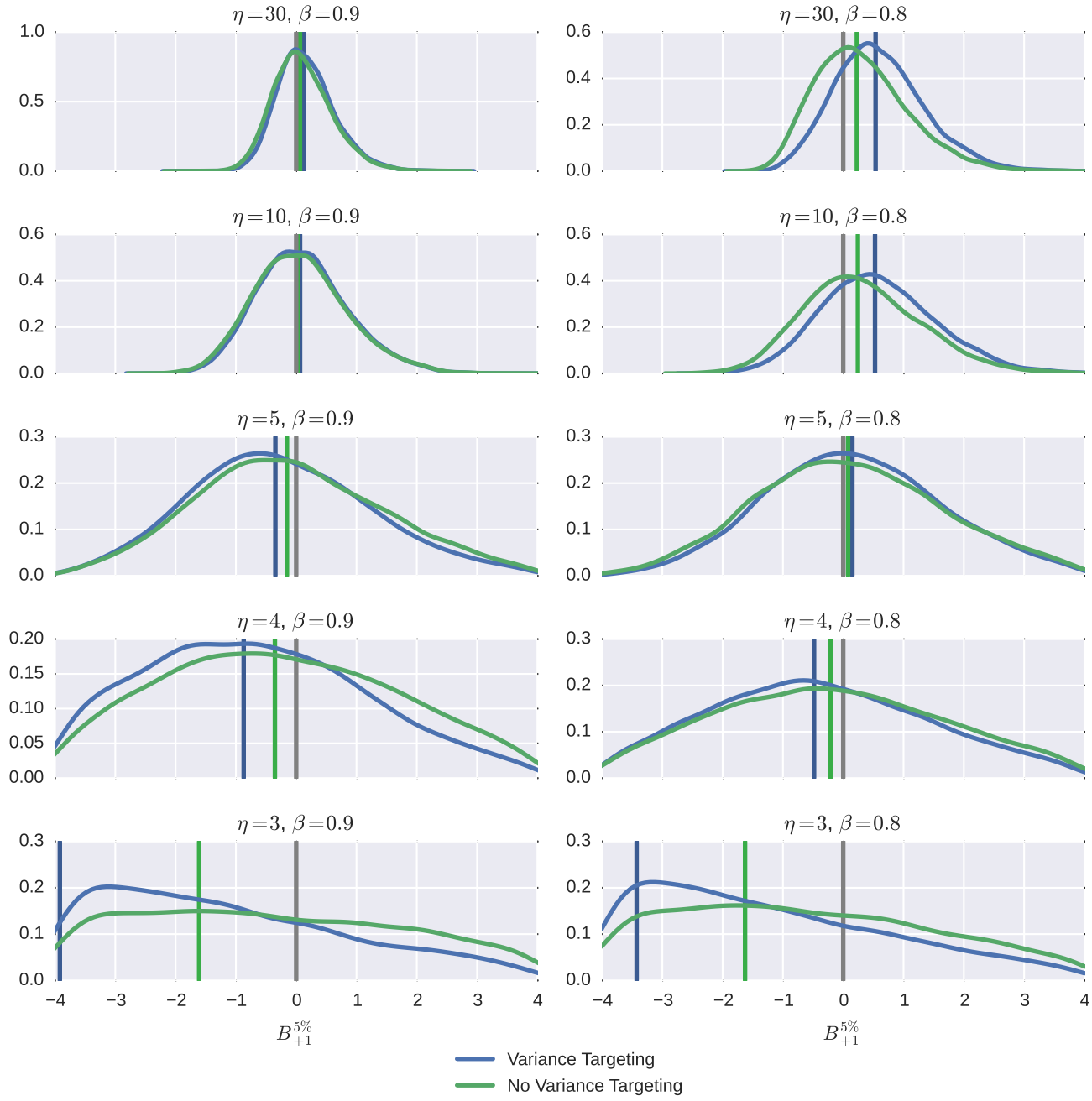

Figure E.6: One period in advance Value-at-Risk bias, $B_{+1}^{5\%}$
Horizontal axis is the difference between predicted and true VaRs which correspond to distribution of returns measured in percentages. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on symmetric Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

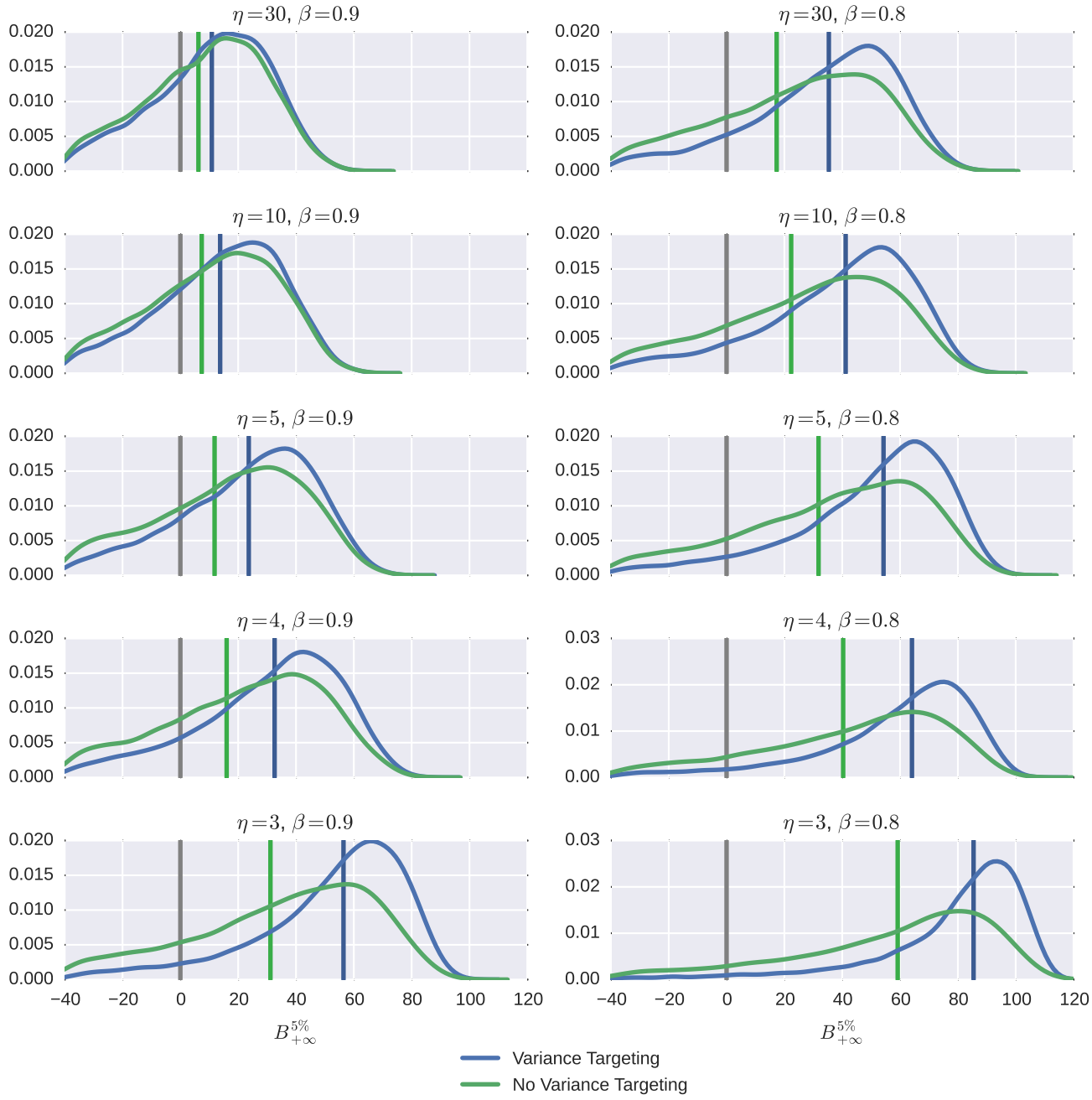

Figure E.7: Long-run Value-at-Risk bias, $B^{5\%}_{+\infty}$

Horizontal axis is the difference between predicted and true VaRs which correspond to distribution of returns measured in percentages. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on symmetric Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

