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 gaussian nonstationary DGP

Method	independent_bootstrap	independent_gaussian	joint_bootstrap	joint_gaussian
Base	12.9200	12.9140	12.6643	12.6329
BottomUp	14.8339	14.7979	14.5841	14.5153
BTTH	26.6143	26.6288	26.7296	26.6402
JPP	25.8865	25.8828	25.8671	25.8263
MinTSam	11.7395	11.7354	11.3327	11.3053
MinTShr	11.5744	11.5687	11.3592	11.3340
OLS	12.3467	12.3381	12.0465	12.0189
ScoreOptE	11.9782	11.9718	11.8894	11.8986
ScoreOptEIn	12.1960	12.1675	11.9106	11.8998
ScoreOptV	NA	NA	NA	NA
ScoreOptVIn	NA	NA	NA	NA
WLS	12.7668	12.7505	12.5344	12.4964

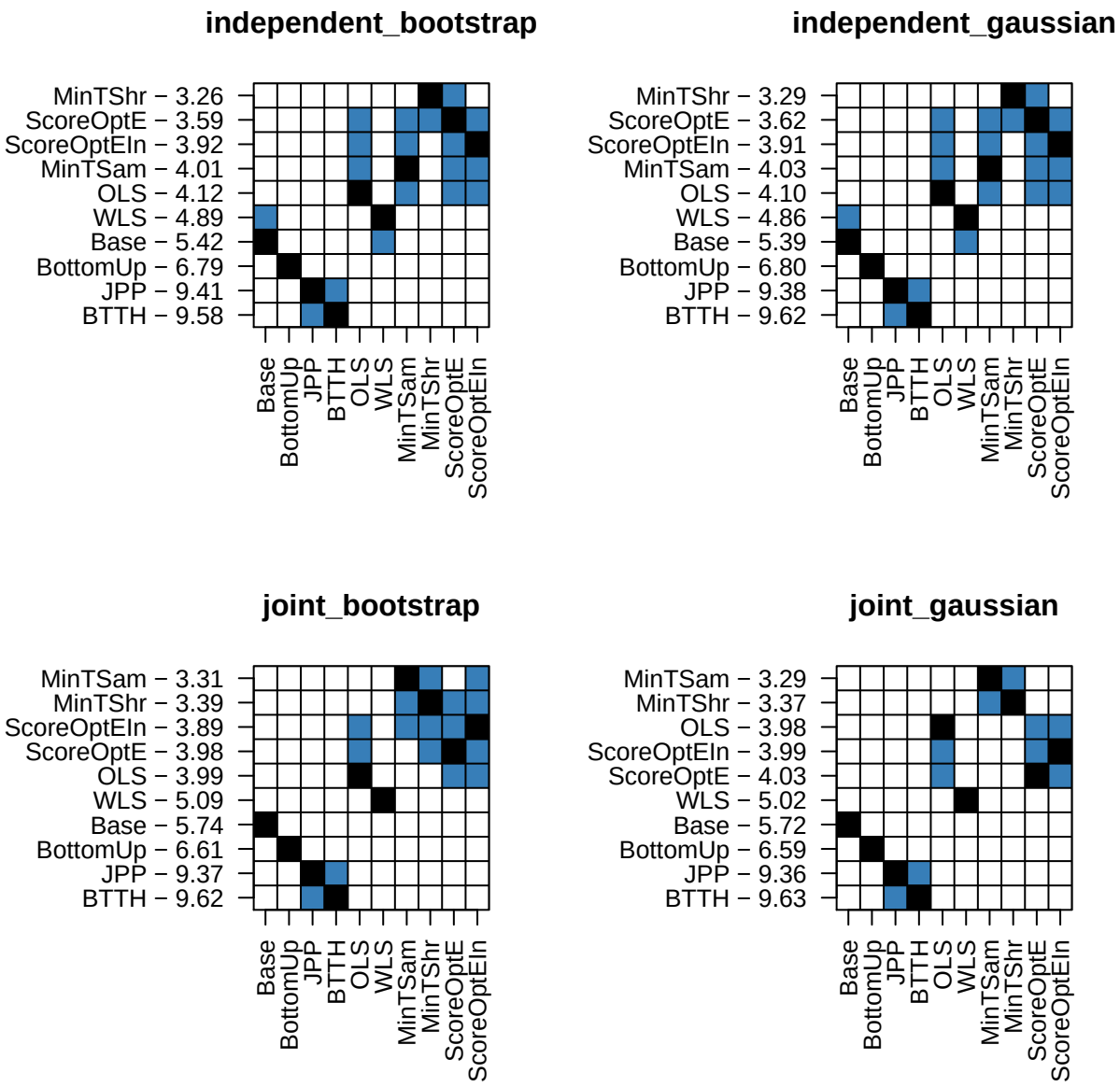

Figure 1: Nemenyi matrix for arima modelling with a gaussian nonstationary DGP

