1 Appendix: Out-of-Sample MSE

Table 1: Descriptive statistics of the out-of-sample MSE of each model. "MLP" refers to the multi-layer perceptron; "RW" is the random walk; "Ridge CV", "LASSO CV", and "Enet CV" are the Ridge, LASSO, and Elastic Net regressions with parameters chosen via cross-validation; "BRidge" is the Bayesian Ridge; "BLASSO" is the Bayesian LASSO; and "MA" is the moving average model suggested by **Atkeson2001**.

Model	MSE	1	2	3	6	12	3M	6M	12M
LSTM	Min.	0.14	0.30	0.40	0.37	0.39	0.24	0.28	0.30
	Q1	0.24	0.46	0.50	0.50	0.51	0.37	0.47	0.41
	Median	0.32	0.51	0.55	0.55	0.57	0.42	0.55	0.49
	Q3	0.40	0.60	0.60	0.64	0.62	0.49	0.68	0.57
	Max.	0.76	1.12	0.96	1.48	1.15	0.73	1.21	1.15
ConvLSTM	Min.	0.09	0.31	0.39	0.39	0.43	0.22	0.27	0.18
	Q1	0.15	0.40	0.44	0.45	0.46	0.30	0.39	0.29
	Median	0.17	0.42	0.45	0.46	0.46	0.33	0.43	0.34
	Q3	0.19	0.44	0.46	0.46	0.47	0.37	0.50	0.40
	Max.	0.25	0.47	0.47	0.47	0.48	0.59	0.86	0.62
MLP	Min.	0.75	0.86	0.88	0.89	0.93	0.88	0.90	0.99
	Q1	0.92	1.10	1.10	1.10	1.09	1.05	1.09	1.11
	Median	0.99	1.16	1.16	1.16	1.18	1.11	1.15	1.17
	Q3	1.07	1.22	1.21	1.25	1.25	1.17	1.24	1.24
	Max.	1.31	1.36	1.34	1.48	1.48	1.32	1.42	1.43
RW	Min.	1.53	1.52	1.60	1.51	1.38	1.46	1.46	1.48
	Q1	1.89	1.84	1.87	1.88	1.81	1.90	1.94	1.91
	Median	2.04	1.99	1.99	2.05	1.97	2.01	2.06	2.07
	Q3	2.15	2.11	2.16	2.19	2.18	2.14	2.19	2.24
	Max.	2.54	2.55	2.61	2.54	2.66	2.43	2.53	2.62
Ridge CV	Min.	0.66	0.88	0.83	0.80	0.82	0.87	0.95	0.94
	Q1	0.80	0.99	0.99	0.99	0.97	0.97	0.99	0.99
	Median	0.85	1.01	1.02	1.03	1.03	0.99	1.00	1.00

Table 1: Descriptive statistics of the out-of-sample MSE of each model. "MLP" refers to the multi-layer perceptron; "RW" is the random walk; "Ridge CV", "LASSO CV", and "Enet CV" are the Ridge, LASSO, and Elastic Net regressions with parameters chosen via cross-validation; "BRidge" is the Bayesian Ridge; "BLASSO" is the Bayesian LASSO; and "MA" is the moving average model suggested by **Atkeson2001**.

Model	MSE	1	2	3	6	12	3M	6M	12M
	Q3	0.89	1.02	1.03	1.04	1.07	1.01	1.02	1.01
	Max.	1.30	1.07	1.07	1.11	1.18	1.19	1.20	1.15
BRidge	Min.	0.61	0.94	0.85	0.87	0.85	0.83	0.88	0.94
	Q1	0.78	1.03	1.03	1.03	1.02	0.97	1.00	1.02
	Median	0.85	1.07	1.08	1.08	1.10	1.01	1.04	1.05
	Q3	0.91	1.11	1.11	1.14	1.15	1.07	1.10	1.11
Max.	1.20	1.26	1.23	1.32	1.36	1.21	1.26	1.26	
LASSO CV	Min.	0.68	0.84	0.84	0.86	0.81	0.88	0.95	0.95
	Q1	0.78	1.00	1.00	0.99	0.98	0.96	1.00	1.00
	Median	0.81	1.01	1.01	1.02	1.03	1.00	1.00	1.00
	Q3	0.87	1.01	1.02	1.04	1.07	1.00	1.00	1.00
	Max.	1.08	1.09	1.12	1.15	1.22	1.07	1.08	1.05
LASSO	Min.	0.68	0.84	0.83	0.79	0.81	0.84	0.94	0.98
	Q1	0.78	1.00	0.99	0.99	0.97	0.96	0.99	0.99
	Median	0.83	1.01	1.01	1.02	1.02	0.98	1.00	1.00
	Q3	0.90	1.01	1.02	1.04	1.07	1.00	1.00	1.00
	Max.	1.03	1.03	1.03	1.06	1.13	1.12	1.05	1.04
Enet CV	Min.	0.49	0.84	0.83	0.78	0.80	0.83	0.91	0.91
	Q1	0.71	0.98	0.98	0.98	0.95	0.93	0.96	0.97
	Median	0.76	1.00	1.00	1.01	1.01	0.96	0.98	0.99
	Q3	0.83	1.01	1.01	1.03	1.06	0.98	1.00	1.00
	Max.	0.97	1.01	1.02	1.05	1.13	1.00	1.00	1.00
SVR	Min.	0.83	0.86	0.83	0.81	0.81	0.90	0.89	0.94
	Q1	0.90	1.01	1.01	1.00	1.00	0.97	0.99	1.00

Table 1: Descriptive statistics of the out-of-sample MSE of each model. "MLP" refers to the multi-layer perceptron; "RW" is the random walk; "Ridge CV", "LASSO CV", and "Enet CV" are the Ridge, LASSO, and Elastic Net regressions with parameters chosen via cross-validation; "BRidge" is the Bayesian Ridge; "BLASSO" is the Bayesian LASSO; and "MA" is the moving average model suggested by **Atkeson2001**.