F Experiment

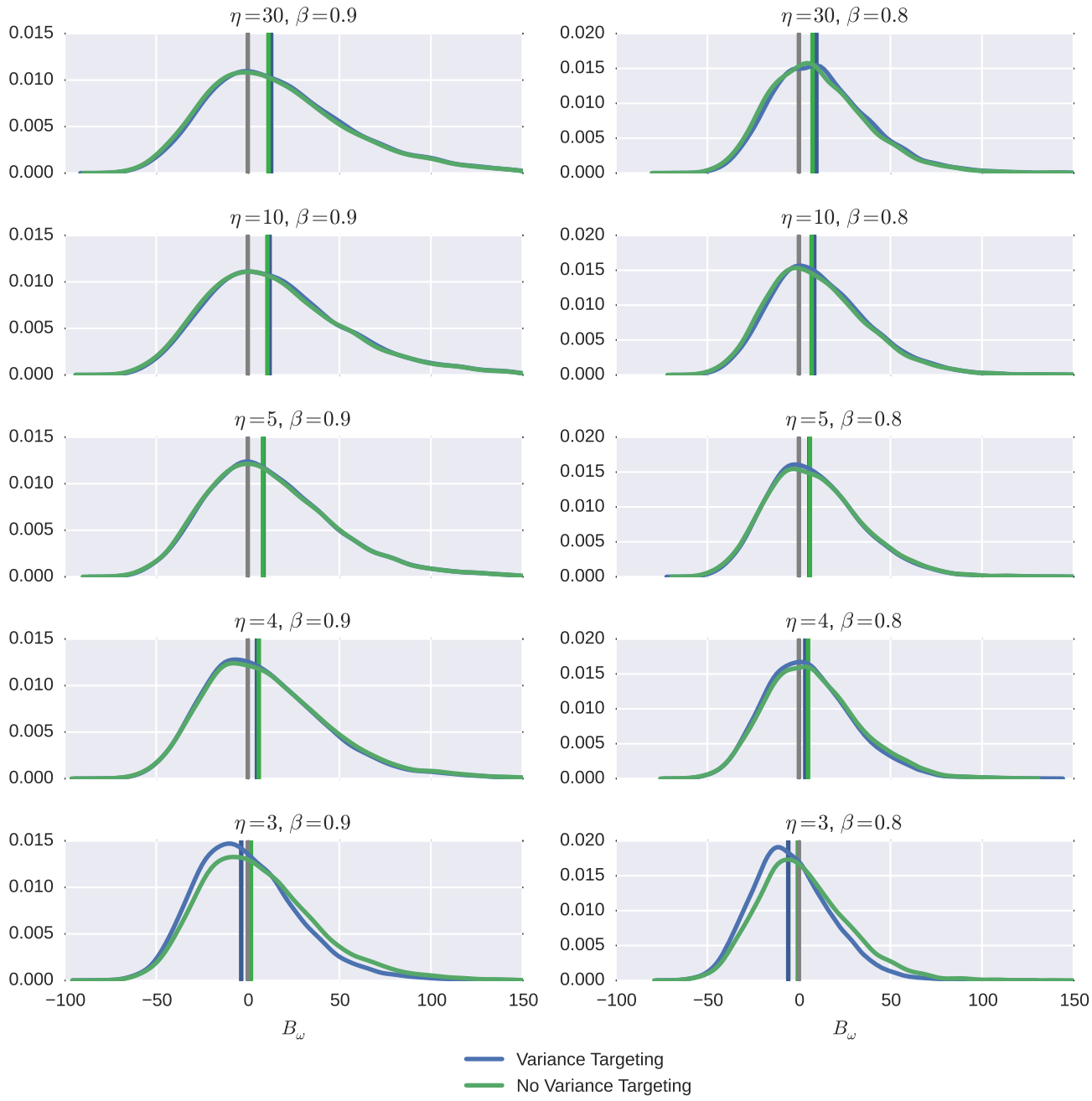

Figure F.1: Intercept bias, B_ω

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

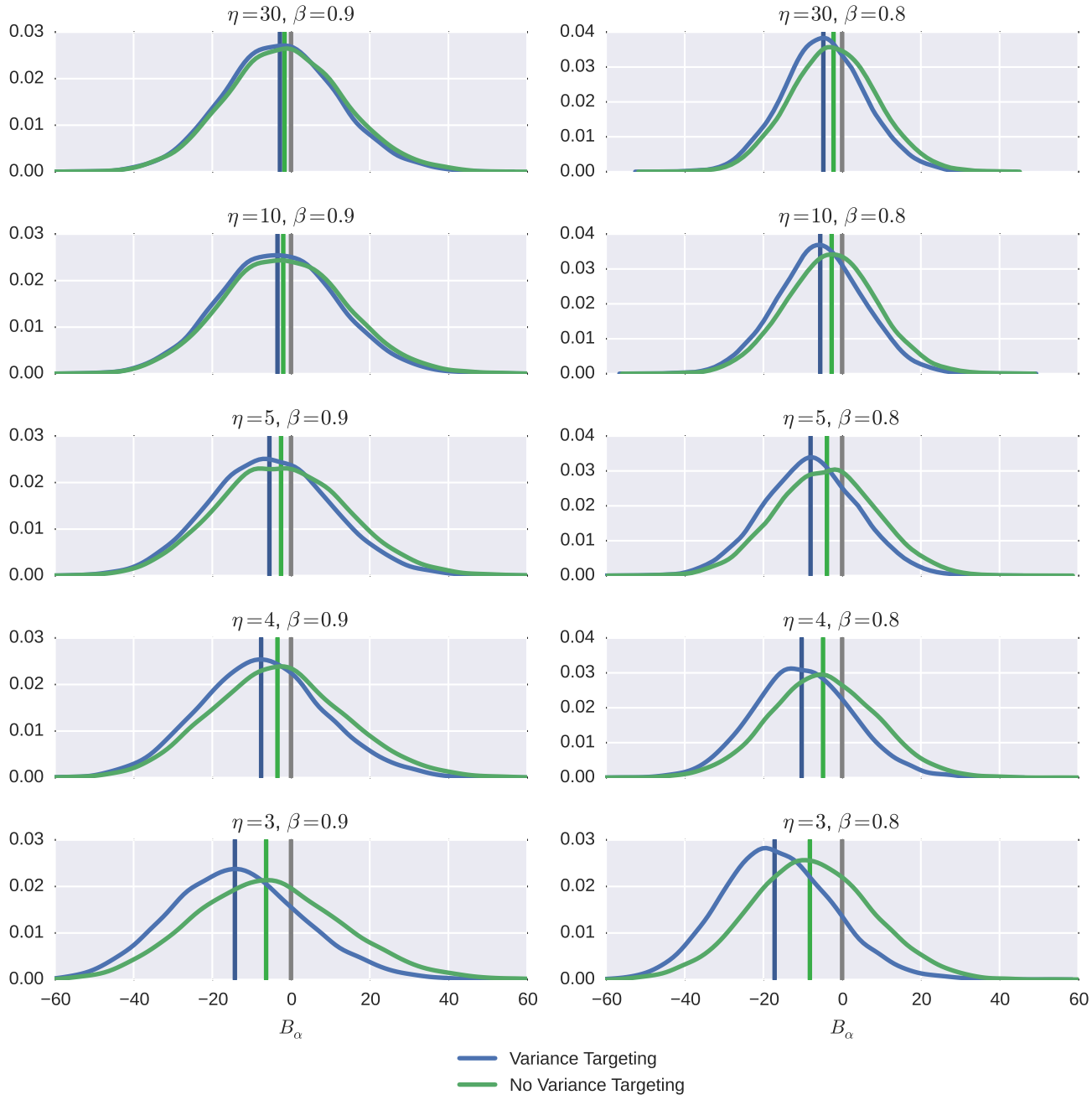

Figure F.2: News impact parameter bias, B_α

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

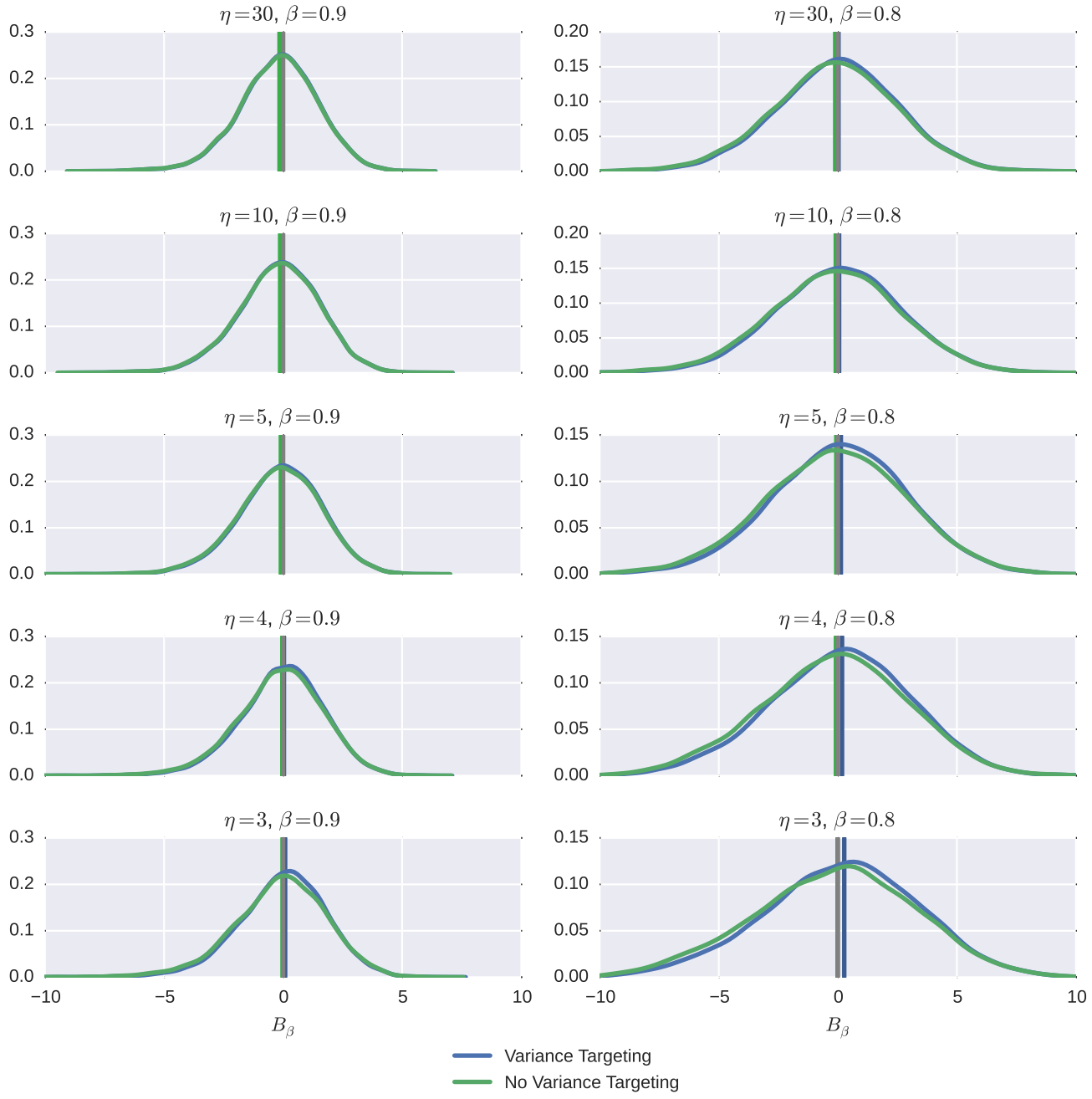

Figure F.3: Feedback bias, B_β

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

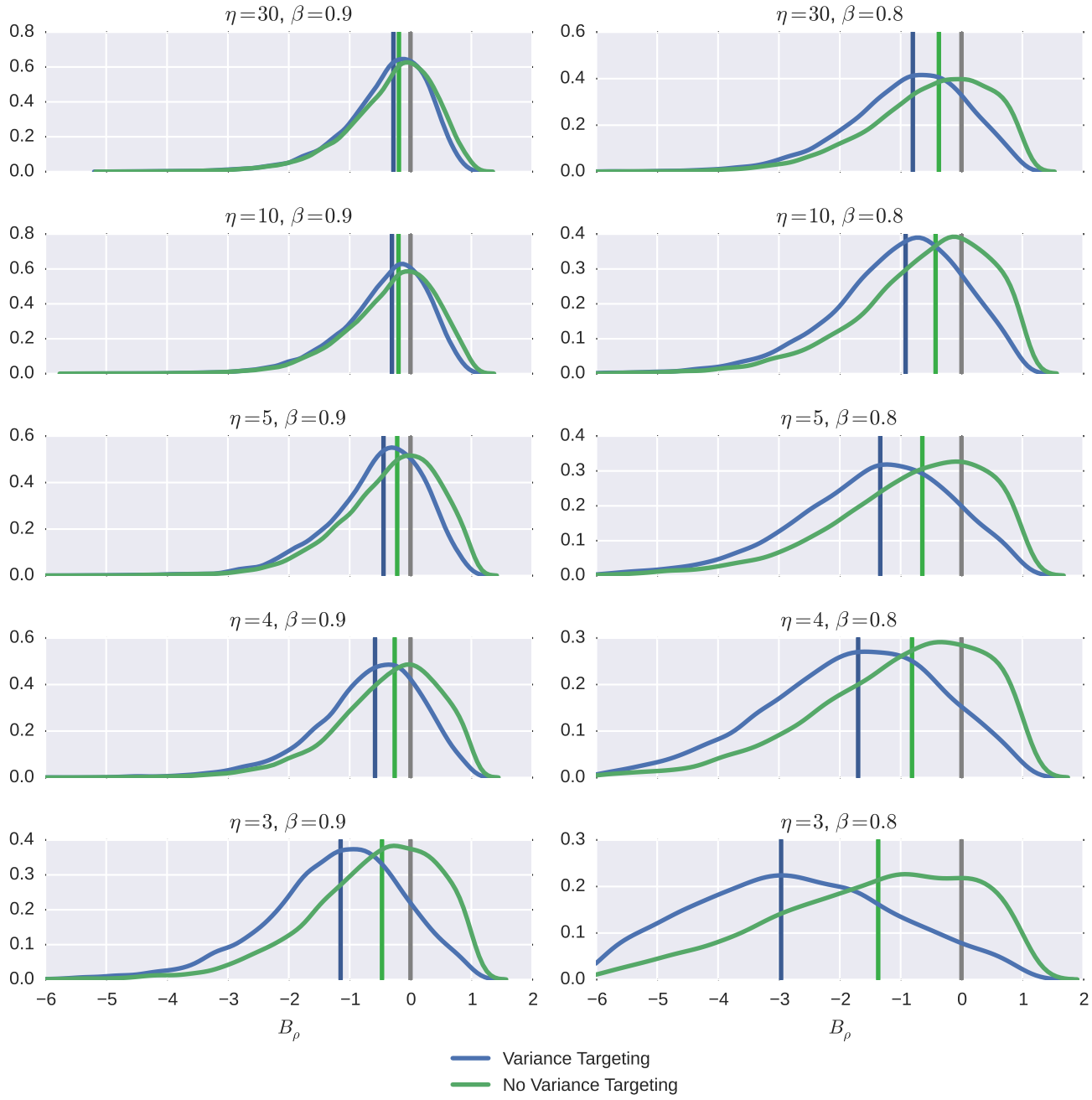

Figure F.4: Persistence bias, B_ρ

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

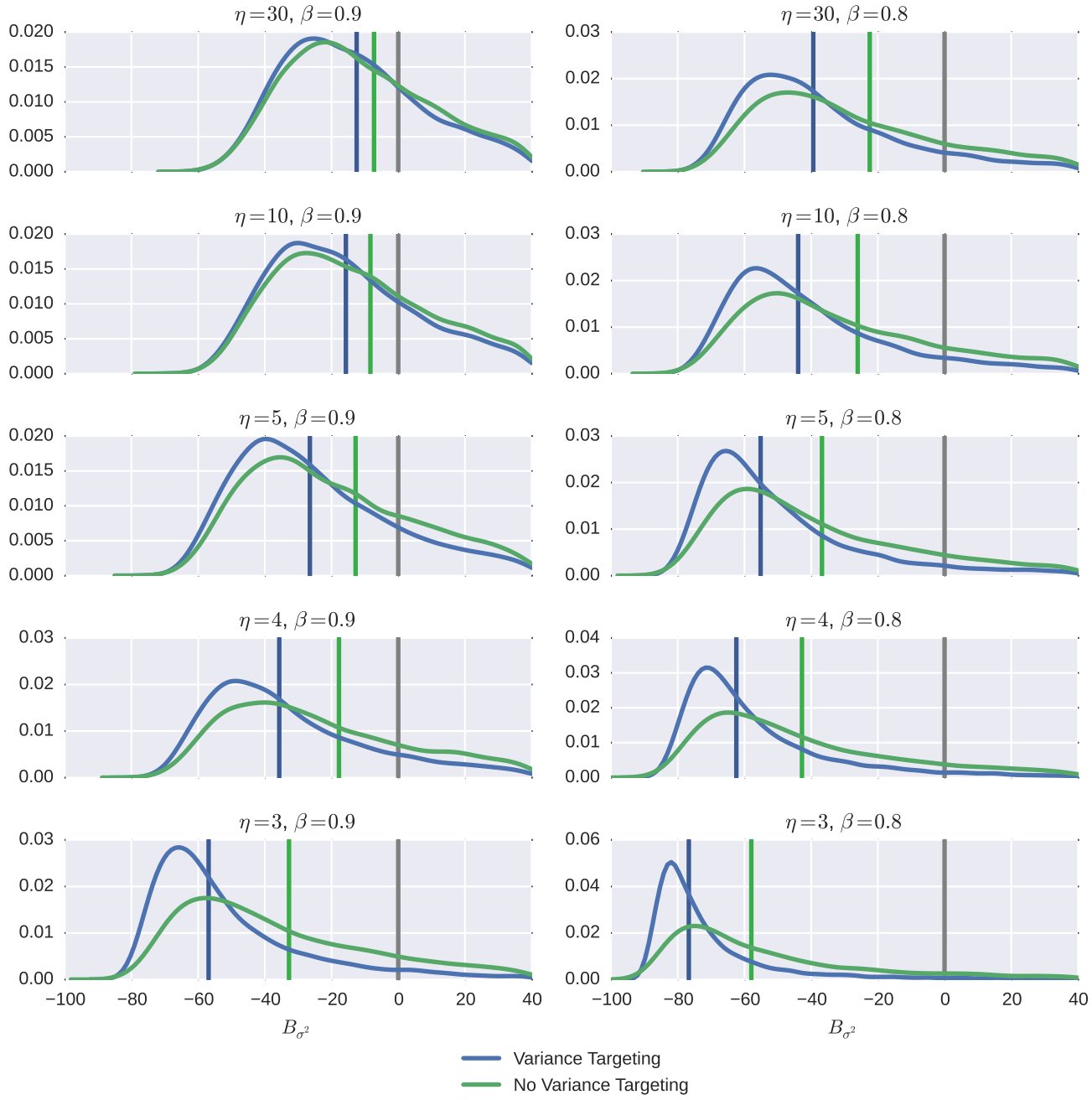

Figure F.5: Unconditional variance bias, B_{σ^2}

Horizontal axis is in percentage of true parameter value. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

