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	12.8753	12.8358	12.6263	12.5845
BottomUp	15.0397	14.9626	14.8220	14.7385
BTTH	27.4309	27.3796	27.5268	27.4480
JPP	25.8255	25.8146	25.8012	25.7446
MinTSam	11.6055	11.5896	11.2416	11.2141
MinTShr	11.4776	11.4587	11.2606	11.2342
OLS	12.1510	12.1161	11.8712	11.8361
ScoreOptE	11.9134	11.8564	11.7483	11.7223
ScoreOptEIn	12.1402	12.0823	11.8415	11.8289
ScoreOptV	NA	NA	NA	NA
ScoreOptVIn	NA	NA	NA	NA
WLS	12.6298	12.5847	12.4093	12.3614

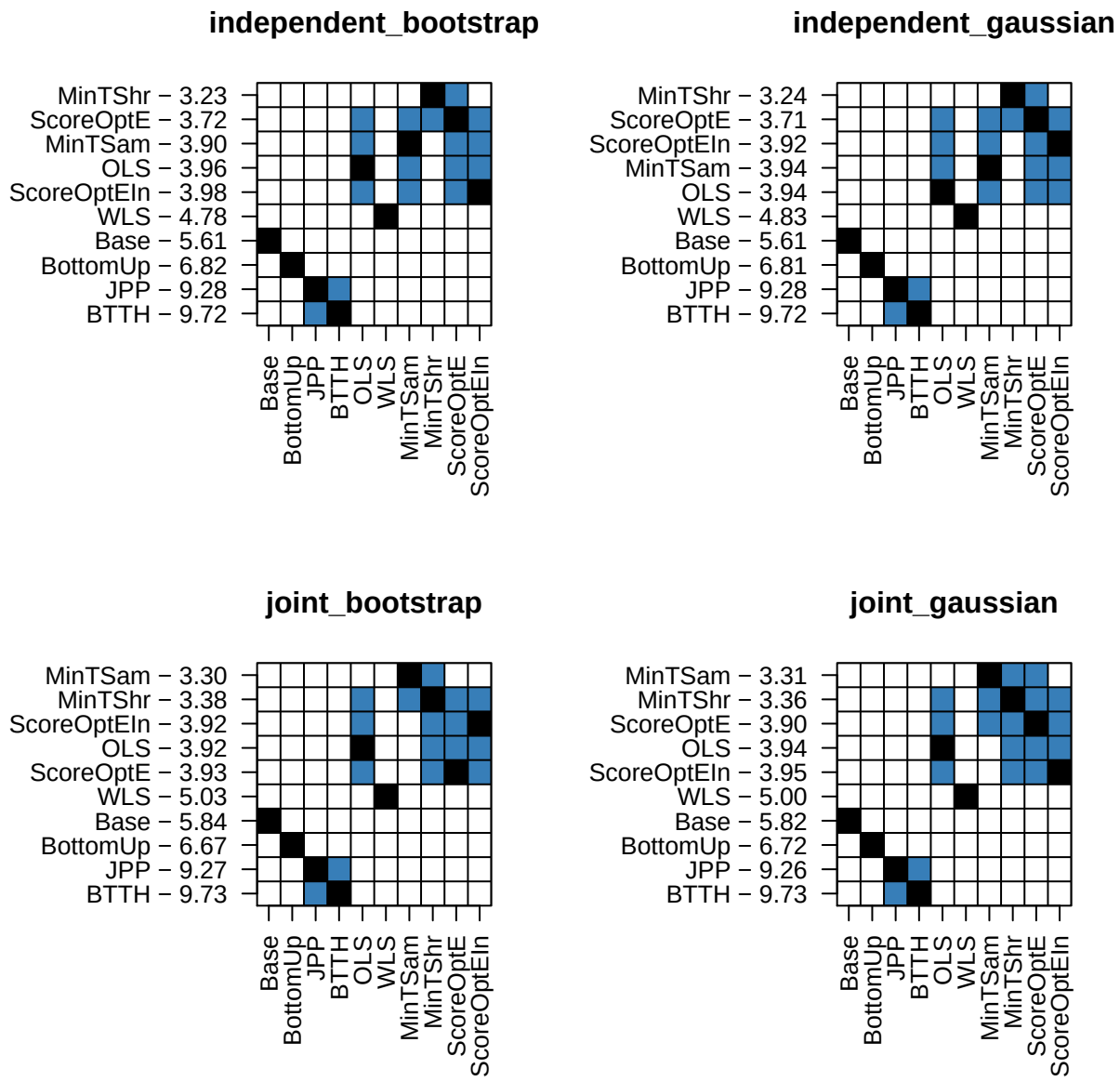

Figure 1: Nemenyi matrix for ets modelling with a gaussian nonstationary DGP

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