Model	MSE	1	2	3	6	12	3M	6M	12M
	Median	0.92	1.03	1.03	1.05	1.06	0.99	1.02	1.03
	Q3	0.94	1.06	1.05	1.08	1.10	1.02	1.04	1.06
	Max.	0.99	1.14	1.14	1.16	1.35	1.08	1.17	1.20
RF	Min.	0.75	0.92	0.89	0.87	0.84	0.87	0.94	0.93
	Q1	0.87	1.05	1.04	1.05	1.03	1.01	1.02	1.02
	Median	0.93	1.09	1.09	1.10	1.10	1.05	1.05	1.07
	Q3	1.00	1.13	1.13	1.15	1.17	1.08	1.10	1.10
	Max.	1.21	1.36	1.27	1.30	1.47	1.15	1.24	1.22
BART	Min.	0.73	0.91	0.85	0.86	0.83	0.88	0.92	0.92
	Q1	0.86	1.01	1.02	1.02	1.02	0.96	0.98	1.00
	Median	0.91	1.05	1.06	1.07	1.08	1.00	1.01	1.02
	Q3	0.96	1.08	1.10	1.11	1.13	1.04	1.04	1.04
	Max.	1.23	1.16	1.27	1.27	1.35	1.12	1.14	1.13
Bagging	Min.	0.80	0.97	0.89	0.87	0.94	0.90	0.91	0.95
	Q1	0.94	1.12	1.08	1.08	1.10	1.05	1.05	1.05
	Median	0.99	1.16	1.14	1.15	1.17	1.10	1.09	1.12
	Q3	1.06	1.21	1.21	1.21	1.23	1.15	1.14	1.17
	Max.	1.31	1.42	1.41	1.32	1.54	1.28	1.40	1.27
kNN	Min.	0.95	0.86	0.90	0.85	0.88	0.92	0.92	0.88
	Q1	0.98	1.00	1.00	1.01	1.00	1.00	1.01	1.00
	Median	1.00	1.03	1.04	1.05	1.05	1.02	1.03	1.03
	Q3	1.02	1.07	1.07	1.07	1.11	1.05	1.05	1.06
	Max.	1.07	1.14	1.14	1.17	1.26	1.12	1.11	1.14
Huber	Min.	0.67	1.68	1.51	1.54	1.54	1.42	1.38	1.55

Table 1: Descriptive statistics of the out-of-sample MSE of each model. "MLP" refers to the multi-layer perceptron; "RW" is the random walk; "Ridge CV", "LASSO CV", and "Enet CV" are the Ridge, LASSO, and Elastic Net regressions with parameters chosen via cross-validation; "BRidge" is the Bayesian Ridge; "BLASSO" is the Bayesian LASSO; and "MA" is the moving average model suggested by **Atkeson2001**.

Model	MSE	1	2	3	6	12	3M	6M	12M
	Q1	0.93	1.99	2.03	1.98	2.01	1.67	1.88	1.92
	Median	1.04	2.18	2.25	2.32	2.20	1.85	2.04	2.14
	Q3	1.19	2.42	2.43	2.55	2.52	2.04	2.25	2.44
	Max.	1.49	3.22	3.29	3.28	3.19	2.45	2.93	2.97
Theil-Sen	Min.	0.67	1.77	1.51	1.66	1.59	1.46	1.45	1.62
	Q1	0.94	2.08	2.10	2.14	2.11	1.71	1.93	1.97
Median	1.04	2.31	2.33	2.44	2.33	1.90	2.09	2.19	
	Q3	1.20	2.55	2.58	2.68	2.60	2.11	2.30	2.52
	Max.	1.53	3.44	3.49	3.49	3.36	2.57	2.97	3.02
Factors	Min.	0.74	0.87	0.88	0.87	0.86	0.94	0.93	0.90
	Q1	0.93	1.01	1.01	1.02	1.02	1.01	1.01	1.01
	Median	1.01	1.04	1.05	1.07	1.08	1.06	1.05	1.03
	Q3	1.08	1.08	1.08	1.11	1.13	1.10	1.11	1.08
	Max.	1.36	1.28	1.24	3.69	1.29	1.27	1.42	2.89
GARCH	Min.	0.24	0.37	0.38	0.35	0.39	0.50	0.45	0.39
	Q1	0.49	0.72	0.83	0.79	0.82	0.67	0.60	0.64
	Median	0.64	0.93	1.05	1.11	1.09	0.72	0.70	0.70
	Q3	0.89	1.34	1.52	1.52	1.46	0.82	0.80	0.83
	Max.	2.19	3.09	3.31	3.67	3.93	1.20	1.30	1.38
VECM	Min.	0.38	0.83	0.99	0.84	1.10	0.53	0.49	0.36
	Q1	0.63	1.28	1.45	1.27	1.42	0.78	0.79	0.77
	Median	0.70	1.44	1.63	1.48	1.57	0.91	0.96	1.13
	Q3	0.77	1.65	1.94	1.70	1.82	1.05	1.15	1.38
	Max.	1.06	2.23	2.95	2.43	3.31	1.51	1.59	2.08

Table 1: Descriptive statistics of the out-of-sample MSE of each model. "MLP" refers to the multi-layer perceptron; "RW" is the random walk; "Ridge CV", "LASSO CV", and "Enet CV" are the Ridge, LASSO, and Elastic Net regressions with parameters chosen via cross-validation; "BRidge" is the Bayesian Ridge; "BLASSO" is the Bayesian LASSO; and "MA" is the moving average model suggested by **Atkeson2001**.

