Online-Appendix zu

„Modern Approaches to Dynamic Portfolio Optimization"

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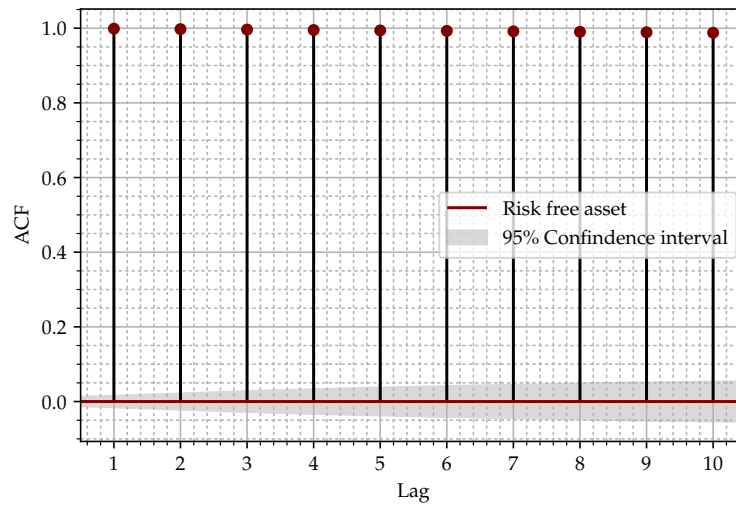# A Risk-Free Asset Correlogram

FIGURE A.1: Full sample correlogram for the risk-free asset
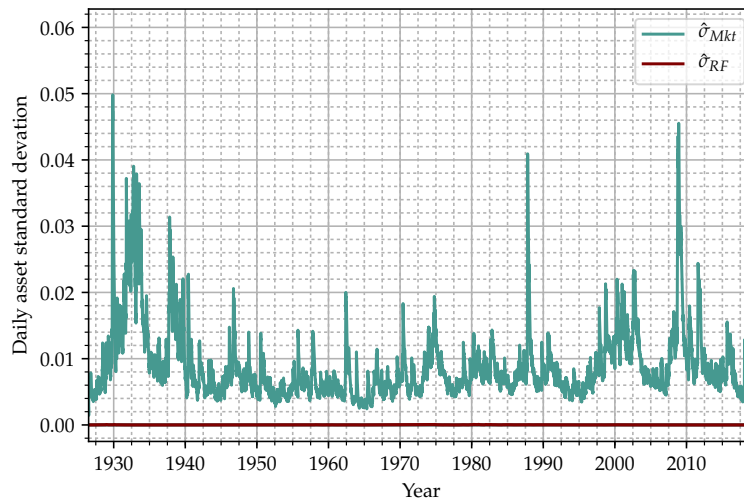
B Daily Volatility Figures