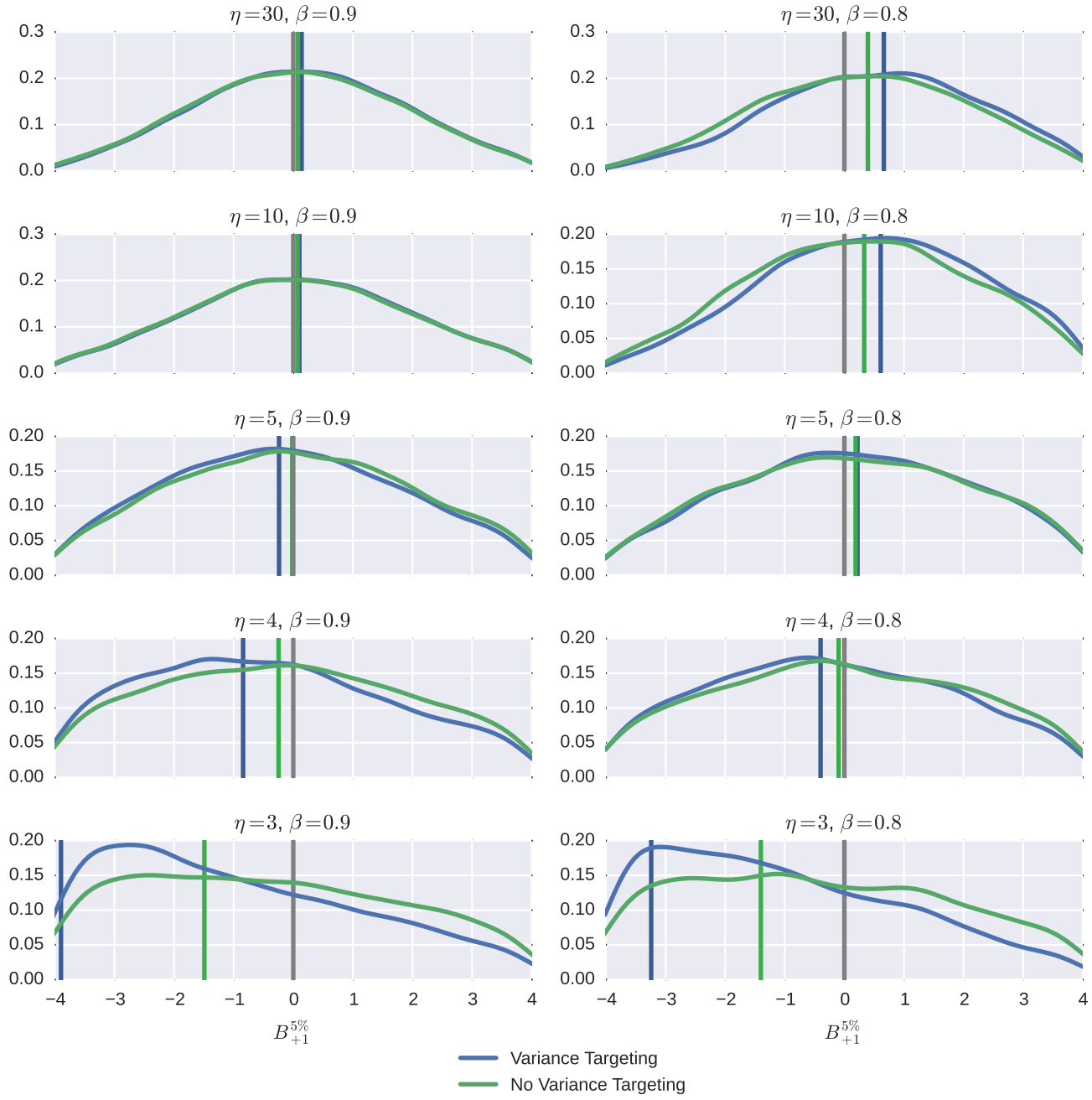

Figure F.6: One period in advance Value-at-Risk bias, $B_{+1}^{5\%}$
Horizontal axis is the difference between predicted and true VaRs which correspond to distribution of returns measured in percentages. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

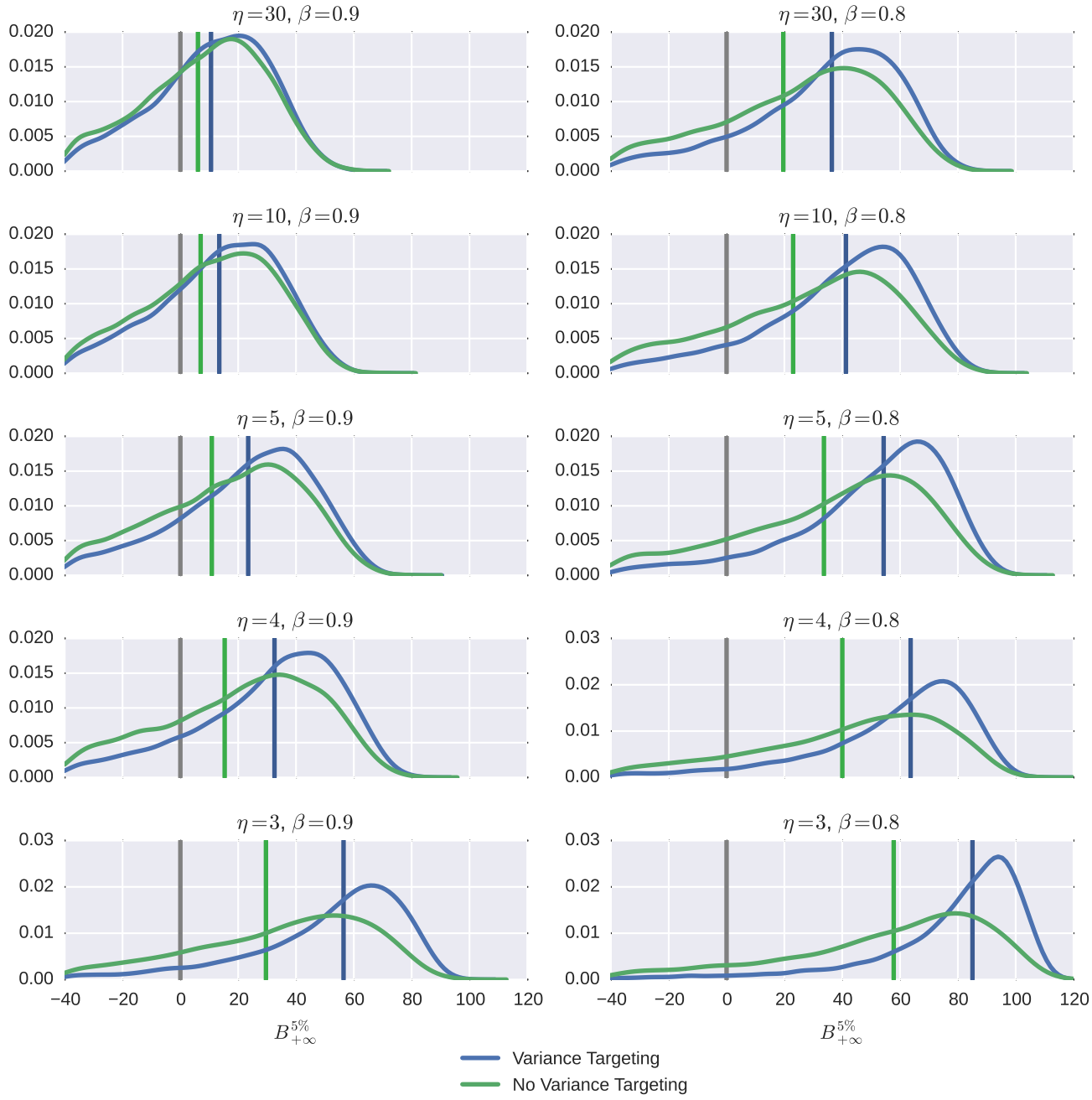

Figure F.7: Long-run Value-at-Risk bias, $B^{5\%}_{+\infty}$

Horizontal axis is the difference between predicted and true VaRs which correspond to distribution of returns measured in percentages. Vertical solid lines are medians and zero (gray). Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