Model	MSE	1	2	3	6	12	3M	6M	12M
SETAR	Min.	0.55	0.71	0.79	0.75	0.65	1.04	0.98	0.67
	Q1	0.80	0.99	1.11	1.04	1.04	1.27	1.33	1.53
	Median	0.93	1.16	1.27	1.20	1.17	1.42	1.55	1.81
	Q3	1.06	1.33	1.48	1.36	1.41	1.59	1.74	2.01
	Max.	1.37	1.75	2.10	1.83	2.01	1.96	2.23	2.66
MA	Min.	0.65	0.78	0.76	0.71	0.71	0.78	0.72	0.67
	Q1	0.84	1.01	0.99	0.92	0.92	1.01	0.93	0.88
	Median	0.93	1.13	1.12	1.06	1.07	1.12	1.06	1.02
	Q3	1.03	1.27	1.27	1.22	1.24	1.24	1.20	1.19
	Max.	1.33	1.64	1.65	1.58	1.62	1.60	1.56	1.55
SARIMA	Min.	0.54	0.64	0.75	0.87	0.85	0.49	0.47	0.39
	Q1	0.70	0.93	1.02	1.09	1.10	0.67	0.60	0.61
	Median	0.77	1.02	1.13	1.24	1.22	0.75	0.69	0.68
	Q3	0.82	1.14	1.28	1.35	1.34	0.81	0.78	0.77
	Max.	1.05	1.54	1.61	1.82	1.82	1.06	1.05	1.22
ARFIMA	Min.	0.51	0.62	0.88	0.82	0.82	0.45	0.46	0.44
	Q1	0.69	0.83	1.02	1.08	1.08	0.62	0.63	0.62
	Median	0.75	0.95	1.14	1.19	1.21	0.70	0.71	0.71
	Q3	0.82	1.11	1.38	1.34	1.35	0.79	0.81	0.81
	Max.	1.12	1.43	1.76	1.92	1.83	1.09	1.00	1.03
GradBoost	Min.	0.75	0.92	0.92	0.92	0.90	0.91	0.90	0.97
	Q1	0.84	1.07	1.09	1.09	1.07	1.03	1.03	1.05
	Median	0.92	1.13	1.16	1.14	1.15	1.07	1.08	1.10
	Q3	0.98	1.19	1.20	1.20	1.23	1.12	1.13	1.15

Table 1: Descriptive statistics of the out-of-sample MSE of each model. "MLP" refers to the multi-layer perceptron; "RW" is the random walk; "Ridge CV", "LASSO CV", and "Enet CV" are the Ridge, LASSO, and Elastic Net regressions with parameters chosen via cross-validation; "BRidge" is the Bayesian Ridge; "BLASSO" is the Bayesian LASSO; and "MA" is the moving average model suggested by **Atkeson2001**.

Model	MSE	1	2	3	6	12	3M	6M	12M
	Max.	1.13	1.39	1.35	1.37	1.45	1.27	1.27	1.37
AdaBoost	Min.	0.80	0.91	0.86	0.84	0.80	0.90	0.96	0.94
	Q1	0.88	1.02	1.03	1.03	1.02	0.99	1.02	1.02
	Median	0.93	1.06	1.06	1.07	1.10	1.04	1.06	1.06
	Q3	0.97	1.09	1.10	1.10	1.15	1.08	1.09	1.11
	Max.	1.10	1.22	1.22	1.24	1.38	1.19	1.30	1.26
Bayes Reg.	Min.	0.76	0.96	1.01	1.00	0.98	0.97	0.99	1.00
	Q1	0.99	1.22	1.22	1.23	1.24	1.19	1.20	1.23
	Median	1.07	1.33	1.32	1.33	1.34	1.30	1.31	1.33
	Q3	1.20	1.43	1.42	1.42	1.50	1.40	1.42	1.46
	Max.	1.56	1.74	1.95	2.08	2.10	1.90	1.71	1.75

Table 2: Average MSE reduction delivered by each model with respect to random walk. Negative values mean that the model increased the MSE. The winning model is highlighted in bold font.

