Results Summary

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Four methods are used to generate base forecasts. Either base forecasts are drawn from an independent distribution or dependent distribution (all DGPs actually have dependence). Also base forecasts are Gaussian or use bootstrapping (the DGPs may be Gaussian or non-Gaussian). The following reconciliation methods are considered

- Base: Not a reconciliation method, just the base forecasts.
- BottomUp: Bottom up
- BTTH: Ben Taieb, Taylor Hyndman (2020). This is like bottom up but reorders a sample from probabilistic forecast to match the empirical copula. Also the mean is adjusted to be the same as that from MinT reconciliation.
- JPP: Jeon Panagiotelis Petropoulos (2019). This reorders a sample from the probabilistic forecast to be perfectly dependent, i.e. it reconciles quantiles. Reconciliation is done by WLS (structural)
- MinTSam: MinT with the usual sample covariance estimator
- MinTShr: MinT with shrinkage covariance estimator
- OLS: OLS reconciliation
- ScoreOptE: Energy score Optimisation by stochastic gradient descent.
- ScoreOptEIn: Energy score Optimisation by stochastic gradient descent but with predicted values (in-sample) used instead of rolling window forecasts.
- ScoreOptV: Variogram score Optimisation by stochastic gradient descent.
- ScoreOptVIn: Variogram score Optimisation by stochastic gradient descent but with predicted values (in-sample) used instead of rolling window forecasts.
- WLS: Weighted least squares using structural scaling.

Table 1: Mean score for ets modelling with a gaussian nonstationary DGP

Method	independent_bootstrap	independent_gaussian	joint_bootstrap	joint_gaussian
Base	12.8746	12.8439	12.6206	12.5919
BottomUp	15.0455	14.9823	14.8212	14.7508
BTTH	27.4547	27.4171	27.4981	27.4786
JPP	26.0359	26.0300	26.0168	25.9833
MinTSam	11.6080	11.5922	11.2344	11.2211
MinTShr	11.4797	11.4598	11.2542	11.2416
OLS	12.1518	12.1172	11.8645	11.8443
ScoreOpt	11.9216	11.8692	11.7445	11.7298
WLS	12.6301	12.5905	12.4027	12.3706