2 Tables

A Experiment

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−38.34	−13.08	10.40	40.44	97.29	−36.55	−11.48	11.83	41.12	98.42
	10	−39.78	−13.43	10.98	42.64	102.94	−38.24	−11.75	12.65	43.59	103.52
0.9	5	−43.71	−15.32	11.38	47.00	121.35	−43.00	−14.10	12.28	47.83	121.68
	4	−47.94	−17.53	11.58	51.22	139.86	−47.72	−17.14	12.62	52.47	143.62
	3	−58.77	−26.71	6.74	55.26	196.47	−59.30	−26.69	7.81	57.83	222.75
	30	−28.52	−9.30	6.84	26.20	61.55	−26.85	−7.49	9.00	28.40	62.98
	10	−30.25	−9.59	7.49	28.44	64.37	−28.29	−8.01	8.97	30.24	65.91
0.8	5	−35.24	−12.70	7.72	32.70	76.61	−33.80	−10.95	9.02	34.01	78.85
	4	−39.69	−14.36	8.18	35.66	93.97	−39.39	−13.85	8.83	36.57	97.02
	3	−53.71	−24.42	1.79	38.10	136.71	−54.24	−24.46	2.70	40.50	149.31

Table A.1: Intercept bias, B_ω

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−25.74	−11.64	−1.73	8.94	23.85	−26.02	−12.56	−2.92	7.19	21.69
	10	−27.43	−12.71	−1.91	8.92	26.83	−27.92	−13.72	−3.55	7.00	23.71
0.9	5	−34.74	−17.09	−3.70	10.67	34.80	−35.28	−18.39	−5.97	7.68	29.99
	4	−41.62	−21.57	−6.11	11.31	43.12	−42.18	−22.83	−8.22	7.96	38.18
	3	−58.26	−34.72	−14.92	9.25	63.64	−58.48	−35.27	−16.53	6.04	58.92
	30	−19.78	−9.41	−2.04	5.32	16.36	−21.60	−11.62	−4.57	2.59	13.06
	10	−21.63	−10.57	−2.65	5.85	18.78	−23.62	−13.03	−5.43	2.33	14.27
0.8	5	−29.42	−15.41	−5.01	5.77	24.28	−31.50	−18.17	−8.48	1.81	18.66
	4	−36.39	−19.94	−7.39	5.94	28.16	−38.53	−22.62	−10.96	1.44	22.36
	3	−54.08	−32.94	−16.57	3.20	39.75	−55.23	−35.22	−19.79	−2.17	35.21

Table A.2: News impact parameter bias, B_α

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−3.09	−1.26	−0.11	0.94	2.42	−3.05	−1.24	−0.09	0.96	2.41
	10	−3.37	−1.38	−0.16	0.99	2.60	−3.32	−1.33	−0.12	1.01	2.61
0.9	5	−4.51	−1.77	−0.18	1.22	3.22	−4.36	−1.70	−0.11	1.27	3.22
	4	−5.71	−2.18	−0.24	1.47	3.76	−5.75	−2.13	−0.17	1.55	3.87
	3	−9.36	−3.22	−0.32	2.00	5.10	−9.92	−3.25	−0.29	2.09	5.31
	30	−4.52	−1.86	−0.08	1.55	4.15	−4.29	−1.68	0.03	1.64	4.18
	10	−5.22	−2.15	−0.18	1.71	4.32	−4.90	−1.92	−0.01	1.85	4.45
0.8	5	−7.11	−2.79	−0.15	2.23	5.72	−6.74	−2.57	0.04	2.42	5.88
	4	−8.90	−3.54	−0.26	2.77	6.84	−8.78	−3.27	−0.02	2.99	7.26
	3	−15.00	−5.29	−0.40	3.96	9.70	−16.03	−5.11	−0.17	4.27	10.46

Table A.3: Feedback bias, B_β

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−1.68	−0.71	−0.18	0.23	0.68	−1.73	−0.76	−0.25	0.11	0.53
	10	−1.89	−0.78	−0.22	0.25	0.73	−1.95	−0.87	−0.33	0.10	0.55
0.9	5	−2.59	−1.10	−0.35	0.22	0.82	−2.65	−1.21	−0.49	0.03	0.58
	4	−3.30	−1.46	−0.56	0.16	0.85	−3.38	−1.57	−0.70	−0.06	0.58
	3	−5.78	−2.72	−1.29	−0.19	0.84	−6.02	−2.85	−1.44	−0.43	0.49
	30	−2.41	−1.09	−0.36	0.26	0.84	−2.70	−1.45	−0.78	−0.16	0.53
	10	−2.82	−1.30	−0.46	0.24	0.83	−3.17	−1.73	−0.93	−0.26	0.54
0.8	5	−4.08	−1.99	−0.84	0.08	0.88	−4.42	−2.45	−1.43	−0.54	0.48
	4	−5.33	−2.74	−1.30	−0.13	0.91	−5.66	−3.18	−1.85	−0.78	0.39
	3	−9.63	−5.18	−2.81	−0.89	1.00	−10.15	−5.60	−3.36	−1.67	0.15

Table A.4: Persistence bias, B_ρ

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−41.41	−24.96	−6.97	24.79	145.55	−41.92	−27.48	−12.41	10.47	74.61
	10	−44.84	−28.46	−9.29	25.04	185.09	−46.06	−31.63	−16.24	8.25	85.82
0.9	5	−54.63	−38.98	−19.47	23.17	335.97	−55.05	−41.89	−26.65	0.30	97.94
	4	−61.36	−47.80	−29.42	12.86	414.73	−61.69	−49.68	−35.36	−9.28	97.95
	3	−74.85	−66.31	−54.53	−26.09	362.53	−74.89	−66.76	−56.94	−37.94	63.04
	30	−61.33	−44.86	−21.39	32.06	424.28	−64.37	−52.75	−39.08	−12.90	101.18
	10	−65.03	−49.85	−27.53	28.11	427.22	−67.82	−57.32	−44.11	−19.05	102.69
0.8	5	−73.03	−61.28	−42.26	7.12	632.74	−74.84	−66.25	−55.60	−34.07	77.96
	4	−78.08	−68.37	−53.71	−14.80	806.06	−79.13	−71.75	−62.41	−44.09	49.32
	3	−86.59	−81.41	−73.85	−53.29	1.15e4	−86.92	−82.38	−76.83	−65.19	−5.32

Table A.5: Unconditional variance bias, B_{σ^2}

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−0.46	−0.16	0.06	0.32	0.80	−0.36	−0.08	0.12	0.36	0.82
	10	−0.53	−0.16	0.09	0.38	0.93	−0.40	−0.06	0.17	0.44	0.98
0.9	5	−0.64	−0.15	0.21	0.63	1.41	−0.44	−0.00	0.31	0.70	1.45
	4	−0.69	−0.09	0.37	0.88	1.90	−0.44	0.08	0.48	0.95	1.92
	3	−0.64	0.26	0.98	1.86	3.72	−0.35	0.44	1.08	1.92	3.75
	30	−0.64	−0.20	0.24	0.76	1.63	−0.41	0.13	0.57	1.04	1.87
	10	−0.66	−0.18	0.33	0.92	1.97	−0.40	0.20	0.69	1.25	2.23
0.8	5	−0.68	−0.05	0.64	1.47	2.92	−0.35	0.44	1.09	1.83	3.19
	4	−0.68	0.14	1.01	2.05	3.91	−0.28	0.65	1.45	2.39	4.14
	3	−0.62	0.83	2.30	4.04	7.24	0.04	1.42	2.70	4.33	7.54

Table A.6: One period in advance Value-at-Risk bias, $B_{+1}^{5\%}$

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−93.26	−19.26	5.84	22.00	38.58	−52.86	−8.40	10.55	24.42	39.13
	10	−113.24	−19.45	7.83	25.36	42.32	−59.73	−6.65	13.95	28.47	43.69
0.9	5	−178.96	−18.07	16.88	35.99	53.69	−66.93	−0.25	23.61	39.10	54.21
	4	−208.69	−10.26	26.30	45.64	62.25	−66.94	7.82	32.24	47.81	62.68
	3	−189.26	23.08	53.57	69.01	82.00	−45.54	34.91	56.55	69.65	82.06
	30	−212.14	−24.53	18.65	42.34	62.20	−68.82	10.97	36.10	51.42	66.31
	10	−213.19	−21.69	24.46	48.00	67.21	−69.69	16.50	41.52	57.02	71.17
0.8	5	−280.76	−5.75	39.50	62.14	79.06	−54.94	30.93	54.88	68.93	81.98
	4	−330.63	12.66	52.57	71.98	87.48	−36.51	41.49	63.64	77.06	89.34
	3	−1611.24	52.07	80.38	93.57	104.25	4.44	67.44	85.31	95.45	105.00

Table A.7: Long-run Value-at-Risk bias, $B^{5\%}_{+\infty}$

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

B Experiment

β	λ	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	0.00	−47.94	−17.53	11.58	51.22	139.86	−47.72	−17.14	12.62	52.47	143.62
	−0.10	−48.21	−17.30	11.29	49.96	139.22	−47.44	−16.82	12.36	51.18	144.10
0.9	−0.30	−49.87	−18.49	11.34	53.02	152.89	−50.28	−17.97	12.36	54.77	158.50
	−0.50	−53.25	−21.36	11.46	56.85	165.75	−54.20	−21.29	11.78	57.80	173.99
	−0.80	−56.10	−23.09	11.24	61.40	183.39	−56.42	−23.19	10.63	60.43	188.34
	0.00	−39.69	−14.36	8.18	35.66	93.97	−39.39	−13.85	8.83	36.57	97.02
	−0.10	−39.63	−15.03	7.86	35.51	95.97	−39.27	−13.97	8.43	36.58	100.30
0.8	−0.30	−42.04	−16.68	8.06	37.81	106.55	−41.64	−15.90	8.17	39.22	111.51
	−0.50	−46.63	−17.92	7.86	42.41	113.53	−47.09	−18.06	8.04	42.91	117.63
	−0.80	−50.02	−20.05	7.66	44.79	127.32	−50.36	−20.49	7.74	45.95	130.57