Model	1	2	3	6	12	3M	6M	12M
LSTM	83.6%	72.8%	72.4%	71.6%	70.9%	78.4%	71.4%	75.2%
ConvLSTM	**91.5%**	**79.0%**	**77.9%**	**77.9%**	**77.0%**	**83.4%**	**77.8%**	**82.8%**
MLP	50.5%	41.5%	42.5%	42.3%	40.8%	44.8%	43.7%	43.4%
RW	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Ridge CV	57.5%	49.3%	49.9%	49.9%	49.0%	50.6%	51.3%	51.7%
BRidge	57.7%	46.0%	46.9%	46.6%	45.7%	49.8%	49.1%	48.9%
LASSO CV	58.8%	49.3%	50.3%	50.4%	49.1%	51.2%	51.4%	51.8%
BLASSO	58.5%	49.5%	50.3%	50.5%	49.3%	51.6%	51.7%	51.9%

Table 2: Average MSE reduction delivered by each model with respect to random walk. Negative values mean that the model increased the MSE. The winning model is highlighted in bold font.

Model	1	2	3	6	12	3M	6M	12M
Enet CV	62.0%	50.1%	50.8%	50.9%	50.0%	53.0%	52.7%	52.7%
SVR	54.5%	48.1%	48.9%	49.1%	47.5%	50.7%	50.8%	50.4%
RF	53.3%	44.8%	46.1%	45.9%	45.0%	48.4%	48.6%	48.8%
BART	55.0%	47.1%	47.4%	47.2%	46.2%	50.4%	50.9%	51.1%
Bagging	50.4%	41.4%	43.2%	42.5%	41.5%	45.6%	46.9%	46.5%
kNN	50.3%	47.9%	48.6%	48.4%	47.4%	49.3%	50.2%	50.4%
Huber	47.4%	-12.5%	-11.7%	-11.9%	-13.4%	7.5%	-0.3%	-4.9%
Theil-Sen	47.0%	-18.4%	-17.5%	-17.7%	-19.0%	4.8%	-3.0%	-7.6%
Factors	49.6%	46.9%	48.2%	47.0%	46.2%	47.3%	48.5%	48.7%
GARCH	65.0%	46.0%	41.0%	40.1%	39.3%	63.0%	65.5%	64.8%
VECM	65.0%	25.7%	15.1%	17.2%	17.4%	54.4%	52.7%	47.3%
SETAR	53.6%	41.1%	35.3%	40.0%	38.6%	28.6%	24.2%	15.1%
MA	54.0%	43.1%	44.2%	46.8%	46.4%	44.4%	48.8%	51.2%
SARIMA	62.0%	47.8%	43.0%	40.7%	38.2%	63.0%	66.0%	66.6%
ARFIMA	62.7%	51.1%	40.5%	39.3%	38.6%	64.7%	65.3%	65.2%
GradBoost	54.6%	42.8%	43.3%	42.9%	42.2%	46.8%	47.5%	47.0%
AdaBoost	54.0%	46.6%	47.2%	47.2%	45.6%	48.4%	48.7%	48.6%
Bayes Reg.	45.5%	32.9%	34.3%	33.9%	31.4%	35.2%	35.9%	35.2%

2 Appendix: Out-of-Sample MAE

Table 3: Descriptive statistics of the out-of-sample MAE of each model. "MLP" refers to the multi-layer perceptron; "RW" is the random walk; "Ridge CV", "LASSO CV", and "Enet CV" are the Ridge, LASSO, and Elastic Net regressions with parameters chosen via cross-validation; "BRidge" is the Bayesian Ridge; "BLASSO" is the Bayesian LASSO; and "MA" is the moving average model suggested by **Atkeson2001**.

Model	Statistic	1	2	3	6	12	3M	6M	12M
LSTM	Min.	0.29	0.42	0.47	0.49	0.49	0.40	0.43	0.45
	Q1	0.40	0.55	0.57	0.57	0.56	0.49	0.55	0.51
	Median	0.45	0.58	0.60	0.59	0.61	0.53	0.59	0.57
	Q3	0.51	0.63	0.63	0.64	0.64	0.58	0.66	0.63
	Max.	0.72	0.84	0.79	1.03	0.91	0.70	0.88	0.86
ConvLSTM	Min.	0.25	0.45	0.48	0.50	0.50	0.37	0.40	0.33
	Q1	0.30	0.52	0.53	0.54	0.54	0.44	0.50	0.43
	Median	0.32	0.53	0.54	0.54	0.54	0.46	0.53	0.46
	Q3	0.35	0.54	0.55	0.55	0.55	0.49	0.58	0.50
	Max.	0.41	0.56	0.56	0.55	0.56	0.58	0.75	0.60
MLP	Min.	0.63	0.71	0.69	0.68	0.67	0.72	0.74	0.78
	Q1	0.68	0.76	0.76	0.76	0.77	0.79	0.82	0.86
	Median	0.71	0.79	0.79	0.80	0.80	0.82	0.85	0.88
	Q3	0.74	0.82	0.82	0.84	0.83	0.85	0.88	0.91
	Max.	0.84	0.88	0.87	0.95	0.91	0.91	0.96	0.98
RW	Min.	0.91	0.88	0.92	0.93	0.91	0.91	0.93	0.96
	Q1	1.02	1.01	1.01	1.02	1.00	1.06	1.08	1.09
	Median	1.07	1.05	1.06	1.07	1.05	1.10	1.11	1.13
	Q3	1.10	1.09	1.11	1.10	1.11	1.13	1.15	1.16
	Max.	1.20	1.18	1.20	1.22	1.28	1.24	1.30	1.25
Ridge CV	Min.	0.56	0.64	0.64	0.63	0.63	0.67	0.71	0.74
	Q1	0.62	0.69	0.69	0.68	0.69	0.75	0.77	0.80
	Median	0.64	0.72	0.71	0.71	0.71	0.77	0.79	0.82
	Q3	0.67	0.73	0.73	0.74	0.74	0.79	0.82	0.84

Table 3: Descriptive statistics of the out-of-sample MAE of each model. "MLP" refers to the multi-layer perceptron; "RW" is the random walk; "Ridge CV", "LASSO CV", and "Enet CV" are the Ridge, LASSO, and Elastic Net regressions with parameters chosen via cross-validation; "BRidge" is the Bayesian Ridge; "BLASSO" is the Bayesian LASSO; and "MA" is the moving average model suggested by **Atkeson2001**.

