

Table S1: Simulation Study Results for Stochastic Coalescent Trees

$\eta$	Inference	Truth	Mean	Median	Error	Bias	Relative HPD width	95% HPD accuracy
$\mathcal{R}_0$	Stoch.Coal.SIR	2.50	2.81	2.64	0.11	0.08	0.95	100.00%
	Deter.Coal.SIR	2.50	2.73	2.65	0.14	0.06	0.85	96.00%
$\gamma$	Stoch.Coal.SIR	0.30	0.28	0.26	0.16	-0.11	1.17	99.00%
	Deter.Coal.SIR	0.30	0.30	0.28	0.18	-0.03	1.20	99.00%
$S_{(0)}$	Stoch.Coal.SIR	999	1456	986	0.21	0.02	3.93	100.00%
	Deter.Coal.SIR	999	1720	1057	0.48	0.24	4.28	99.00%
$z_{(0)}$	Stoch.Coal.SIR	(varies)	42.36	40.43	0.03	0.02	0.20	98.00%
	Deter.Coal.SIR	(varies)	41.25	39.77	0.03	0.01	0.07	64.00%