Table B.1: Intercept bias, B_ω

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

β	λ	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	0.00	−41.62	−21.57	−6.11	11.31	43.12	−42.18	−22.83	−8.22	7.96	38.18
	−0.10	−42.29	−21.60	−6.02	11.26	42.92	−43.12	−23.02	−8.15	8.27	38.74
0.9	−0.30	−45.05	−24.22	−7.37	11.93	48.15	−45.36	−25.29	−9.62	8.41	42.79
	−0.50	−48.55	−27.45	−10.12	11.87	55.75	−48.67	−28.73	−11.96	7.88	48.77
	−0.80	−52.87	−31.11	−12.07	10.79	64.10	−53.37	−31.91	−14.37	7.26	54.01
	0.00	−36.39	−19.94	−7.39	5.94	28.16	−38.53	−22.62	−10.96	1.44	22.36
	−0.10	−35.87	−19.99	−7.33	6.04	28.58	−38.33	−22.83	−11.18	1.42	23.23
0.8	−0.30	−39.85	−22.12	−9.00	5.52	32.35	−41.78	−24.97	−12.82	0.95	26.22
	−0.50	−45.05	−26.05	−11.20	5.87	36.51	−46.89	−28.68	−14.98	0.60	29.58
	−0.80	−50.59	−30.03	−13.35	5.76	42.81	−51.74	−32.53	−17.28	−0.08	34.51

Table B.2: News impact parameter bias, B_α

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

β	λ	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	0.00	−5.71	−2.18	−0.24	1.47	3.76	−5.75	−2.13	−0.17	1.55	3.87
	−0.10	−5.77	−2.17	−0.26	1.49	3.87	−5.85	−2.12	−0.20	1.55	3.96
0.9	−0.30	−6.49	−2.39	−0.27	1.61	4.11	−6.59	−2.34	−0.19	1.69	4.22
	−0.50	−7.66	−2.60	−0.22	1.77	4.33	−7.68	−2.49	−0.13	1.87	4.45
	−0.80	−8.82	−2.85	−0.20	1.98	4.70	−8.81	−2.74	−0.10	2.11	4.84
	0.00	−8.90	−3.54	−0.26	2.77	6.84	−8.78	−3.27	−0.02	2.99	7.26
	−0.10	−9.18	−3.53	−0.28	2.75	6.71	−9.15	−3.28	−0.01	3.00	7.17
0.8	−0.30	−10.37	−3.86	−0.21	3.15	7.40	−10.54	−3.60	0.02	3.36	7.79
	−0.50	−12.10	−4.44	−0.35	3.54	8.51	−12.04	−4.12	−0.01	3.85	8.96
	−0.80	−14.20	−5.07	−0.27	3.92	9.46	−14.01	−4.68	0.07	4.27	9.87

Table B.3: Feedback bias, B_β

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

β	λ	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	0.00	−3.30	−1.46	−0.56	0.16	0.85	−3.38	−1.57	−0.70	−0.06	0.58
	−0.10	−3.33	−1.45	−0.55	0.15	0.86	−3.40	−1.57	−0.71	−0.08	0.58
0.9	−0.30	−3.74	−1.64	−0.63	0.15	0.86	−3.81	−1.75	−0.80	−0.12	0.59
	−0.50	−4.27	−1.91	−0.78	0.08	0.88	−4.32	−2.01	−0.92	−0.14	0.58
	−0.80	−5.01	−2.21	−0.92	0.04	0.91	−5.15	−2.29	−1.06	−0.22	0.58
	0.00	−5.33	−2.74	−1.30	−0.13	0.91	−5.66	−3.18	−1.85	−0.78	0.39
	−0.10	−5.37	−2.75	−1.32	−0.15	0.94	−5.70	−3.24	−1.91	−0.79	0.38
0.8	−0.30	−5.98	−3.09	−1.52	−0.22	0.95	−6.32	−3.56	−2.10	−0.91	0.35
	−0.50	−7.00	−3.72	−1.85	−0.38	0.99	−7.40	−4.14	−2.42	−1.09	0.31
	−0.80	−8.29	−4.33	−2.21	−0.52	1.01	−8.65	−4.78	−2.79	−1.29	0.24

Table B.4: Persistence bias, B_ρ

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

β	λ	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	0.00	−61.36	−47.80	−29.42	12.86	414.73	−61.69	−49.68	−35.36	−9.28	97.95
	−0.10	−61.52	−47.99	−29.59	10.90	448.96	−61.89	−49.85	−35.67	−10.59	96.16
0.9	−0.30	−64.05	−51.33	−33.42	7.65	453.72	−64.45	−52.88	−38.96	−14.01	90.44
	−0.50	−67.85	−55.70	−39.39	2.53	556.68	−67.85	−56.84	−43.32	−18.64	91.24
	−0.80	−71.12	−59.87	−44.29	−3.31	692.77	−71.05	−60.84	−47.95	−23.99	89.06
	0.00	−78.08	−68.37	−53.71	−14.80	806.06	−79.13	−71.75	−62.41	−44.09	49.32
	−0.10	−78.05	−68.64	−54.19	−15.39	1306.77	−79.28	−72.04	−63.06	−44.81	46.65
0.8	−0.30	−79.82	−71.09	−58.18	−21.99	1800.31	−80.67	−74.03	−65.50	−48.58	41.07
	−0.50	−82.02	−74.70	−62.97	−31.64	4163.95	−82.67	−76.75	−69.14	−53.38	30.79
	−0.80	−84.22	−77.66	−67.24	−39.07	2.17e7	−84.66	−79.24	−72.38	−58.40	18.07

Table B.5: Unconditional variance bias, B_{σ^2}

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

β	λ	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	0.00	−0.69	−0.09	0.37	0.88	1.90	−0.44	0.08	0.48	0.95	1.92
	−0.10	−0.67	−0.08	0.37	0.88	1.93	−0.45	0.09	0.49	0.96	1.98
0.9	−0.30	−0.72	−0.06	0.43	1.03	2.23	−0.45	0.14	0.54	1.09	2.23
	−0.50	−0.72	−0.02	0.55	1.22	2.57	−0.46	0.18	0.65	1.29	2.56
	−0.80	−0.76	0.03	0.66	1.45	3.09	−0.43	0.24	0.77	1.50	3.07
	0.00	−0.68	0.14	1.01	2.05	3.91	−0.28	0.65	1.45	2.39	4.14
	−0.10	−0.69	0.15	1.02	2.06	3.95	−0.26	0.66	1.49	2.43	4.16
0.8	−0.30	−0.69	0.22	1.18	2.32	4.40	−0.23	0.78	1.65	2.68	4.67
	−0.50	−0.69	0.37	1.46	2.82	5.16	−0.18	0.92	1.92	3.14	5.43
	−0.80	−0.71	0.50	1.75	3.30	6.27	−0.12	1.10	2.22	3.62	6.40

Table B.6: One period in advance Value-at-Risk bias, $B_{+1}^{5\%}$
Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

β	λ	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	0.00	−208.69	−10.26	26.30	45.64	62.25	−66.94	7.82	32.24	47.81	62.68
	−0.10	−220.90	−8.73	26.47	45.87	62.45	−65.89	8.95	32.56	48.01	62.94
0.9	−0.30	−222.57	−6.17	30.27	49.73	65.87	−62.50	11.96	35.98	51.58	66.41
	−0.50	−257.02	−2.07	36.43	55.00	71.22	−62.98	16.12	40.65	56.43	71.22
	−0.80	−298.64	2.74	41.72	60.29	76.09	−61.68	21.08	45.82	61.55	75.98
	0.00	−330.63	12.66	52.57	71.98	87.48	−36.51	41.49	63.64	77.06	89.34
	−0.10	−452.45	13.19	53.16	72.38	87.42	−34.71	42.29	64.51	77.52	89.62
0.8	−0.30	−552.55	19.21	58.11	76.05	90.60	−30.88	46.54	67.87	80.66	92.17
	−0.50	−909.59	28.49	64.39	81.74	94.73	−23.63	52.18	73.11	85.18	96.01
	−0.80	−76587.84	36.09	70.33	86.75	99.15	−14.25	58.40	78.04	89.55	100.07

Table B.7: Long-run Value-at-Risk bias, $B_{+\infty}^{5\%}$
Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Degrees of freedom η is 4. Persistence ρ is 0.99.

C Experiment

β	T	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	500	−66.72	−18.52	41.03	146.49	568.75	−65.68	−19.51	38.38	140.33	547.76
	1000	−58.10	−19.99	19.91	83.62	241.75	−57.83	−20.28	19.22	82.35	247.11
0.9	2000	−47.94	−17.53	11.58	51.22	139.86	−47.72	−17.14	12.62	52.47	143.62
	5000	−38.05	−14.92	4.54	28.63	75.16	−36.92	−13.25	6.63	31.11	80.86
	10000	−31.25	−12.76	1.76	19.26	50.55	−29.48	−10.43	4.50	22.04	55.29
	500	−61.40	−22.41	20.60	86.13	252.54	−61.74	−23.75	19.05	83.33	249.78
	1000	−49.16	−19.39	10.81	53.26	147.83	−49.38	−19.29	10.80	52.31	150.04
0.8	2000	−39.69	−14.36	8.18	35.66	93.97	−39.39	−13.85	8.83	36.57	97.02
	5000	−30.06	−11.46	3.51	20.93	55.68	−28.51	−8.86	6.15	24.41	59.82
	10000	−23.05	−9.26	1.95	14.31	39.21	−21.07	−6.57	4.99	17.91	44.01

Table C.1: Intercept bias, B_ω

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

β	T	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	500	−77.91	−43.46	−16.49	15.55	85.57	−70.42	−39.21	−14.24	16.11	77.61
	1000	−54.83	−30.37	−10.91	12.55	55.92	−53.73	−29.98	−11.35	10.09	49.75
0.9	2000	−41.62	−21.57	−6.11	11.31	43.12	−42.18	−22.83	−8.22	7.96	38.18
	5000	−28.74	−13.98	−3.06	9.05	30.24	−30.94	−16.31	−6.09	5.47	25.37
	10000	−22.12	−10.07	−1.67	7.31	22.68	−24.28	−12.80	−4.66	3.66	18.29
	500	−64.14	−37.57	−16.18	7.71	51.01	−61.55	−35.89	−16.27	5.00	44.07
	1000	−49.31	−27.93	−11.89	5.73	38.73	−49.03	−28.77	−13.76	2.63	32.31
0.8	2000	−36.39	−19.94	−7.39	5.94	28.16	−38.53	−22.62	−10.96	1.44	22.36
	5000	−25.59	−13.60	−4.71	4.35	19.67	−29.00	−17.43	−8.88	−0.08	15.00
	10000	−19.10	−9.58	−2.88	4.30	15.20	−23.41	−14.39	−7.76	−0.93	10.48