Model	Statistic	1	2	3	6	12	3M	6M	12M
	Max.	0.82	0.78	0.78	0.78	0.79	0.84	0.87	0.91
BRidge	Min.	0.55	0.67	0.65	0.66	0.66	0.69	0.73	0.74
	Q1	0.63	0.72	0.72	0.72	0.72	0.75	0.79	0.81
	Median	0.65	0.75	0.74	0.76	0.75	0.78	0.82	0.84
	Q3	0.68	0.78	0.77	0.78	0.78	0.80	0.84	0.86
	Max.	0.80	0.86	0.83	0.84	0.85	0.86	0.93	0.94
LASSO CV	Min.	0.58	0.64	0.65	0.63	0.64	0.68	0.70	0.72
	Q1	0.62	0.69	0.69	0.69	0.70	0.74	0.77	0.80
	Median	0.64	0.71	0.71	0.71	0.71	0.76	0.79	0.82
	Q3	0.66	0.73	0.73	0.74	0.74	0.78	0.82	0.84
	Max.	0.76	0.78	0.77	0.79	0.81	0.84	0.88	0.89
BLASSO	Min.	0.53	0.64	0.65	0.63	0.64	0.67	0.70	0.72
	Q1	0.63	0.69	0.69	0.68	0.69	0.74	0.77	0.80
	Median	0.66	0.71	0.71	0.71	0.71	0.76	0.79	0.82
	Q3	0.69	0.73	0.73	0.73	0.74	0.78	0.81	0.84
	Max.	0.75	0.77	0.77	0.78	0.79	0.83	0.86	0.89
Enet CV	Min.	0.55	0.64	0.64	0.64	0.64	0.66	0.70	0.72
	Q1	0.60	0.68	0.68	0.68	0.68	0.73	0.76	0.79
	Median	0.63	0.71	0.71	0.71	0.71	0.75	0.78	0.81
	Q3	0.65	0.73	0.72	0.73	0.73	0.77	0.81	0.83
	Max.	0.74	0.77	0.77	0.78	0.79	0.81	0.86	0.87
SVR	Min.	0.59	0.64	0.66	0.65	0.65	0.68	0.73	0.74
	Q1	0.65	0.70	0.70	0.70	0.70	0.74	0.78	0.80
	Median	0.67	0.73	0.73	0.73	0.73	0.77	0.80	0.83

Table 3: Descriptive statistics of the out-of-sample MAE of each model. "MLP" refers to the multi-layer perceptron; "RW" is the random walk; "Ridge CV", "LASSO CV", and "Enet CV" are the Ridge, LASSO, and Elastic Net regressions with parameters chosen via cross-validation; "BRidge" is the Bayesian Ridge; "BLASSO" is the Bayesian LASSO; and "MA" is the moving average model suggested by **Atkeson2001**.

Model	Statistic	1	2	3	6	12	3M	6M	12M
	Q3	0.69	0.75	0.74	0.75	0.75	0.79	0.82	0.85
	Max.	0.76	0.81	0.79	0.81	0.83	0.82	0.88	0.90
RF	Min.	0.55	0.66	0.67	0.65	0.67	0.69	0.73	0.76
	Q1	0.67	0.74	0.72	0.73	0.73	0.76	0.79	0.81
	Median	0.69	0.76	0.75	0.76	0.76	0.79	0.82	0.84
	Q3	0.71	0.78	0.77	0.78	0.79	0.81	0.84	0.87
	Max.	0.79	0.83	0.87	0.87	0.92	0.86	0.92	0.92
BART	Min.	0.60	0.64	0.66	0.64	0.66	0.67	0.71	0.74
	Q1	0.66	0.71	0.71	0.71	0.72	0.75	0.78	0.80
	Median	0.68	0.74	0.74	0.74	0.75	0.77	0.80	0.83
	Q3	0.71	0.76	0.76	0.77	0.78	0.79	0.82	0.85
	Max.	0.80	0.81	0.83	0.83	0.88	0.85	0.88	0.91
Bagging	Min.	0.65	0.70	0.67	0.69	0.69	0.72	0.71	0.73
	Q1	0.70	0.77	0.74	0.75	0.76	0.79	0.81	0.83
	Median	0.72	0.79	0.77	0.78	0.79	0.82	0.83	0.86
	Q3	0.74	0.82	0.80	0.81	0.82	0.83	0.86	0.89
	Max.	0.83	0.90	0.89	0.88	0.91	0.90	0.92	0.95
kNN	Min.	0.63	0.66	0.65	0.62	0.66	0.67	0.72	0.73
	Q1	0.69	0.71	0.70	0.71	0.71	0.76	0.78	0.81
	Median	0.71	0.73	0.72	0.73	0.73	0.78	0.81	0.83
	Q3	0.73	0.75	0.75	0.76	0.77	0.80	0.83	0.85
	Max.	0.78	0.79	0.80	0.82	0.83	0.84	0.90	0.91
Huber	Min.	0.63	0.99	0.94	0.94	0.96	0.92	0.92	0.99
	Q1	0.72	1.10	1.09	1.11	1.10	1.01	1.09	1.11

