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 arima modelling with a nongaussian nonstationary DGP

Method	independent_bootstrap	independent_gaussian	joint_bootstrap	joint_gaussian
Base	1.5718	1.5740	1.5327	1.5347
BottomUp	1.7427	1.7449	1.7161	1.7185
BTTH	3.2276	3.2710	3.2307	3.2775
JPP	3.1721	3.2071	3.1649	3.1955
MinTSam	1.4968	1.4990	1.4096	1.4121
MinTShr	1.4430	1.4444	1.4086	1.4113
OLS	1.4923	1.4934	1.4598	1.4622
ScoreOptE	1.5216	1.5214	1.4963	1.4915
ScoreOptEIn	2.3428	2.3004	2.3998	2.2943
ScoreOptV	NA	NA	NA	NA
ScoreOptVIn	NA	NA	NA	NA
WLS	1.5481	1.5490	1.5179	1.5202

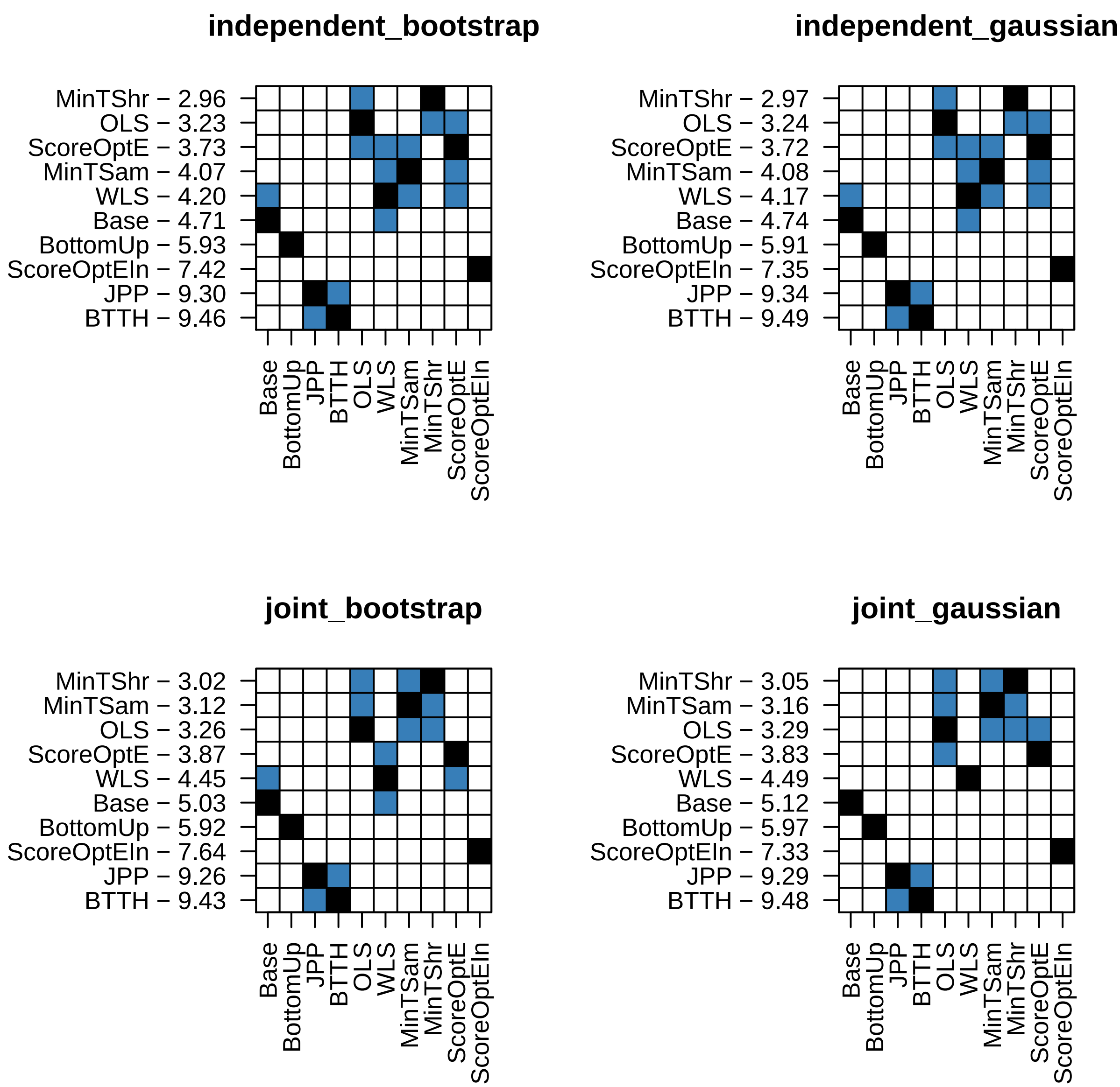

Figure 1: Nemenyi matrix for arima modelling with a nongaussian nonstationary DGP