FIGURE B.1: Daily asset standard deviation over time

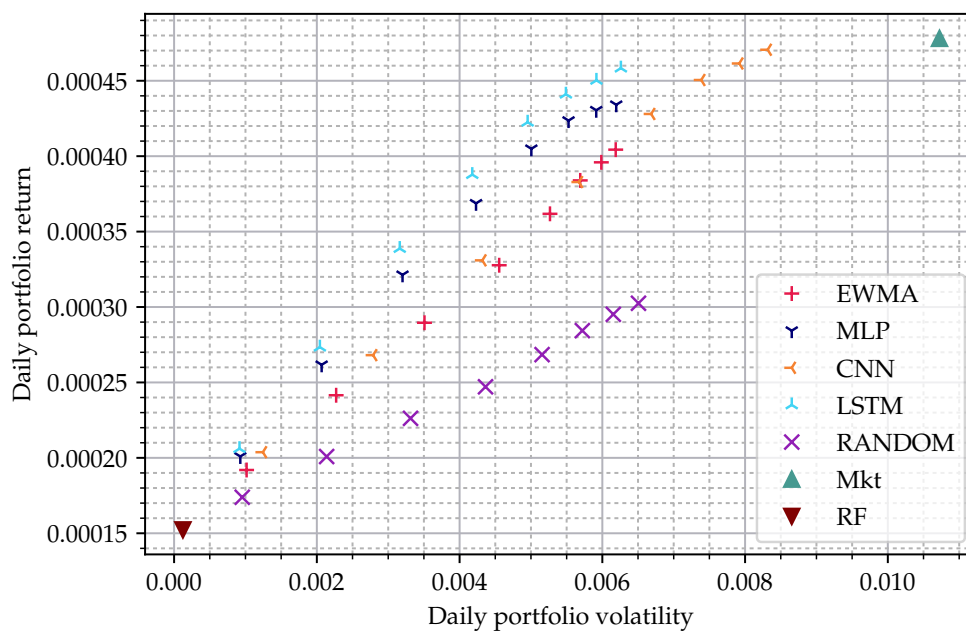FIGURE B.2: Portfolio performances in μ-σ-space
(daily rebalancing, no TC)
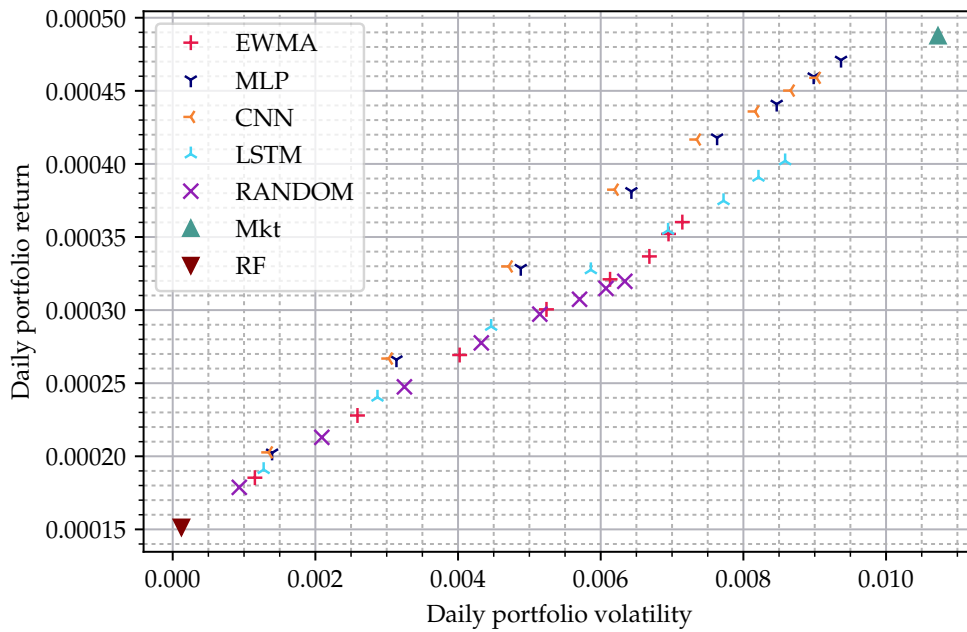
FIGURE B.3: Portfolio performances in μ-σ-space
(monthly rebalancing, no TC)