Table 3: Descriptive statistics of the out-of-sample MAE of each model. "MLP" refers to the multi-layer perceptron; "RW" is the random walk; "Ridge CV", "LASSO CV", and "Enet CV" are the Ridge, LASSO, and Elastic Net regressions with parameters chosen via cross-validation; "BRidge" is the Bayesian Ridge; "BLASSO" is the Bayesian LASSO; and "MA" is the moving average model suggested by **Atkeson2001**.

Model	Statistic	1	2	3	6	12	3M	6M	12M
	Median	0.76	1.15	1.15	1.17	1.16	1.07	1.14	1.16
	Q3	0.79	1.22	1.22	1.23	1.25	1.10	1.20	1.24
	Max.	0.87	1.46	1.38	1.45	1.43	1.24	1.37	1.41
Theil-Sen	Min.	0.63	1.01	0.95	0.99	1.00	0.94	0.92	1.00
	Q1	0.72	1.11	1.12	1.13	1.13	1.02	1.09	1.12
	Median	0.76	1.19	1.18	1.20	1.20	1.08	1.16	1.18
	Q3	0.79	1.25	1.26	1.27	1.28	1.12	1.22	1.26
	Max.	0.87	1.48	1.41	1.50	1.48	1.25	1.38	1.44
Factors	Min.	0.61	0.65	0.63	0.66	0.65	0.71	0.74	0.74
	Q1	0.69	0.71	0.71	0.71	0.71	0.76	0.79	0.81
	Median	0.72	0.74	0.74	0.74	0.74	0.79	0.82	0.83
	Q3	0.76	0.76	0.76	0.77	0.77	0.82	0.85	0.86
	Max.	0.85	0.83	0.81	1.50	0.88	0.90	0.95	1.32
GARCH	Min.	0.38	0.49	0.48	0.49	0.49	0.53	0.50	0.50
	Q1	0.56	0.67	0.68	0.70	0.71	0.62	0.61	0.62
	Median	0.63	0.74	0.79	0.81	0.81	0.67	0.65	0.67
	Q3	0.72	0.89	0.93	0.93	0.95	0.71	0.70	0.73
	Max.	0.99	1.20	1.24	1.33	1.39	0.86	0.86	0.94
VECM	Min.	0.48	0.71	0.80	0.69	0.81	0.59	0.54	0.49
	Q1	0.61	0.89	0.95	0.90	0.94	0.70	0.69	0.72
	Median	0.64	0.93	1.02	0.96	0.99	0.75	0.78	0.85
	Q3	0.68	1.02	1.12	1.03	1.06	0.81	0.86	0.94
	Max.	0.77	1.16	1.36	1.24	1.46	0.97	1.04	1.20
SETAR	Min.	0.51	0.62	0.64	0.65	0.60	0.78	0.79	0.65

Table 3: Descriptive statistics of the out-of-sample MAE of each model. "MLP" refers to the multi-layer perceptron; "RW" is the random walk; "Ridge CV", "LASSO CV", and "Enet CV" are the Ridge, LASSO, and Elastic Net regressions with parameters chosen via cross-validation; "BRidge" is the Bayesian Ridge; "BLASSO" is the Bayesian LASSO; and "MA" is the moving average model suggested by **Atkeson2001**.

Model	Statistic	1	2	3	6	12	3M	6M	12M
	Q1	0.64	0.73	0.78	0.76	0.75	0.87	0.92	1.00
	Median	0.68	0.78	0.85	0.81	0.81	0.93	0.98	1.07
	Q3	0.72	0.84	0.91	0.87	0.89	0.99	1.06	1.14
	Max	0.82	0.95	1.06	0.99	0.98	1.13	1.21	1.39
MA	Min.	0.48	0.52	0.51	0.49	0.49	0.53	0.50	0.48
	Q1	0.61	0.68	0.66	0.64	0.64	0.68	0.64	0.62
	Median	0.68	0.76	0.75	0.73	0.74	0.75	0.73	0.72
	Q3	0.76	0.85	0.85	0.84	0.86	0.83	0.83	0.84
	Max.	0.97	1.10	1.10	1.09	1.12	1.07	1.07	1.09
SARIMA	Min.	0.56	0.64	0.68	0.74	0.72	0.56	0.57	0.50
	Q1	0.67	0.77	0.81	0.83	0.84	0.65	0.62	0.62
	Median	0.71	0.81	0.85	0.88	0.88	0.69	0.67	0.67
	Q3	0.74	0.85	0.91	0.93	0.95	0.73	0.71	0.71
	Max.	0.84	1.00	1.04	1.10	1.09	0.84	0.81	0.93
ARFIMA	Min.	0.58	0.61	0.72	0.70	0.73	0.53	0.51	0.52
	Q1	0.65	0.73	0.80	0.82	0.83	0.63	0.64	0.63
	Median	0.69	0.77	0.85	0.87	0.87	0.66	0.68	0.68
	Q3	0.72	0.84	0.94	0.92	0.93	0.70	0.71	0.72
	Max.	0.86	0.93	1.07	1.12	1.07	0.83	0.80	0.83
GradBoost	Min.	0.59	0.68	0.70	0.71	0.67	0.71	0.75	0.74
	Q1	0.66	0.75	0.76	0.75	0.75	0.78	0.80	0.83
	Median	0.68	0.77	0.78	0.78	0.78	0.80	0.83	0.86
	Q3	0.71	0.80	0.80	0.80	0.81	0.82	0.85	0.88
	Max.	0.77	0.89	0.86	0.88	0.92	0.90	0.91	0.93