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

Method	independent_bootstrap	independent_gaussian	joint_bootstrap	joint_gaussian
Base	2191.623	2185.810	2191.772	2186.435
BottomUp	2505.321	2491.974	2482.479	2469.628
BTTH	2560.979	2547.253	2559.660	2544.641
JPP	2184.813	2177.547	2185.462	2178.101
MinTSam	1943.012	1934.722	1941.072	1930.904
MinTShr	1944.419	1937.010	1949.399	1940.323
OLS	2121.561	2115.588	2130.454	2124.375
ScoreOptE	2059.837	2056.642	2082.405	2087.935
ScoreOptEIn	2070.862	2058.318	2070.658	2065.662
ScoreOptV	NA	NA	NA	NA
ScoreOptVIn	NA	NA	NA	NA
WLS	2172.791	2165.492	2181.382	2173.941

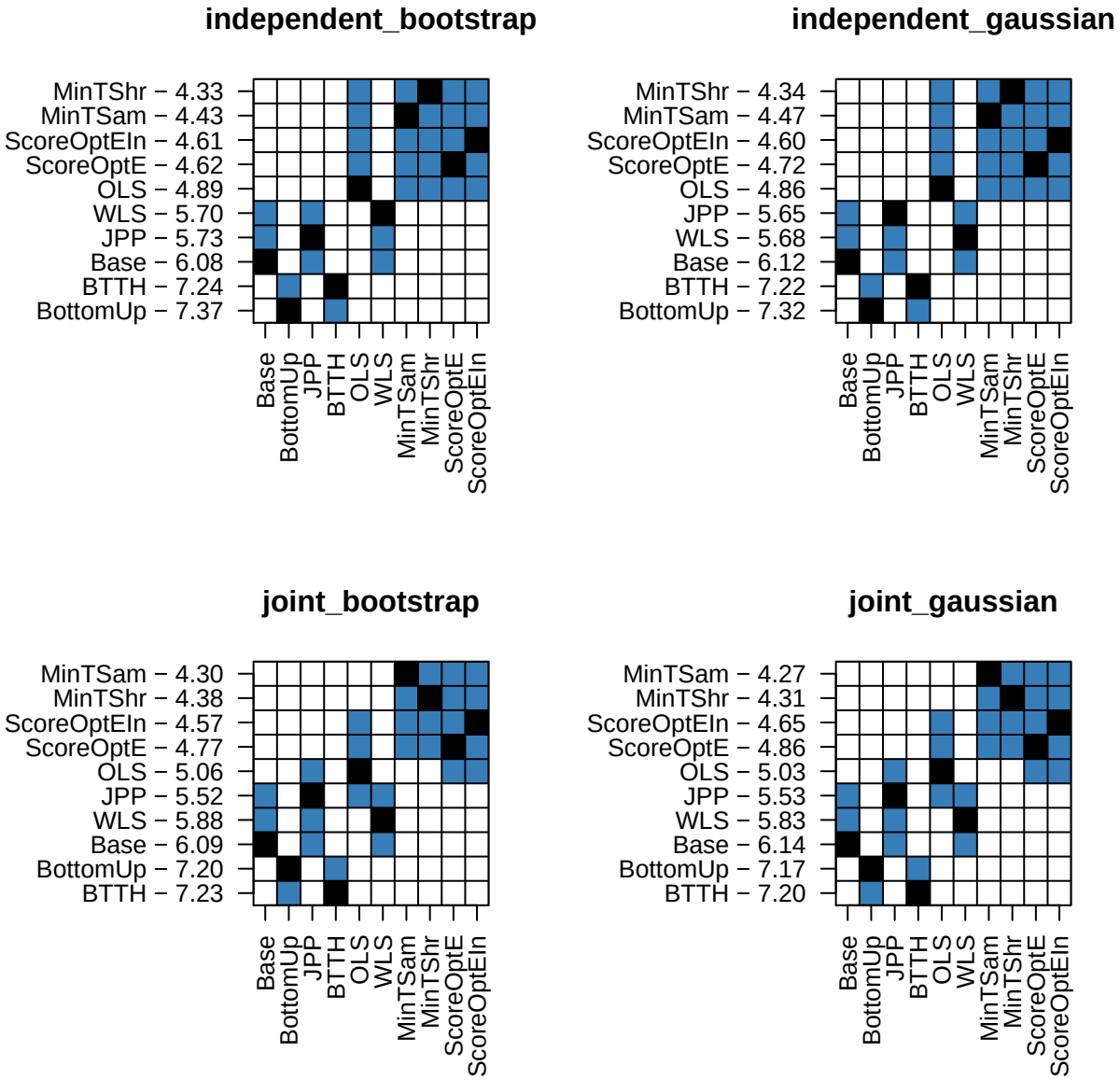

Figure 2: Nemenyi matrix for arima modelling with a gaussian nonstationary DGP