Table C.2: News impact parameter bias, B_α

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

β	T	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	500	−17.73	−4.98	−0.66	2.63	6.74	−16.81	−4.82	−0.69	2.44	6.20
	1000	−9.03	−3.07	−0.35	1.99	4.94	−8.82	−2.96	−0.29	2.01	4.86
0.9	2000	−5.71	−2.18	−0.24	1.47	3.76	−5.75	−2.13	−0.17	1.55	3.87
	5000	−3.52	−1.33	−0.12	1.03	2.74	−3.53	−1.28	−0.04	1.12	2.85
	10000	−2.38	−0.96	−0.06	0.78	2.09	−2.42	−0.91	−0.01	0.86	2.18
	500	−21.91	−7.56	−0.61	4.96	12.42	−20.79	−7.09	−0.51	4.93	12.17
	1000	−13.20	−4.68	−0.23	3.85	9.54	−13.02	−4.53	−0.11	3.93	9.55
0.8	2000	−8.90	−3.54	−0.26	2.77	6.84	−8.78	−3.27	−0.02	2.99	7.26
	5000	−5.56	−2.10	−0.05	1.98	4.78	−5.69	−2.00	0.13	2.16	5.20
	10000	−4.03	−1.58	−0.02	1.48	3.73	−4.00	−1.39	0.16	1.72	4.13

Table C.3: Feedback bias, B_β

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

β	T	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	500	−11.94	−3.73	−1.53	−0.26	0.80	−11.15	−3.55	−1.42	−0.23	0.61
	1000	−5.49	−2.25	−0.89	0.05	0.86	−5.45	−2.24	−0.93	−0.10	0.62
0.9	2000	−3.30	−1.46	−0.56	0.16	0.85	−3.38	−1.57	−0.70	−0.06	0.58
	5000	−1.86	−0.85	−0.25	0.26	0.81	−2.00	−1.02	−0.48	−0.02	0.55
	10000	−1.25	−0.56	−0.15	0.25	0.77	−1.40	−0.77	−0.39	−0.02	0.51
	500	−13.68	−5.88	−2.85	−0.79	0.82	−13.22	−5.72	−2.82	−0.99	0.44
	1000	−8.25	−3.91	−1.91	−0.38	0.90	−8.13	−4.11	−2.24	−0.86	0.42
0.8	2000	−5.33	−2.74	−1.30	−0.13	0.91	−5.66	−3.18	−1.85	−0.78	0.39
	5000	−3.28	−1.72	−0.72	0.13	0.92	−3.80	−2.35	−1.48	−0.66	0.37
	10000	−2.28	−1.17	−0.45	0.22	0.89	−2.97	−1.94	−1.28	−0.63	0.34

Table C.4: Persistence bias, B_ρ

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

β	T	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	500	−75.78	−64.10	−48.11	−11.31	315.38	−73.71	−61.97	−46.30	−15.63	136.36
	1000	−68.61	−55.87	−39.02	−0.05	483.19	−68.03	−55.68	−40.87	−12.48	110.34
0.9	2000	−61.36	−47.80	−29.42	12.86	414.73	−61.69	−49.68	−35.36	−9.28	97.95
	5000	−51.39	−37.18	−17.52	24.78	341.78	−53.28	−41.72	−28.76	−5.91	87.94
	10000	−43.96	−29.66	−11.54	24.78	253.02	−47.32	−36.47	−24.58	−4.37	73.98
	500	−86.74	−79.90	−70.40	−45.75	393.00	−86.34	−79.70	−70.65	−52.62	51.97
	1000	−82.61	−74.87	−62.56	−30.73	746.96	−82.85	−75.96	−66.62	−47.38	54.26
0.8	2000	−78.08	−68.37	−53.71	−14.80	806.06	−79.13	−71.75	−62.41	−44.09	49.32
	5000	−70.78	−59.12	−40.84	9.73	980.63	−74.00	−66.39	−57.34	−39.33	50.97
	10000	−64.25	−50.61	−30.06	26.15	703.76	−69.97	−62.55	−53.87	−37.47	44.47

Table C.5: Unconditional variance bias, B_{σ^2}

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

β	T	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	500	−1.00	0.13	0.89	2.09	6.44	−0.84	0.15	0.80	1.94	6.06
	1000	−0.78	0.00	0.56	1.33	3.13	−0.55	0.12	0.60	1.30	3.09
0.9	2000	−0.69	−0.09	0.37	0.88	1.90	−0.44	0.08	0.48	0.95	1.92
	5000	−0.60	−0.15	0.18	0.54	1.10	−0.38	0.05	0.34	0.66	1.18
	10000	−0.53	−0.15	0.11	0.37	0.76	−0.34	0.04	0.28	0.51	0.86
	500	−0.61	0.68	2.17	4.30	9.95	−0.30	0.86	2.12	4.17	9.58
	1000	−0.66	0.35	1.46	2.89	5.94	−0.30	0.73	1.73	3.05	5.92
0.8	2000	−0.68	0.14	1.01	2.05	3.91	−0.28	0.65	1.45	2.39	4.14
	5000	−0.68	−0.07	0.57	1.31	2.41	−0.27	0.54	1.17	1.79	2.82
	10000	−0.66	−0.17	0.36	0.90	1.69	−0.25	0.50	1.00	1.49	2.21

Table C.6: One period in advance Value-at-Risk bias, $B_{+1}^{5\%}$

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

β	T	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	500	−170.75	9.58	46.00	65.93	83.54	−88.39	13.40	43.95	63.05	80.15
	1000	−232.74	0.04	36.04	55.21	72.34	−74.07	10.60	38.00	54.98	71.49
0.9	2000	−208.69	−10.26	26.30	45.64	62.25	−66.94	7.82	32.24	47.81	62.68
	5000	−181.24	−19.25	15.10	34.11	49.80	−61.01	4.93	25.65	38.92	52.06
	10000	−144.56	−19.25	9.78	26.53	41.35	−52.47	3.64	21.64	33.38	45.10
	500	−200.73	43.33	75.00	90.74	104.59	−38.29	51.27	75.38	90.38	103.70
	1000	−314.21	27.59	63.84	82.02	95.90	−39.81	45.16	69.45	83.84	96.36
0.8	2000	−330.63	12.66	52.57	71.98	87.48	−36.51	41.49	63.64	77.06	89.34
	5000	−376.23	−7.82	37.97	59.32	75.58	−37.61	36.37	57.05	69.13	80.62
	10000	−301.84	−20.26	26.93	48.89	66.13	−33.22	34.41	52.77	63.83	74.34

Table C.7: Long-run Value-at-Risk bias, $B^{5\%}_{+\infty}$

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Degrees of freedom η is 4. Asymmetry λ is 0. Persistence ρ is 0.99.

D Experiment

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−35.85	−13.10	6.83	31.75	78.27	−33.76	−10.86	9.17	34.22	79.87
	10	−36.80	−13.67	6.89	33.18	82.11	−35.06	−11.65	8.91	34.95	83.92
0.9	5	−42.30	−15.51	8.77	40.22	105.11	−40.88	−14.18	10.49	41.44	108.04
	4	−46.82	−18.29	8.59	43.20	119.16	−46.31	−17.12	9.58	45.46	127.44
	3	−59.50	−28.89	2.79	49.42	170.67	−59.71	−27.57	5.00	53.89	200.05
	30	−27.71	−8.84	6.72	25.58	56.98	−25.82	−6.66	9.07	27.85	59.72
	10	−29.42	−9.96	7.19	26.60	61.68	−27.29	−7.83	8.92	28.62	63.66
0.8	5	−34.54	−12.33	7.48	31.99	76.72	−33.63	−10.83	8.70	33.10	77.69
	4	−39.56	−15.34	5.88	32.77	90.79	−38.80	−14.23	7.24	34.26	93.10
	3	−53.54	−24.90	0.36	37.48	129.89	−54.43	−24.94	1.10	39.77	142.62

Table D.1: Intercept bias, B_ω

Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−62.30	−30.28	−7.35	17.77	54.67	−60.55	−29.59	−7.04	17.06	53.09
	10	−66.02	−32.66	−8.17	18.80	60.71	−65.11	−31.87	−8.39	17.68	57.15
0.9	5	−75.86	−39.58	−11.27	21.77	79.83	−74.52	−38.97	−11.99	20.36	75.89
	4	−82.83	−46.90	−15.25	23.36	94.04	−81.16	−46.53	−15.94	21.68	95.68
	3	−98.04	−63.02	−27.40	22.78	144.46	−96.17	−62.73	−27.55	22.73	162.57
	30	−29.89	−13.85	−2.64	9.11	26.23	−31.09	−15.78	−4.92	6.10	23.31
	10	−32.97	−16.38	−3.88	9.70	29.12	−34.31	−17.99	−6.32	6.39	25.37
0.8	5	−43.44	−22.63	−6.97	10.39	39.23	−44.76	−25.07	−9.88	6.84	35.39
	4	−52.45	−29.29	−10.34	10.72	48.91	−54.16	−31.74	−13.66	7.23	44.49
	3	−70.98	−44.22	−19.52	10.01	78.57	−73.67	−47.63	−23.79	5.08	70.66

Table D.2: News impact parameter bias, B_α

Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−2.75	−1.09	0.02	1.06	2.53	−2.75	−1.09	0.01	1.05	2.50
	10	−3.06	−1.21	−0.01	1.16	2.71	−3.01	−1.18	0.00	1.16	2.70
0.9	5	−4.22	−1.65	−0.09	1.37	3.25	−4.12	−1.60	−0.03	1.38	3.29
	4	−5.34	−1.92	−0.08	1.58	3.80	−5.36	−1.89	−0.04	1.64	3.88
	3	−9.18	−3.06	−0.20	2.10	5.20	−10.21	−3.14	−0.16	2.20	5.35
	30	−4.49	−1.85	−0.11	1.59	4.02	−4.27	−1.66	0.03	1.70	4.07
	10	−5.25	−2.02	−0.06	1.91	4.46	−4.96	−1.82	0.07	1.98	4.51
0.8	5	−7.04	−2.76	−0.11	2.42	5.89	−6.72	−2.49	0.12	2.62	5.97
	4	−8.83	−3.22	−0.01	2.87	6.99	−8.75	−3.10	0.19	3.14	7.37
	3	−15.44	−5.46	−0.30	3.98	10.09	−16.06	−5.22	0.04	4.36	10.85

Table D.3: Feedback bias, B_β

Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−1.53	−0.61	−0.13	0.26	0.70	−1.72	−0.78	−0.29	0.09	0.54
	10	−1.66	−0.69	−0.17	0.28	0.76	−1.88	−0.88	−0.35	0.09	0.58
0.9	5	−2.40	−1.03	−0.32	0.27	0.85	−2.66	−1.25	−0.57	−0.02	0.58
	4	−3.18	−1.39	−0.50	0.19	0.88	−3.39	−1.60	−0.75	−0.10	0.58
	3	−5.61	−2.61	−1.18	−0.12	0.91	−6.10	−2.81	−1.47	−0.47	0.48
	30	−2.37	−1.08	−0.34	0.30	0.87	−2.83	−1.54	−0.80	−0.18	0.53
	10	−2.76	−1.30	−0.45	0.25	0.88	−3.20	−1.78	−0.96	−0.30	0.50
0.8	5	−3.95	−2.00	−0.82	0.12	0.94	−4.41	−2.52	−1.45	−0.53	0.46
	4	−5.33	−2.75	−1.27	−0.06	0.98	−5.69	−3.20	−1.86	−0.77	0.40
	3	−9.50	−5.10	−2.70	−0.77	1.01	−10.09	−5.59	−3.42	−1.66	0.13