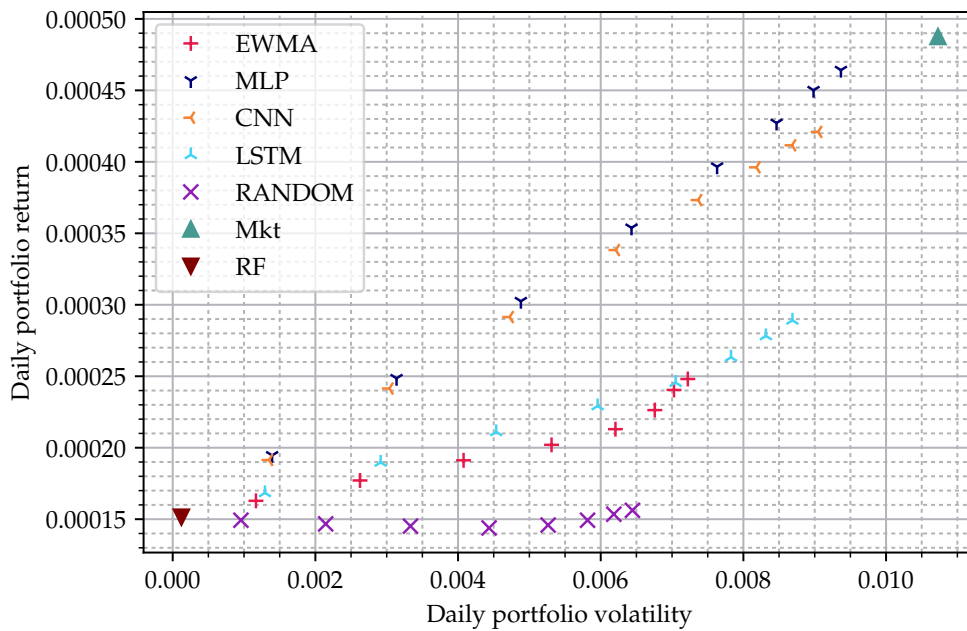
FIGURE B.4: Portfolio performances in μ-σ-space
(monthly rebalancing, with TC)
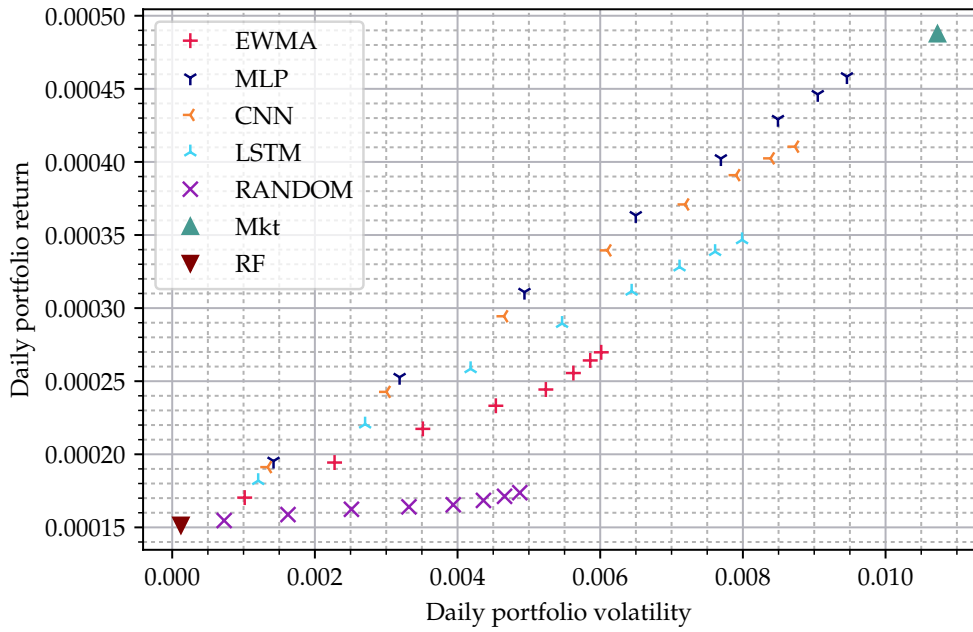
FIGURE B.5: Portfolio performances in μ-σ-space
(smoothed daily rebalancing, with TC)
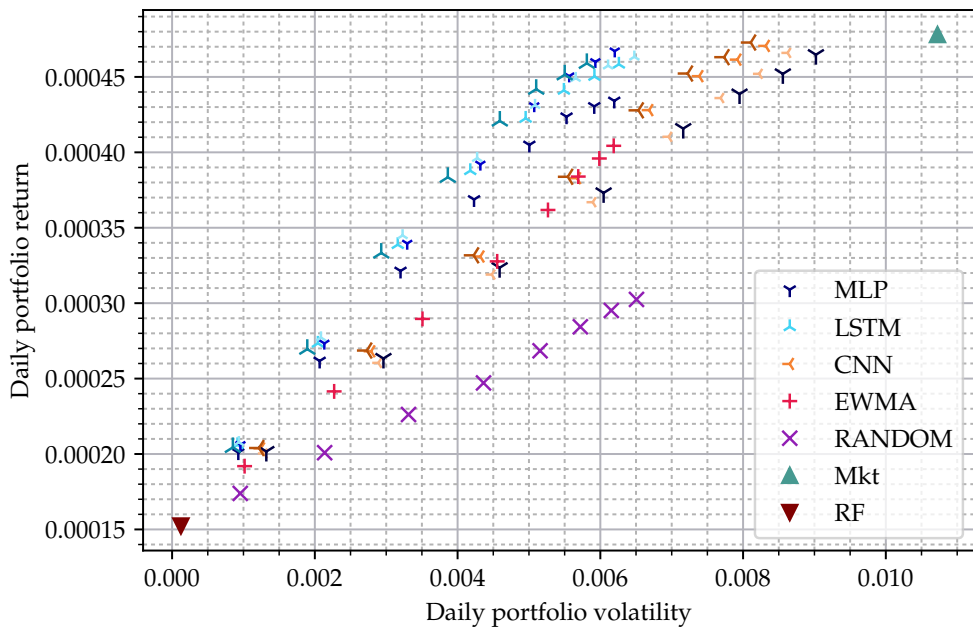