Table 2: Mean score for arima modelling with a nongaussian nonstationary DGP

Method	independent_bootstrap	independent_gaussian	joint_bootstrap	joint_gaussian
Base	34.4008	34.4094	34.3328	34.3281
BottomUp	37.1891	37.2132	37.1412	37.1400
BTTH	40.5704	40.6472	40.3768	40.5792
JPP	34.1543	34.1687	34.1022	34.0996
MinTSam	32.5086	32.4679	32.4076	32.3983
MinTShr	32.4472	32.4234	32.3692	32.3606
OLS	33.5707	33.5801	33.5104	33.5050
ScoreOptE	34.0114	34.0151	34.0897	33.9835
ScoreOptEIn	44.0704	43.6201	45.8618	44.5088
ScoreOptV	NA	NA	NA	NA
ScoreOptVIn	NA	NA	NA	NA
WLS	34.1541	34.1684	34.1012	34.0982

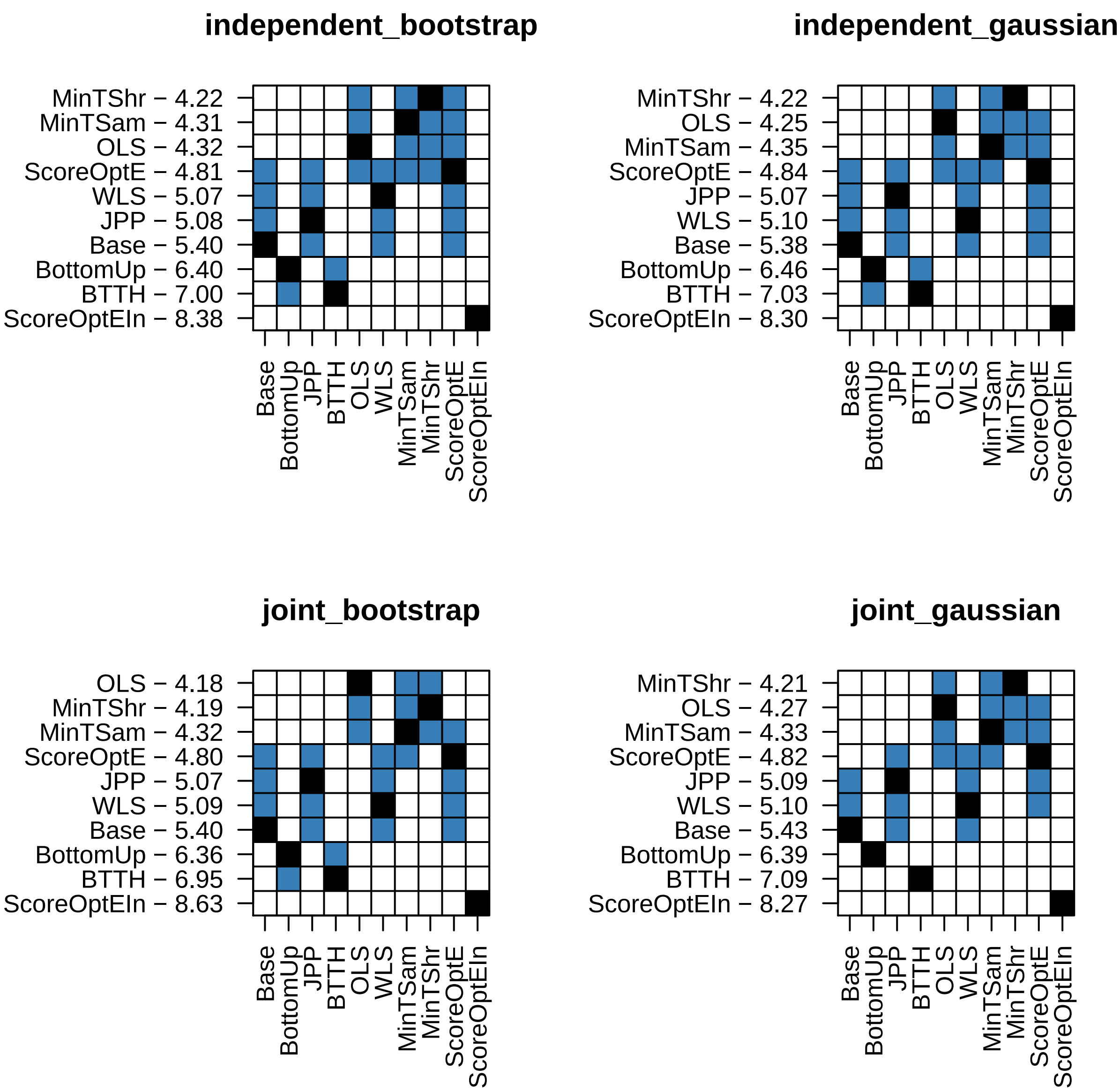

Figure 2: Nemenyi matrix for arima modelling with a nongaussian nonstationary DGP