Table D.4: Persistence bias, B_ρ

Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−33.62	−13.68	0.56	14.82	35.66	−35.77	−16.50	−2.76	11.32	31.53
	10	−37.77	−15.39	0.31	16.31	40.68	−39.83	−18.88	−3.44	12.10	36.01
0.9	5	−51.43	−21.99	−1.51	20.14	53.68	−54.54	−26.11	−6.78	14.24	45.51
	4	−63.16	−29.39	−5.35	20.70	63.62	−67.70	−33.49	−9.97	15.45	55.33
	3	−96.35	−47.80	−15.81	21.14	91.14	−107.19	−52.29	−20.53	14.61	84.98
	30	−55.65	−23.58	−1.42	21.41	55.42	−56.77	−26.47	−5.71	15.63	48.75
	10	−62.24	−26.47	−2.23	24.11	61.67	−63.77	−30.13	−6.55	17.56	53.07
0.8	5	−86.26	−37.30	−3.91	30.23	82.27	−88.59	−41.84	−10.07	22.23	72.80
	4	−109.49	−48.40	−6.55	34.75	101.41	−115.65	−52.91	−12.64	27.66	95.04
	3	−174.72	−73.92	−17.37	42.21	148.38	−187.34	−78.71	−21.96	34.92	139.34

Table D.5: Leverage bias, B_γ

Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−42.08	−25.28	−5.84	26.83	167.94	−46.40	−31.95	−16.70	7.79	87.12
	10	−45.57	−29.13	−8.70	30.47	231.25	−49.50	−35.35	−20.03	6.00	102.82
0.9	5	−55.30	−39.65	−19.04	28.06	431.71	−58.04	−45.23	−30.47	−4.87	101.05
	4	−62.70	−48.84	−30.33	15.52	560.06	−64.38	−52.86	−38.96	−13.31	106.82
	3	−75.49	−66.95	−54.46	−24.41	621.40	−76.10	−68.38	−58.86	−40.00	56.57
	30	−61.28	−45.26	−20.80	38.51	568.21	−65.68	−54.26	−39.88	−13.99	101.21
	10	−65.37	−49.64	−26.00	31.17	589.58	−68.99	−58.00	−44.92	−21.00	89.32
0.8	5	−73.21	−61.05	−41.90	10.72	1176.42	−75.37	−66.81	−56.01	−34.55	72.21
	4	−78.27	−68.74	−53.54	−10.02	3581.02	−79.53	−72.50	−63.15	−44.65	48.03
	3	−86.79	−81.46	−73.43	−50.23	1.74e6	−87.10	−82.79	−77.27	−66.13	−5.94

Table D.6: Unconditional variance bias, B_{σ^2}

Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−0.48	−0.17	0.05	0.31	0.77	−0.39	−0.06	0.17	0.44	0.93
	10	−0.54	−0.19	0.08	0.38	0.89	−0.41	−0.05	0.22	0.52	1.04
0.9	5	−0.65	−0.18	0.20	0.61	1.37	−0.43	0.04	0.39	0.78	1.54
	4	−0.69	−0.11	0.37	0.89	1.91	−0.44	0.12	0.54	1.05	2.10
	3	−0.64	0.23	0.95	1.85	3.68	−0.31	0.49	1.12	1.97	3.91
	30	−0.67	−0.23	0.23	0.76	1.62	−0.41	0.14	0.59	1.11	1.97
	10	−0.69	−0.20	0.31	0.92	1.94	−0.39	0.23	0.72	1.28	2.27
0.8	5	−0.72	−0.08	0.62	1.47	2.87	−0.34	0.44	1.12	1.88	3.23
	4	−0.71	0.09	0.98	2.07	3.92	−0.26	0.66	1.47	2.44	4.20
	3	−0.65	0.75	2.21	3.97	7.23	0.04	1.46	2.79	4.36	7.64

Table D.7: One period in advance Value-at-Risk bias, $B_{+1}^{5\%}$

Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−104.76	−20.75	4.88	22.30	39.30	−60.52	−6.29	14.36	28.80	44.06
	10	−134.88	−23.40	7.32	26.01	43.13	−69.77	−4.87	17.39	32.23	47.59
0.9	5	−214.80	−21.65	16.49	36.71	54.51	−68.74	4.06	27.33	42.75	57.94
	4	−258.10	−12.30	27.19	46.84	64.02	−72.06	11.33	35.97	51.56	66.32
	3	−277.30	21.48	53.48	69.92	83.05	−41.33	37.08	58.99	71.99	84.07
	30	−260.71	−29.10	18.10	42.79	62.13	−68.83	11.94	36.95	53.25	68.12
	10	−267.45	−23.90	22.99	47.76	67.69	−61.84	18.29	42.41	57.89	72.88
0.8	5	−423.17	−8.59	39.11	61.83	79.35	−51.37	31.41	55.39	69.73	82.85
	4	−833.35	8.46	52.37	72.53	87.81	−35.64	42.11	64.63	78.23	90.07
	3	−21544.83	48.45	79.70	93.66	104.70	4.96	68.76	86.07	96.24	105.42

Table D.8: Long-run Value-at-Risk bias, $B^{5\%}_{+\infty}$

Model is GJR(1,1,1) with leverage parameter γ equal to 0.1. Errors are simulated from Skewed Student distribution. Likelihood is based on normal distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

E Experiment

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−37.28	−12.64	10.46	40.15	97.20	−36.21	−10.98	11.98	41.59	98.88
	10	−37.58	−12.54	10.23	38.24	94.61	−36.39	−11.09	11.36	39.63	95.29
0.9	5	−36.52	−12.87	8.49	33.44	83.70	−35.82	−12.15	8.76	33.26	82.96
	4	−35.64	−13.26	6.70	30.15	73.48	−36.11	−13.91	5.55	28.33	70.81
	3	−38.17	−16.30	1.74	22.39	61.17	−40.15	−19.89	−3.31	15.48	49.53
	30	−27.75	−8.62	6.97	25.94	60.08	−26.07	−6.59	9.15	27.88	62.34
	10	−28.35	−9.49	6.77	26.04	59.27	−27.04	−7.68	8.38	27.60	60.61
0.8	5	−29.17	−10.21	5.57	23.72	55.91	−28.36	−9.77	5.66	23.29	54.99
	4	−29.97	−11.65	3.99	22.29	53.14	−30.18	−12.06	2.92	20.48	50.19
	3	−34.31	−16.16	−1.19	16.43	46.04	−36.59	−19.55	−6.01	9.28	35.64

Table E.1: Intercept bias, B_ω

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on symmetric Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−25.22	−11.51	−1.67	8.75	23.49	−25.97	−12.36	−2.82	7.35	21.46
	10	−26.59	−12.13	−1.99	8.27	24.35	−27.37	−13.18	−3.58	6.25	21.75
0.9	5	−28.64	−13.36	−2.82	8.03	25.13	−30.08	−15.58	−5.61	4.61	20.69
	4	−30.39	−15.32	−3.79	7.76	25.44	−32.72	−18.57	−7.88	2.86	18.58
	3	−35.33	−19.30	−6.72	5.80	25.46	−40.46	−25.77	−14.36	−2.99	14.30
	30	−19.75	−9.08	−1.78	5.68	16.19	−21.29	−11.18	−4.44	2.50	12.89
	10	−21.26	−10.43	−2.60	5.39	17.20	−23.20	−12.90	−5.58	1.93	13.29
0.8	5	−24.08	−12.50	−4.05	5.09	18.27	−27.12	−16.17	−8.09	−0.03	12.31
	4	−26.43	−14.20	−5.36	4.03	17.08	−30.04	−18.91	−10.56	−2.04	10.90
	3	−33.06	−18.63	−8.62	1.93	17.13	−39.06	−26.86	−17.52	−7.45	6.68

Table E.2: News impact parameter bias, B_α

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on symmetric Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−3.06	−1.27	−0.14	0.92	2.42	−3.03	−1.25	−0.12	0.93	2.42
	10	−3.09	−1.24	−0.11	0.95	2.46	−3.04	−1.20	−0.08	0.97	2.47
0.9	5	−3.17	−1.25	−0.07	1.03	2.56	−3.07	−1.18	−0.02	1.06	2.58
	4	−3.13	−1.20	−0.05	1.10	2.62	−2.99	−1.09	0.03	1.15	2.65
	3	−3.41	−1.26	−0.01	1.18	2.78	−3.17	−1.11	0.07	1.23	2.78
	30	−4.56	−1.87	−0.12	1.56	3.93	−4.34	−1.70	0.02	1.63	3.98
	10	−4.91	−1.96	−0.11	1.77	4.08	−4.62	−1.75	0.05	1.86	4.17
0.8	5	−5.24	−2.05	−0.05	1.94	4.41	−4.87	−1.81	0.15	2.07	4.51
	4	−5.46	−2.08	−0.00	2.03	4.72	−5.02	−1.74	0.24	2.17	4.83
	3	−6.21	−2.34	0.05	2.29	5.35	−5.48	−1.90	0.32	2.43	5.40

Table E.3: Feedback bias, B_β

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on symmetric Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−1.67	−0.71	−0.19	0.22	0.68	−1.73	−0.77	−0.28	0.12	0.54
	10	−1.76	−0.75	−0.21	0.24	0.73	−1.84	−0.84	−0.31	0.10	0.56
0.9	5	−1.94	−0.84	−0.23	0.25	0.78	−2.12	−1.01	−0.45	0.02	0.56
	4	−2.12	−0.92	−0.28	0.26	0.79	−2.38	−1.22	−0.60	−0.08	0.53
	3	−2.77	−1.29	−0.51	0.17	0.81	−3.37	−1.93	−1.15	−0.48	0.40
	30	−2.42	−1.07	−0.33	0.28	0.84	−2.68	−1.46	−0.76	−0.17	0.52
	10	−2.71	−1.23	−0.41	0.25	0.82	−3.07	−1.69	−0.91	−0.24	0.50
0.8	5	−3.26	−1.57	−0.60	0.17	0.83	−3.87	−2.24	−1.32	−0.52	0.43
	4	−3.74	−1.87	−0.80	0.06	0.81	−4.54	−2.76	−1.72	−0.80	0.38
	3	−5.25	−2.76	−1.39	−0.21	0.75	−6.57	−4.31	−2.99	−1.71	0.01

Table E.4: Persistence bias, B_ρ

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on symmetric Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−40.77	−24.90	−7.46	22.44	144.79	−41.85	−27.57	−12.79	10.10	74.45
	10	−44.86	−28.29	−8.78	25.78	192.23	−46.25	−31.69	−16.03	8.37	85.06
0.9	5	−53.02	−35.71	−13.87	32.18	294.13	−55.33	−41.88	−26.70	−0.19	101.14
	4	−58.53	−41.77	−18.52	32.42	351.79	−61.97	−49.72	−35.71	−10.21	95.12
	3	−70.49	−56.10	−34.30	18.67	403.85	−75.32	−67.03	−56.84	−37.52	64.84
	30	−61.28	−44.50	−19.96	35.94	443.60	−64.32	−52.46	−38.39	−12.92	97.38
	10	−64.87	−48.68	−25.32	30.76	396.62	−68.04	−56.86	−43.81	−19.05	90.18
0.8	5	−71.49	−57.31	−34.95	19.86	461.13	−74.89	−65.90	−55.11	−34.19	69.89
	4	−75.76	−62.97	−43.02	6.33	395.88	−79.28	−71.85	−62.77	−44.63	55.31
	3	−83.37	−74.03	−59.02	−18.45	292.69	−87.04	−82.54	−76.90	−65.51	−0.07