FIGURE B.6: Portfolio performances in μ-σ-space
(small and large models, daily rebalancing, no TC)
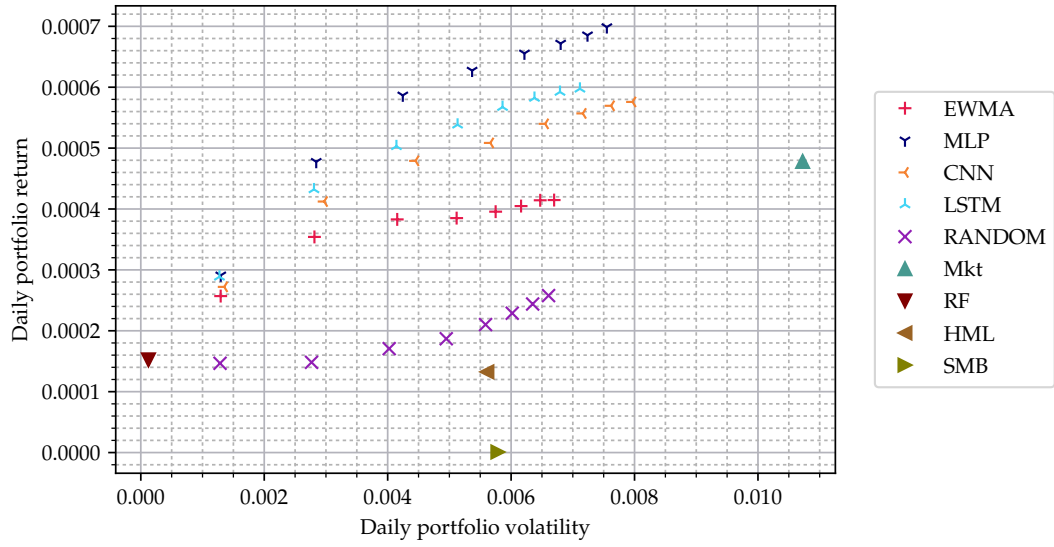
FIGURE B.7: Portfolio performances in μ-σ-space
(all assets, daily rebalancing, no TC)
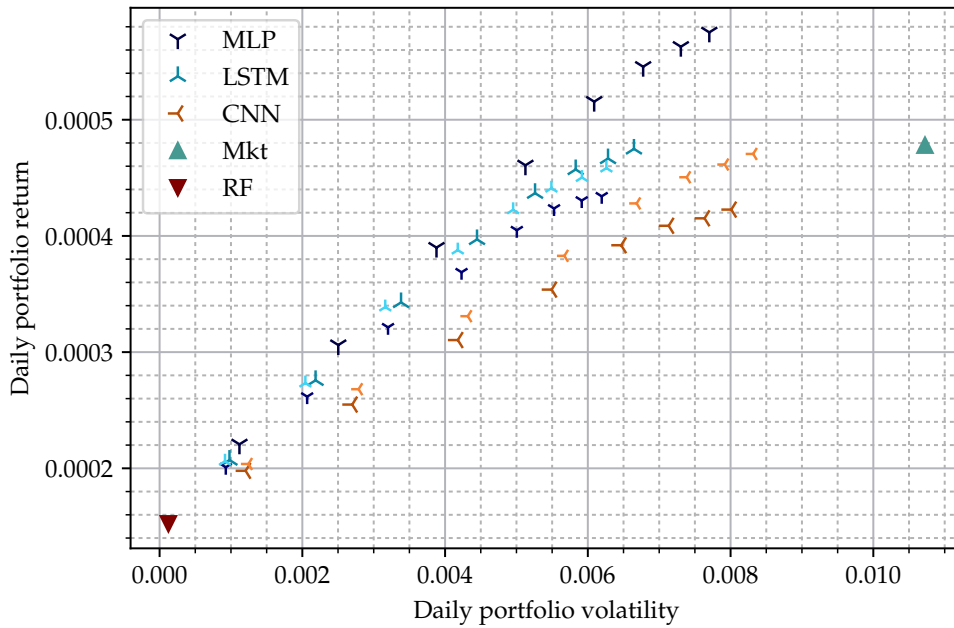