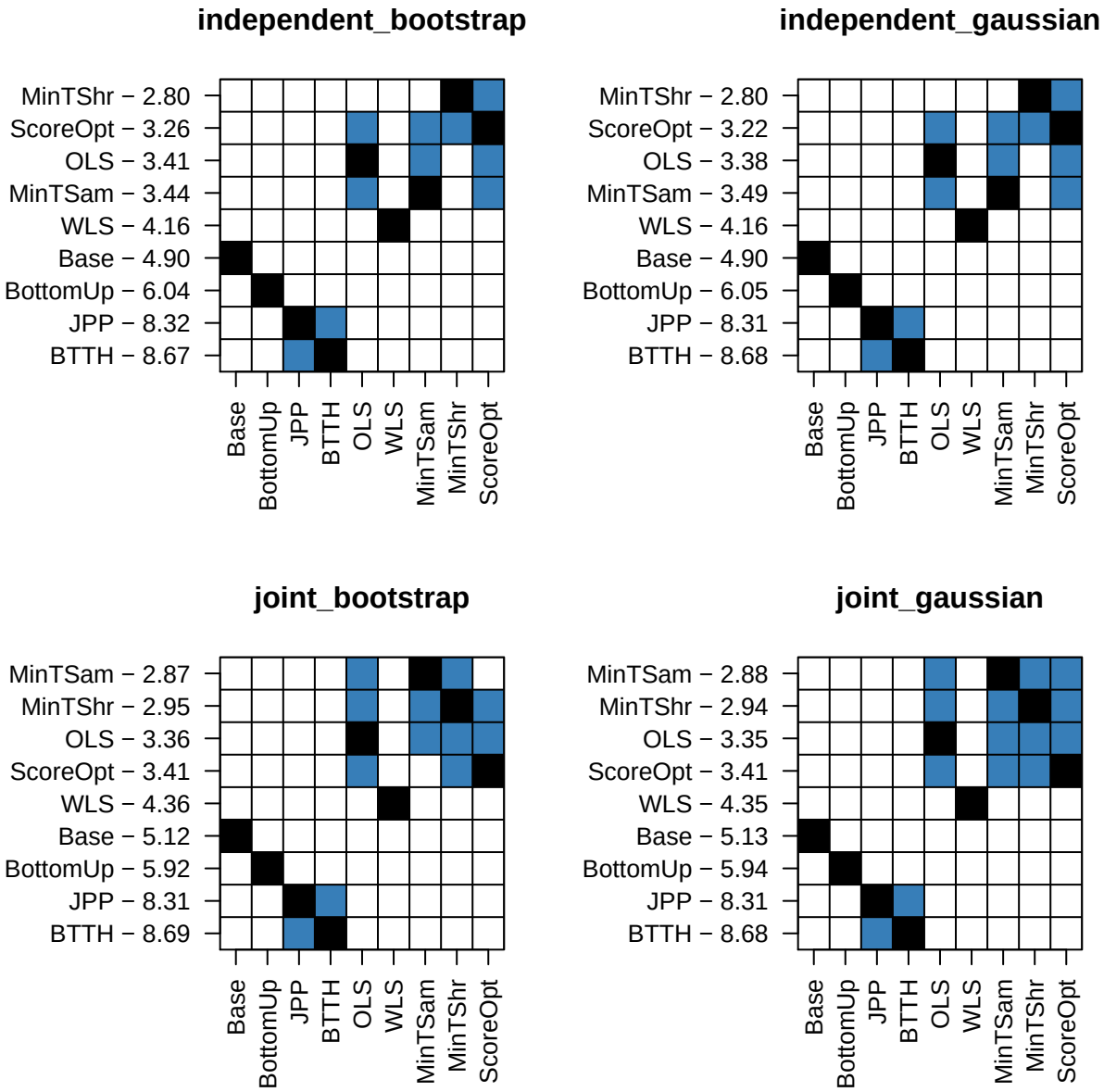

Figure 1: Nemenyi matrix for ets modelling with a gaussian nonstationary DGP

Table 2: Mean score for ets modelling with a gaussian nonstationary DGP

Method	independent_bootstrap	independent_gaussian	joint_bootstrap	joint_gaussian
Base	2163.782	2157.284	2162.777	2157.226
BottomUp	2504.728	2492.586	2485.377	2473.162
BTTH	2675.077	2653.792	2665.580	2653.278
JPP	2131.695	2124.211	2130.815	2124.134
MinTSam	1912.265	1907.009	1909.653	1904.564
MinTShr	1913.062	1907.942	1915.884	1910.944
OLS	2065.309	2058.713	2073.159	2067.209
ScoreOpt	2082.876	2069.384	2072.493	2067.099
WLS	2119.772	2112.215	2127.500	2120.392

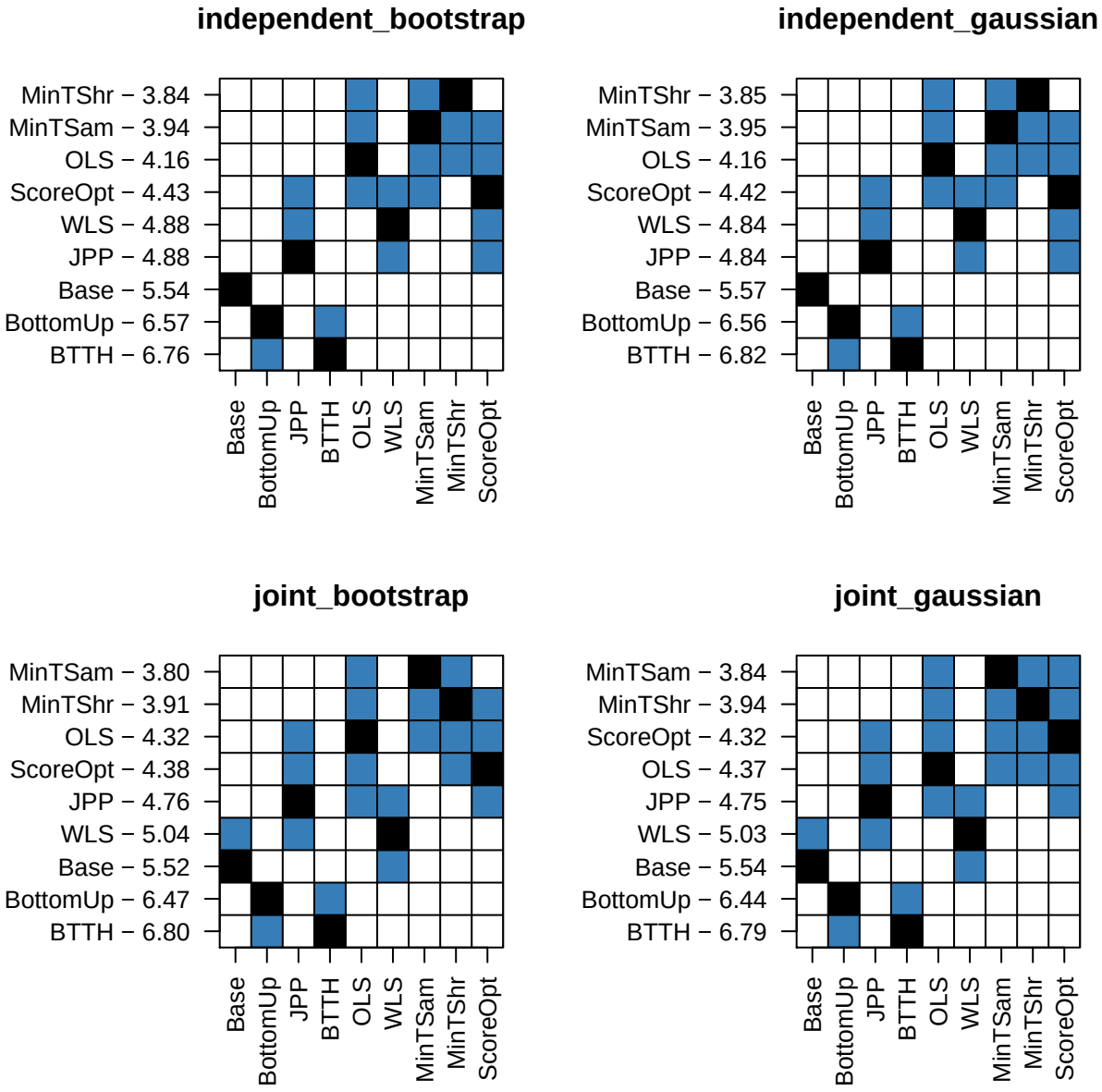

Figure 2: Nemenyi matrix for ets modelling with a gaussian nonstationary DGP