Table 3: Descriptive statistics of the out-of-sample MAE of each model. "MLP" refers to the multi-layer perceptron; "RW" is the random walk; "Ridge CV", "LASSO CV", and "Enet CV" are the Ridge, LASSO, and Elastic Net regressions with parameters chosen via cross-validation; "BRidge" is the Bayesian Ridge; "BLASSO" is the Bayesian LASSO; and "MA" is the moving average model suggested by **Atkeson2001**.

Model	Statistic	1	2	3	6	12	3M	6M	12M
AdaBoost	Min.	0.60	0.66	0.66	0.67	0.65	0.69	0.73	0.75
	Q1	0.66	0.72	0.72	0.72	0.72	0.76	0.79	0.82
	Median	0.69	0.74	0.74	0.74	0.75	0.78	0.82	0.84
	Q3	0.71	0.76	0.77	0.77	0.78	0.81	0.84	0.86
	Max.	0.80	0.83	0.81	0.83	0.87	0.89	0.93	0.93
Bayes Reg.	Min.	0.65	0.71	0.74	0.72	0.73	0.75	0.76	0.77
	Q1	0.73	0.82	0.82	0.82	0.83	0.85	0.86	0.90
	Median	0.77	0.86	0.86	0.87	0.87	0.88	0.91	0.93
	Q3	0.81	0.90	0.90	0.90	0.92	0.92	0.95	0.98
	Max.	0.93	1.01	1.01	1.07	1.05	1.06	1.08	1.09

Table 4: Average MAE reduction delivered by each model with respect to random walk. Negative values mean that the model increased the MSE. The winning model is highlighted in bold font.

Model	1	2	3	6	12	3M	6M	12M
LSTM	57.9%	44.5%	43.5%	43.5%	42.1%	51.6%	46.9%	49.5%
ConvLSTM	**69.7%**	**49.7%**	**48.9%**	**49.2%**	**48.0%**	**58.2%**	**52.1%**	**58.8%**
MLP	33.1%	24.5%	25.7%	25.6%	23.8%	25.7%	23.3%	22.0%
RW	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Ridge CV	39.8%	31.6%	32.9%	33.1%	31.8%	30.2%	28.8%	27.1%
BRidge	39.1%	28.7%	30.1%	29.9%	28.4%	29.2%	26.5%	25.3%
LASSO CV	39.7%	32.6%	33.7%	33.4%	32.3%	30.4%	28.9%	27.3%
BLASSO	38.3%	32.4%	33.7%	33.8%	32.4%	30.6%	28.9%	27.3%
Enet CV	41.2%	32.6%	33.7%	33.7%	32.3%	31.4%	29.6%	27.7%

Table 4: Average MAE reduction delivered by each model with respect to random walk. Negative values mean that the model increased the MSE. The winning model is highlighted in bold font.

Model	1	2	3	6	12	3M	6M	12M
SVR	36.9%	30.4%	31.6%	32.5%	30.4%	29.7%	28.1%	26.1%
RF	35.7%	27.4%	29.3%	29.7%	27.1%	28.5%	26.4%	25.6%
BART	36.3%	29.2%	30.5%	30.5%	28.8%	30.0%	28.5%	26.6%
Bagging	32.5%	24.6%	27.4%	26.8%	24.7%	25.6%	25.7%	23.6%
kNN	33.2%	30.3%	32.0%	31.6%	30.4%	29.4%	27.6%	26.0%
Huber	29.2%	-10.0%	-7.8%	-9.0%	-11.2%	2.5%	-2.0%	-2.9%
Theil-Sen	28.6%	-14.0%	-10.6%	-11.9%	-14.5%	1.4%	-4.2%	-4.6%
Factors	32.2%	29.8%	30.9%	30.5%	29.2%	27.6%	26.7%	26.0%
GARCH	40.7%	29.1%	25.4%	23.8%	23.0%	39.3%	41.4%	40.6%
VECM	39.9%	11.2%	3.8%	5.9%	5.4%	31.3%	29.8%	24.6%
SETAR	36.3%	25.5%	20.4%	24.6%	23.0%	15.7%	12.3%	5.3%
MA	35.9%	27.9%	29.9%	31.9%	29.6%	32.0%	34.3%	36.5%
SARIMA	33.7%	22.4%	19.9%	18.1%	15.9%	37.2%	40.3%	40.9%
ARFIMA	35.4%	27.0%	20.1%	18.6%	17.1%	39.5%	38.8%	39.8%
GradBoost	36.3%	26.1%	26.7%	27.2%	26.0%	27.4%	25.6%	24.0%
AdaBoost	35.3%	29.4%	30.1%	30.0%	28.8%	28.7%	26.6%	25.6%
Bayes Reg.	27.7%	18.0%	18.9%	19.6%	17.3%	19.7%	18.4%	17.3%

Table 5: Ranks produced by comparing the models according to their average MAE through the simulations. The two best models are highlight in bold font.