FIGURE B.8: Portfolio performances in μ-σ-space
(recalibrated, daily rebalancing, no TC)

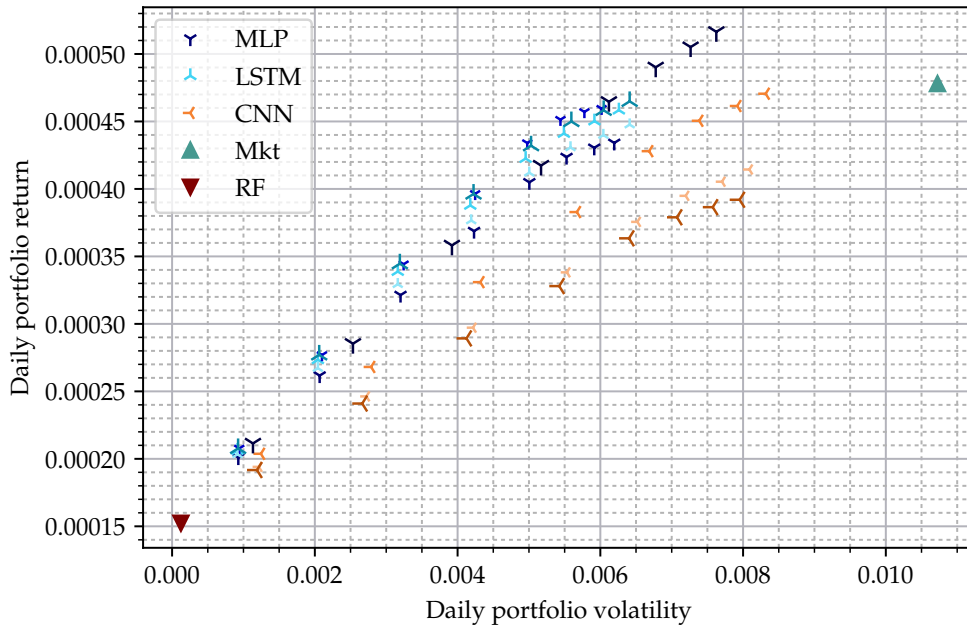FIGURE B.9: Portfolio performances in μ-σ-space
(rerun consistency, daily rebalancing, no TC)
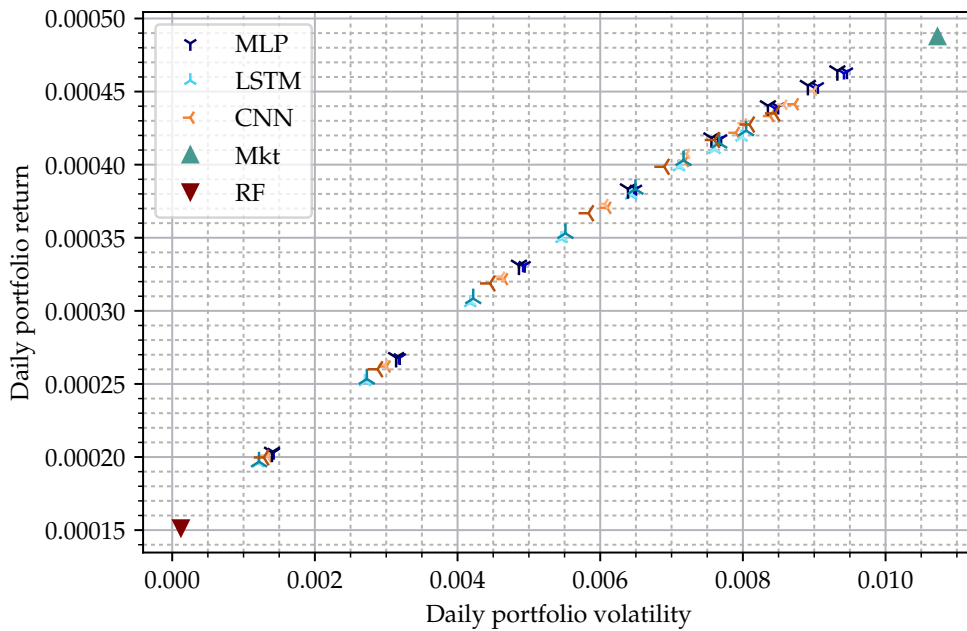
FIGURE B.10: Portfolio performances in μ-σ-space
(rerun consistency, smoothed daily rebalancing, no TC)

C Daily Sharpe Ratio Tables

TABLE C.1: Portfolio Sharpe ratios (daily rebalancing, no TC)

Vola Target	EWMA	MLP	CNN	LSTM	RANDOM
0.1%	0.039	*0.053*	0.042	**0.059**	0.023
0.3%	0.039	*0.053*	0.042	**0.059**	0.023
0.4%	0.039	*0.053*	0.041	**0.059**	0.022
0.6%	0.039	*0.051*	0.041	**0.056**	0.022
0.8%	0.040	*0.051*	0.041	**0.055**	0.023
0.9%	0.041	*0.049*	0.040	**0.053**	0.023
1.1%	0.041	*0.047*	0.039	**0.050**	0.023
1.2%	0.041	*0.046*	0.038	**0.049**	0.023

 Bold and italic table entries represent the highest and second highest Sharpe ratios per risk target, respectively.

TABLE C.2: Portfolio Sharpe ratios (monthly rebalancing, with TC)

Vola Target	EWMA	MLP	CNN	LSTM	RANDOM
0.1%	0.010	**0.031**	*0.030*	0.013	−0.002
0.3%	0.010	**0.031**	*0.030*	0.013	−0.002
0.4%	0.010	**0.031**	*0.030*	0.013	−0.002
0.6%	0.010	**0.031**	*0.030*	0.013	−0.002
0.8%	0.010	**0.032**	*0.030*	0.013	−0.001
0.9%	0.011	**0.033**	*0.030*	0.014	−0.000
1.1%	0.013	**0.033**	*0.030*	0.015	0.000
1.2%	0.013	**0.033**	*0.030*	0.016	0.001

 Bold and italic table entries represent the highest and second highest Sharpe ratios per risk target, respectively.