Table E.5: Unconditional variance bias, B_{σ^2}

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on symmetric Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−0.62	−0.23	0.06	0.41	0.98	−0.54	−0.17	0.12	0.44	1.02
	10	−1.11	−0.47	0.03	0.56	1.46	−1.05	−0.42	0.06	0.57	1.46
0.9	5	−2.58	−1.19	−0.15	1.03	2.93	−2.64	−1.31	−0.35	0.76	2.54
	4	−3.88	−1.91	−0.35	1.36	3.99	−4.15	−2.33	−0.87	0.61	3.04
	3	−8.15	−4.48	−1.61	1.46	5.86	−9.65	−6.49	−3.92	−1.20	3.17
	30	−0.79	−0.25	0.23	0.77	1.72	−0.53	0.07	0.54	1.05	1.95
	10	−1.14	−0.37	0.24	0.94	2.04	−0.86	−0.08	0.53	1.19	2.27
0.8	5	−2.41	−0.98	0.08	1.24	3.12	−2.20	−0.84	0.15	1.20	2.89
	4	−3.59	−1.69	−0.21	1.37	3.92	−3.59	−1.82	−0.48	0.97	3.25
	3	−7.44	−4.12	−1.63	0.97	5.10	−8.52	−5.64	−3.43	−0.99	2.91

Table E.6: One period in advance Value-at-Risk bias, $B_{+1}^{5\%}$
Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on symmetric Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−92.87	−17.52	6.25	21.94	37.89	−52.77	−8.10	10.88	24.50	39.05
	10	−116.70	−19.99	7.39	25.20	42.35	−59.27	−6.75	13.76	28.54	43.89
0.9	5	−162.06	−24.62	11.84	32.60	51.74	−68.79	0.16	23.66	39.09	54.55
	4	−185.13	−24.79	16.01	38.97	58.56	−65.28	8.63	32.60	47.85	63.04
	3	−204.73	−14.70	31.16	55.50	75.13	−46.70	34.47	56.43	70.03	82.77
	30	−219.02	−27.29	17.32	41.95	62.14	−66.60	10.99	35.38	51.08	66.23
	10	−202.07	−23.61	22.34	46.65	66.99	−62.35	16.50	41.19	56.45	71.50
0.8	5	−225.15	−15.59	31.82	57.01	76.65	−49.91	31.05	54.29	68.44	82.07
	4	−201.80	−5.13	40.33	64.40	83.50	−40.50	42.09	64.12	77.22	89.61
	3	−161.47	15.95	59.19	80.66	97.40	0.06	67.89	85.43	95.75	105.28

Table E.7: Long-run Value-at-Risk bias, $B_{+\infty}^{5\%}$
Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on symmetric Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

F Experiment

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−37.84	−11.75	11.29	40.73	100.00	−36.21	−10.26	12.77	42.16	100.53
	10	−38.02	−12.25	10.72	38.94	94.59	−36.57	−10.85	11.93	39.58	95.83
0.9	5	−36.63	−12.49	8.28	34.01	80.72	−35.93	−11.97	8.61	34.05	80.56
	4	−36.61	−14.16	6.03	31.03	76.34	−36.62	−14.48	4.99	29.19	72.30
	3	−38.36	−17.11	1.73	24.04	65.83	−40.49	−20.71	−3.59	16.28	51.46
	30	−28.08	−9.03	7.46	26.30	59.95	−26.32	−6.92	9.56	28.27	61.27
	10	−28.22	−9.34	6.95	26.61	60.22	−26.76	−7.66	8.38	27.90	61.27
0.8	5	−29.37	−10.08	6.01	24.55	56.03	−28.18	−9.87	5.69	24.05	55.14
	4	−29.96	−10.75	5.02	22.60	53.42	−30.00	−11.68	3.50	20.48	49.91
	3	−34.12	−14.91	−0.59	16.96	47.38	−36.32	−19.00	−5.80	9.83	35.20

Table F.1: Intercept bias, B_ω

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−25.50	−11.46	−1.64	8.56	23.65	−25.80	−12.35	−2.81	6.92	21.68
	10	−26.79	−12.38	−1.97	8.87	24.62	−27.27	−13.42	−3.43	6.82	21.89
0.9	5	−28.61	−13.47	−2.53	8.95	25.46	−30.24	−15.80	−5.49	5.11	20.89
	4	−30.23	−14.76	−3.44	7.97	25.73	−32.60	−17.99	−7.59	2.92	19.42
	3	−35.59	−18.75	−6.32	6.67	26.22	−40.66	−25.51	−14.26	−2.80	15.60
	30	−20.08	−9.58	−2.19	5.29	16.33	−21.85	−11.56	−4.77	2.33	13.00
	10	−21.70	−10.45	−2.66	5.05	16.66	−23.86	−12.80	−5.56	1.84	12.67
0.8	5	−24.93	−12.76	−3.86	4.66	17.31	−27.89	−16.14	−8.02	0.04	12.20
	4	−26.74	−13.80	−4.85	4.31	17.69	−30.13	−18.44	−10.28	−1.65	11.19
	3	−32.97	−18.45	−8.20	2.30	17.88	−38.84	−26.20	−17.16	−7.37	7.90

Table F.2: News impact parameter bias, B_α

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−2.99	−1.26	−0.15	0.92	2.44	−2.96	−1.23	−0.13	0.93	2.44
	10	−3.16	−1.28	−0.13	0.99	2.46	−3.10	−1.23	−0.10	1.01	2.47
0.9	5	−3.17	−1.28	−0.10	1.04	2.58	−3.06	−1.21	−0.04	1.07	2.60
	4	−3.24	−1.24	−0.03	1.09	2.66	−3.05	−1.12	0.04	1.12	2.65
	3	−3.49	−1.31	−0.02	1.20	2.87	−3.18	−1.14	0.09	1.23	2.83
	30	−4.60	−1.84	−0.11	1.59	4.02	−4.35	−1.68	0.03	1.66	4.10
	10	−4.67	−1.94	−0.09	1.71	4.27	−4.38	−1.75	0.05	1.80	4.30
0.8	5	−5.13	−2.09	−0.07	1.93	4.74	−4.75	−1.81	0.13	2.03	4.71
	4	−5.48	−2.18	−0.08	1.94	4.75	−5.04	−1.88	0.18	2.11	4.82
	3	−6.12	−2.42	−0.01	2.22	5.20	−5.52	−1.97	0.27	2.38	5.25

Table F.3: Feedback bias, B_β

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−1.71	−0.71	−0.19	0.22	0.66	−1.76	−0.77	−0.28	0.11	0.53
	10	−1.75	−0.74	−0.20	0.23	0.72	−1.83	−0.83	−0.30	0.09	0.54
0.9	5	−1.90	−0.82	−0.22	0.26	0.78	−2.08	−1.01	−0.44	0.02	0.54
	4	−2.07	−0.89	−0.26	0.26	0.80	−2.41	−1.19	−0.58	−0.07	0.53
	3	−2.67	−1.26	−0.47	0.18	0.81	−3.32	−1.90	−1.15	−0.47	0.41
	30	−2.43	−1.12	−0.37	0.24	0.83	−2.72	−1.49	−0.80	−0.19	0.53
	10	−2.75	−1.23	−0.43	0.21	0.83	−3.05	−1.68	−0.92	−0.26	0.52
0.8	5	−3.33	−1.59	−0.64	0.13	0.80	−3.84	−2.26	−1.33	−0.53	0.44
	4	−3.73	−1.90	−0.81	0.06	0.82	−4.49	−2.76	−1.70	−0.76	0.36
	3	−5.11	−2.79	−1.37	−0.23	0.76	−6.51	−4.31	−2.96	−1.68	0.02

Table F.4: Persistence bias, B_ρ

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−41.28	−24.93	−7.26	22.36	134.70	−41.86	−27.56	−12.47	9.78	74.79
	10	−44.61	−27.89	−8.34	25.08	170.58	−45.83	−31.29	−15.70	7.86	81.16
0.9	5	−52.28	−35.22	−12.79	32.00	288.02	−55.21	−41.34	−26.49	−0.49	97.05
	4	−57.94	−40.51	−17.77	33.10	352.66	−61.66	−49.63	−35.67	−8.87	102.42
	3	−69.93	−55.11	−32.75	21.25	400.77	−75.11	−66.84	−56.85	−36.79	62.74
	30	−61.62	−45.41	−22.44	32.11	416.16	−64.67	−53.12	−39.37	−14.31	96.92
	10	−65.07	−48.93	−26.04	27.81	442.75	−68.02	−57.05	−43.90	−19.55	102.43
0.8	5	−71.41	−57.39	−36.76	15.56	390.56	−74.96	−66.05	−55.15	−34.56	75.95
	4	−75.89	−62.59	−42.76	6.17	409.11	−78.98	−71.56	−62.43	−43.71	53.08
	3	−83.62	−73.63	−57.94	−19.65	281.71	−86.83	−82.31	−76.68	−65.16	2.60

Table F.5: Unconditional variance bias, B_{σ^2}

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−2.96	−1.19	0.08	1.37	3.28	−2.87	−1.13	0.14	1.42	3.31
	10	−3.33	−1.29	0.07	1.49	3.62	−3.30	−1.24	0.10	1.51	3.62
0.9	5	−4.17	−1.73	−0.02	1.72	4.30	−4.24	−1.88	−0.24	1.47	3.94
	4	−5.11	−2.28	−0.25	1.85	4.99	−5.42	−2.77	−0.84	1.16	4.17
	3	−8.69	−4.54	−1.49	1.71	6.47	−10.36	−6.65	−3.90	−0.93	3.76
	30	−2.79	−0.99	0.39	1.73	3.68	−2.48	−0.67	0.66	1.98	3.94
	10	−3.11	−1.13	0.33	1.83	3.98	−2.80	−0.84	0.61	2.08	4.17
0.8	5	−3.85	−1.53	0.19	2.00	4.52	−3.67	−1.42	0.22	1.95	4.37
	4	−4.85	−2.10	−0.10	2.01	4.92	−4.88	−2.23	−0.40	1.56	4.25
	3	−8.14	−4.25	−1.40	1.47	6.01	−9.24	−5.73	−3.24	−0.63	3.34

Table F.6: One period in advance Value-at-Risk bias, $B_{+1}^{5\%}$

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.

β	η	No Variance Targeting					Variance Targeting				
		5	25	50	75	95	5	25	50	75	95
	30	−87.50	−17.47	6.09	21.97	38.44	−52.98	−7.85	10.60	24.49	39.06
	10	−106.08	−19.47	7.01	24.81	42.07	−56.91	−6.34	13.46	28.15	43.42
0.9	5	−159.52	−24.49	10.88	32.09	50.86	−66.41	0.40	23.46	38.51	54.40
	4	−185.47	−25.28	15.33	37.62	57.81	−69.54	7.46	32.56	47.74	62.63
	3	−203.60	−16.63	29.60	54.28	74.29	−45.35	33.71	56.44	69.76	82.42
	30	−209.21	−24.57	19.62	42.96	62.58	−66.33	12.22	36.41	51.86	66.71
	10	−218.71	−21.47	23.03	46.94	67.28	−69.54	16.96	41.28	56.69	71.47
0.8	5	−199.83	−12.33	33.68	57.12	76.54	−53.70	31.43	54.33	68.65	82.18
	4	−206.65	−5.00	40.04	63.88	83.72	−39.02	41.08	63.66	76.77	89.08
	3	−156.88	17.04	57.81	80.02	97.91	−2.13	67.40	85.05	95.30	104.80

Table F.7: Long-run Value-at-Risk bias, $B^{5\%}_{+\infty}$

Model is GARCH(1,1). Errors are simulated from Skewed Student distribution. Likelihood is based on Skewed Student distribution. Sample size T is 2000. Asymmetry λ is 0. Persistence ρ is 0.99.