Model	1	2	3	6	12	3M	6M	12M
LSTM	2	2	2	2	2	2	2	2
ConvLSTM	1	1	1	1	1	1	1	1
MLP	20	20	17	17	19	20	21	21
RW	26	24	24	24	24	26	24	24

Table 5: Ranks produced by comparing the models according to their average MAE through the simulations. The two best models are highlight in bold font.

Model	1	2	3	6	12	3M	6M	12M
Ridge CV	6	6	6	6	6	11	11	10
BRidge	8	13	11	13	13	15	17	17
LASSO CV	7	3	5	5	5	10	9	9
BLASSO	9	5	3	3	4	9	10	8
Enet CV	3	4	4	4	3	7	8	7
SVR	10	7	8	7	8	13	13	12
RF	15	15	14	14	15	17	18	15
BART	13	11	10	11	10	12	12	11
Bagging	21	19	15	16	17	21	19	20
kNN	19	8	7	9	7	14	14	13
Huber	23	25	25	25	25	24	25	25
Theil-Sen	24	26	26	26	26	25	26	26
Factors	22	9	9	10	11	18	15	14
GARCH	4	12	18	19	12	4	3	4
VECM	5	23	23	23	23	8	7	18
SETAR	11	18	19	18	18	23	23	23
MA	14	14	13	8	9	6	6	6
SARIMA	18	21	21	22	21	5	4	3
ARFIMA	16	16	20	21	20	3	5	5
GradBoost	12	17	16	15	16	19	20	19
AdaBoost	17	10	12	12	14	16	16	16
Bayes Reg.	25	22	22	20	22	22	22	22

3 Appendix: Out-of-Sample MAPE

Since MAPE is closely related to MAE and MSE, for the sake of brevity, we are here providing only the ranks of the models according to their respective MAPE.

Table 6: Ranks produced by comparing the models according to their average MAE through the simulations. The two best models are highlight in bold font.

Model	1	2	3	6	12	3M	6M	12M
LSTM	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
ConvLSTM	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
MLP	21	22	21	22	20	20	21	21
RW	26	25	24	24	24	26	24	24
Ridge CV	6	7	6	6	6	9	9	10
BRidge	7	8	7	9	7	15	17	17
LASSO CV	8	3	5	5	5	10	11	9
BLASSO	3	5	3	3	4	4	3	8
Enet CV	5	4	4	4	3	7	8	7
SVR	10	6	8	7	8	13	13	12
RF	15	15	14	14	15	17	18	18
BART	4	11	10	11	10	11	10	11
Bagging	20	19	15	16	17	21	19	20
kNN	19	13	11	13	13	14	14	13
Huber	23	24	25	25	25	24	25	25
Theil-Sen	25	26	26	26	26	25	26	26
Factors	22	9	9	10	11	18	15	14
GARCH	13	12	18	19	12	12	12	4
VECM	9	23	23	23	23	8	7	15
SETAR	11	18	19	18	18	23	23	23
MA	14	14	13	8	9	6	6	6
SARIMA	18	21	17	17	21	5	4	3
ARFIMA	16	16	20	21	19	3	5	5

Table 6: Ranks produced by comparing the models according to their average MAE through the simulations. The two best models are highlight in bold font.

Model	1	2	3	6	12	3M	6M	12M
GradBoost	17	17	16	15	16	19	20	19
AdaBoost	12	10	12	12	14	16	16	16
Bayes Reg.	24	20	22	20	22	22	22	22

4 Appendix: Out-of-Sample R^2

Analogously to the case of MAPE, we are simply providing the ranks of each model according to their respective out-of-sample R^2.

Table 7: Ranks produced by comparing the models according to their average R^2 through the simulations. The two best models are highlight in bold font.

Model	1	2	3	6	12	3M	6M	12M
LSTM	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
ConvLSTM	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
MLP	17	17	16	15	15	18	19	19
RW	25	22	22	22	22	22	22	22
Ridge CV	26	26	26	26	26	26	26	26
BRidge	9	6	5	5	5	10	9	8
LASSO CV	24	25	25	25	25	25	25	25
BLASSO	8	5	4	4	4	8	8	7
Enet CV	7	4	3	3	3	7	6	6
SVR	12	7	6	6	6	9	11	12
RF	16	14	11	12	12	14	15	13
BART	10	10	9	9	9	11	10	10
Bagging	18	18	14	14	14	17	18	18
kNN	19	8	7	7	7	12	12	11

Table 7: Ranks produced by comparing the models according to their average R^2 through the simulations. The two best models are highlight in bold font.

Model	1	2	3	6	12	3M	6M	12M
Huber	21	23	23	23	23	23	23	23
Theil-Sen	22	24	24	24	24	24	24	24
Factors	20	11	8	10	10	15	16	14
GARCH	4	13	17	17	16	5	4	5
VECM	3	21	21	21	21	6	7	16
SETAR	15	19	19	18	17	21	21	21
MA	13	15	12	11	8	19	13	9
SARIMA	6	9	15	16	19	4	3	3
ARFIMA	5	3	18	19	18	3	5	4
GradBoost	11	16	13	13	13	16	17	17
AdaBoost	14	12	10	8	11	13	14	15
Bayes Reg.	23	20	20	20	20	20	20	20