TABLE C.3: Portfolio Sharpe ratios
(smoothed daily rebalancing, with TC)

Vola Target	EWMA	MLP	CNN	LSTM	RANDOM
0.1%	0.019	**0.031**	*0.030*	0.025	0.004
0.3%	0.019	**0.032**	*0.030*	0.026	0.004
0.4%	0.019	**0.032**	*0.031*	0.026	0.004
0.6%	0.018	**0.033**	*0.031*	0.025	0.004
0.8%	0.018	**0.033**	*0.031*	0.025	0.004
0.9%	0.019	**0.033**	*0.030*	0.025	0.004
1.1%	0.019	**0.033**	*0.030*	0.025	0.004
1.2%	0.020	**0.032**	*0.030*	0.024	0.005

Bold and italic table entries represent the highest and second highest Sharpe ratios per risk target, respectively.

D Lowest and Highest Risk Target Total Return Indices
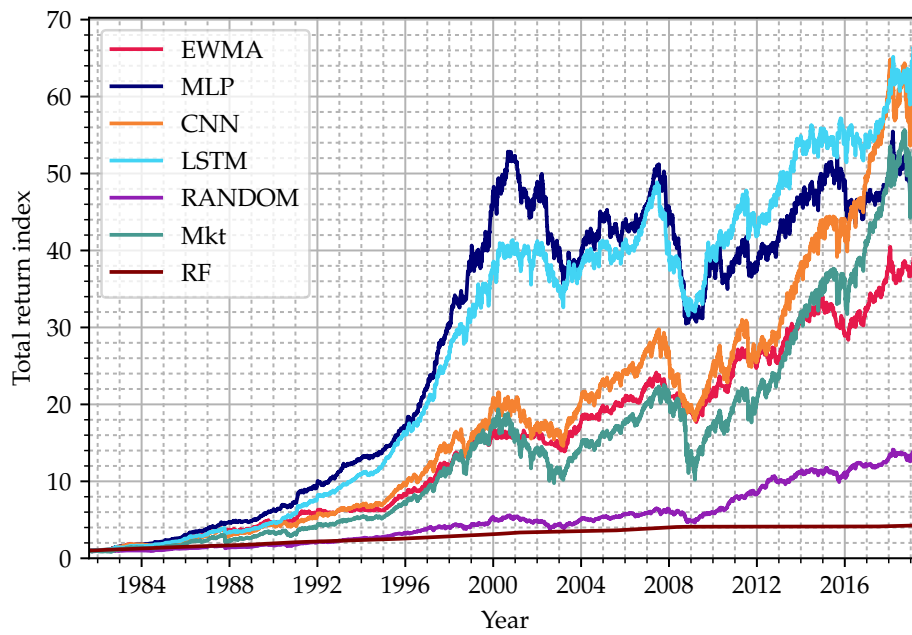
FIGURE D.1: Total return indices for the highest risk target
(19.5% volatility)
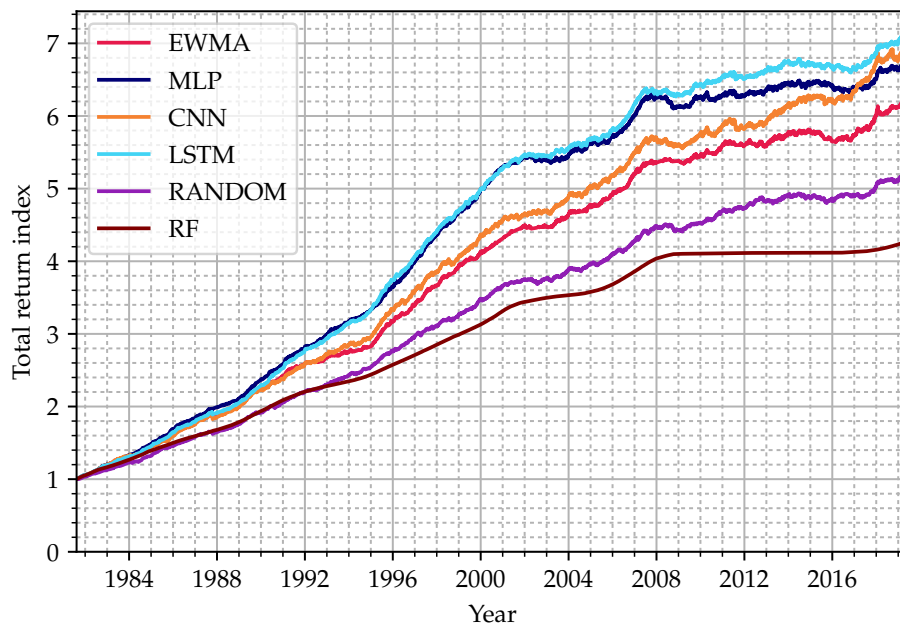
FIGURE D.2: Total return indices for the lowest risk target
(2% volatility)

The market asset is omitted from this figure for an improved representation, as all models closely track the risk-free asset at this risk target.