Method	independent_bootstrap	independent_gaussian	joint_bootstrap	joint_gaussian
Base	2163.824	2158.605	2165.607	2157.570
BottomUp	2505.427	2491.637	2488.378	2472.635
BTTH	2668.059	2652.290	2661.287	2657.572
JPP	2131.322	2124.518	2133.785	2124.229
MinTSam	1912.138	1909.312	1912.311	1904.950
MinTShr	1912.718	1909.880	1918.465	1911.369
OLS	2064.924	2059.742	2075.674	2067.767
ScoreOptE	2082.269	2070.894	2074.073	2067.904
ScoreOptEIn	2060.086	2047.870	2055.829	2053.632
ScoreOptV	NA	NA	NA	NA
ScoreOptVIn	NA	NA	NA	NA
WLS	2119.486	2112.573	2130.193	2120.633

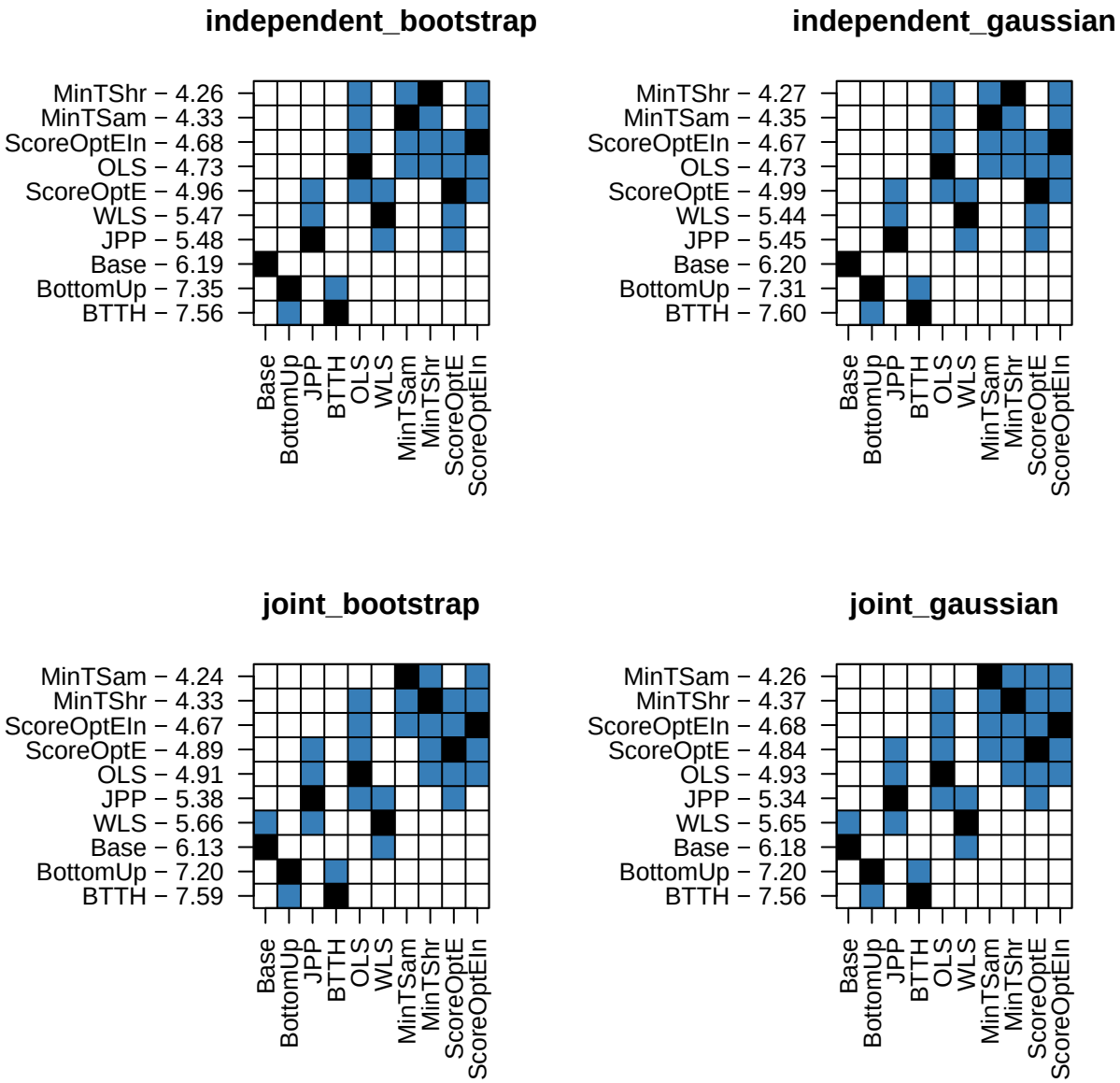

Figure 2: Nemenyi matrix for ets modelling with a gaussian nonstationary DGP