E Monthly and Smoothed μ-Max DD Figures
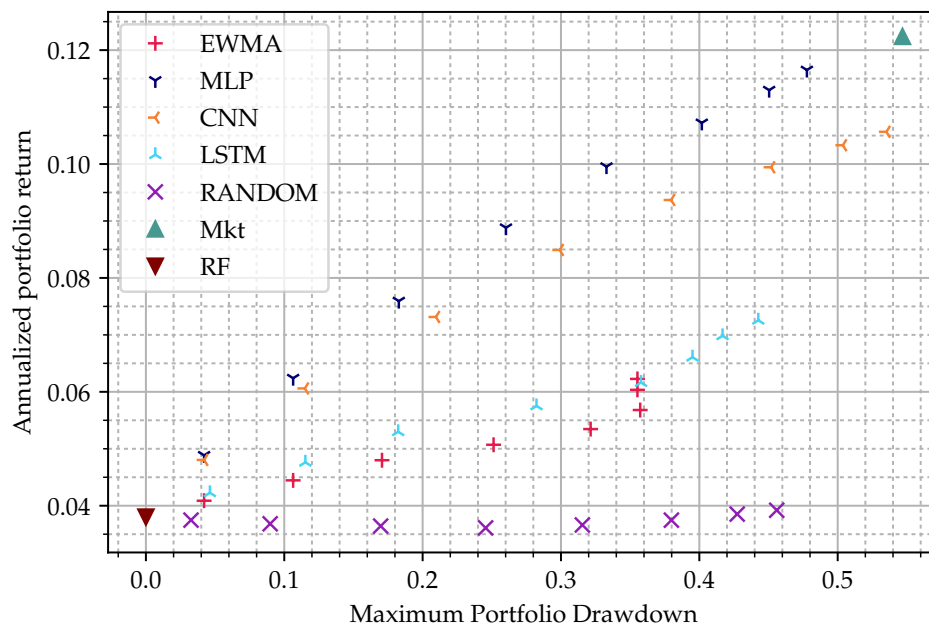
FIGURE E.1: Portfolio performances in μ-Max DD-space
(monthly rebalancing, with TC)
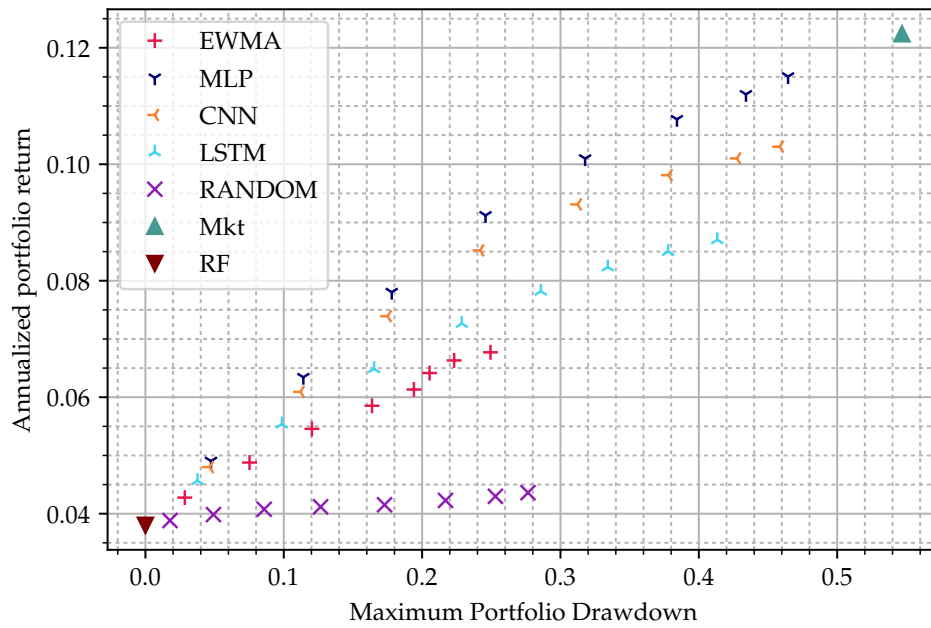
FIGURE E.2: Portfolio performances in μ-Max DD-space
(smoothed daily rebalancing, with TC)

F Hyperparameter variation model architectures

InputLayer	input:	[(None, 5)]
	output:	[(None, 5)]

Dense	input:	(None, 5)
	output:	(None, 16)

Dropout	input:	(None, 16)
	output:	(None, 16)

Dense	input:	(None, 16)
	output:	(None, 16)

Dropout	input:	(None, 16)
	output:	(None, 16)

InputLayer	input:	[(None, 5)]
	output:	[(None, 5)]

Dense	input:	(None, 16)
	output:	(None, 16)

Dense	input:	(None, 5)
	output:	(None, 8)

Dropout	input:	(None, 16)
	output:	(None, 16)

Dropout	input:	(None, 8)
	output:	(None, 8)

Dense	input:	(None, 16)
	output:	(None, 1)

Dense	input:	(None, 8)
	output:	(None, 1)

(A) Reduced model size   (B) Extended model size

FIGURE F.1: MLP architecture variation

InputLayer	input:	[(None, 22, 1)]
	output:	[(None, 22, 1)]

Conv1D	input:	(None, 22, 1)
	output:	(None, 18, 32)

MaxPooling1D	input:	(None, 18, 32)
	output:	(None, 9, 32)

Conv1D	input:	(None, 9, 32)
	output:	(None, 7, 16)

MaxPooling1D	input:	(None, 7, 16)
	output:	(None, 3, 16)

Flatten	input:	(None, 3, 16)
	output:	(None, 48)

Dense	input:	(None, 48)
	output:	(None, 16)

Dropout	input:	(None, 16)
	output:	(None, 16)

Dense	input:	(None, 16)
	output:	(None, 1)

InputLayer	input:	[(None, 22, 1)]
	output:	[(None, 22, 1)]

Conv1D	input:	(None, 22, 1)
	output:	(None, 21, 8)

MaxPooling1D	input:	(None, 21, 8)
	output:	(None, 10, 8)

Flatten	input:	(None, 10, 8)
	output:	(None, 80)

Dense	input:	(None, 80)
	output:	(None, 8)

Dropout	input:	(None, 8)
	output:	(None, 8)

Dense	input:	(None, 8)
	output:	(None, 1)

(A) Reduced model size

(B) Extended model size

FIGURE F.2: CNN architecture variation

InputLayer	input:	[(None, 21, 1)]
	output:	[(None, 21, 1)]

LSTM	input:	(None, 21, 1)
	output:	(None, 21, 32)

Dropout	input:	(None, 21, 32)
	output:	(None, 21, 32)

LSTM	input:	(None, 21, 32)
	output:	(None, 32)

Dropout	input:	(None, 32)
	output:	(None, 32)

Dense	input:	(None, 32)
	output:	(None, 1)

InputLayer	input:	[(None, 21, 1)]
	output:	[(None, 21, 1)]

LSTM	input:	(None, 21, 1)
	output:	(None, 8)

Dropout	input:	(None, 8)
	output:	(None, 8)

Dense	input:	(None, 8)
	output:	(None, 1)
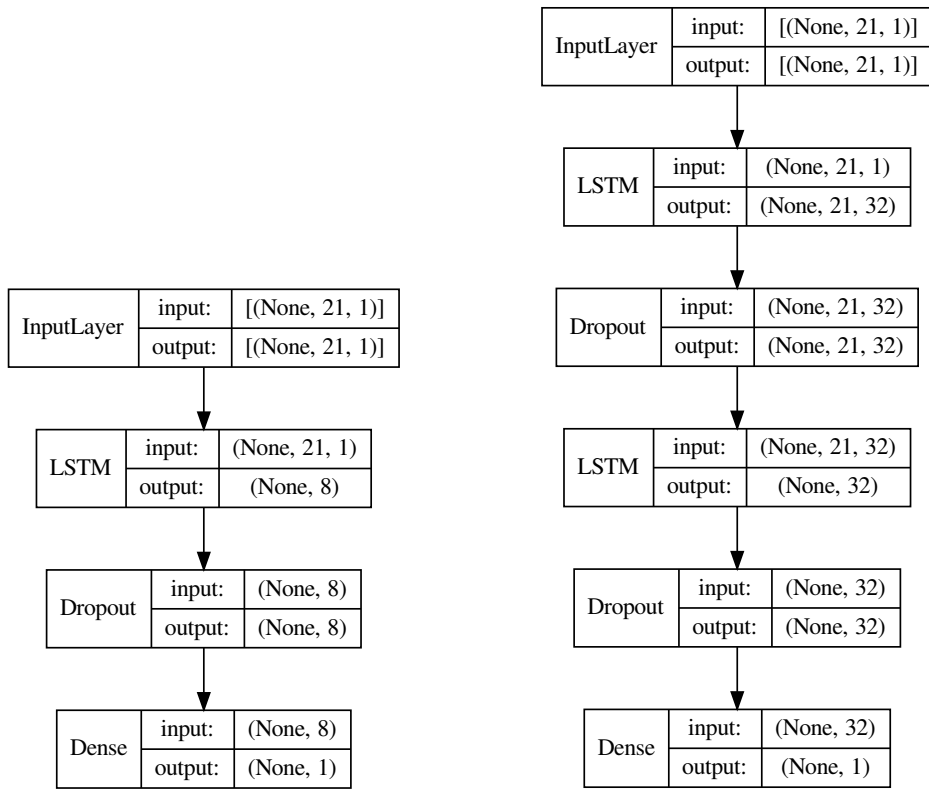
(A) Reduced model size

(B) Extended model size

FIGURE F.3: LSTM architecture variation