Results Summary

Anastasios Panagiotelis

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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 stationary DGP

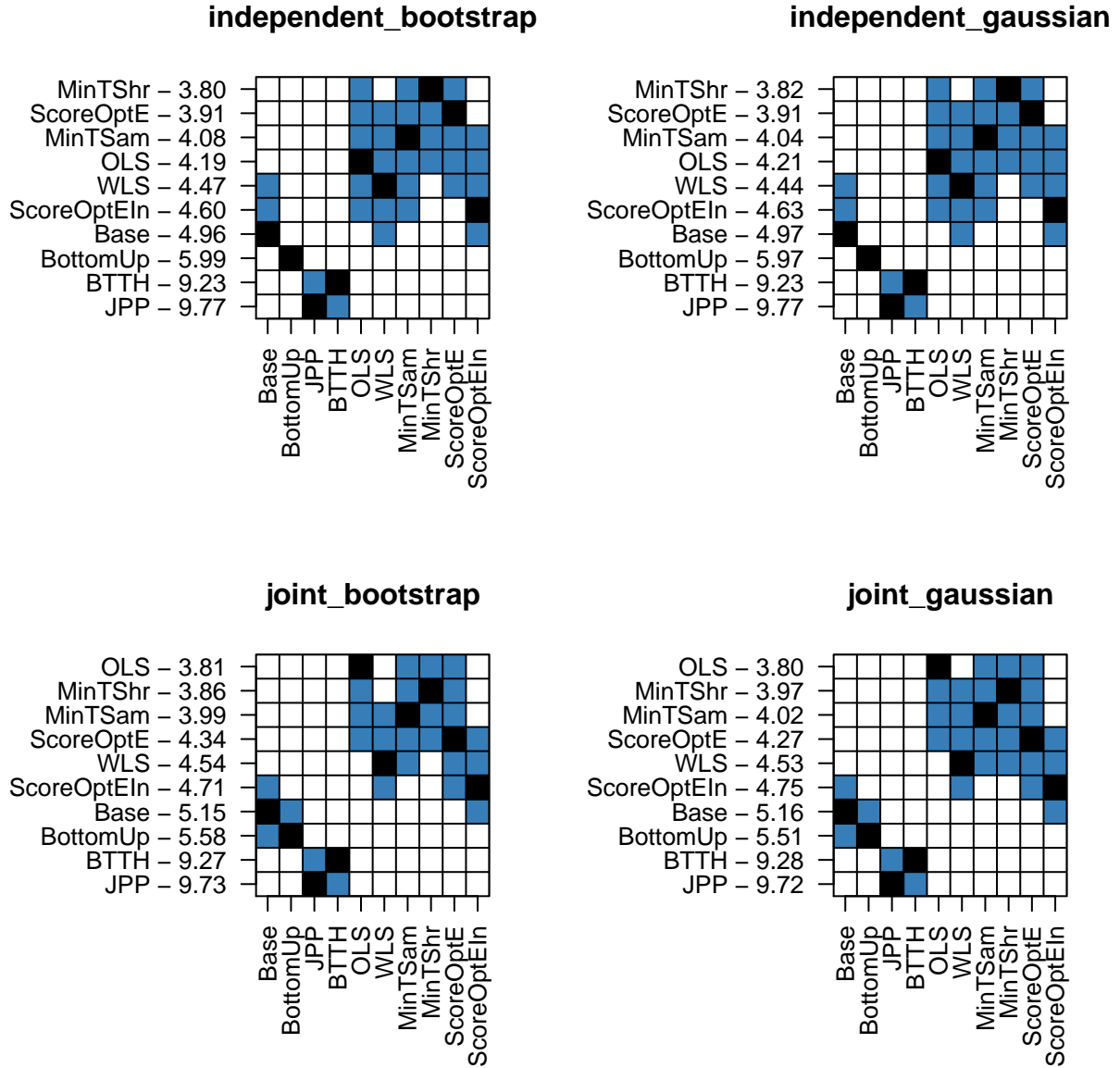| Method	independent_bootstrap	independent_gaussian	joint_bootstrap	joint_gaussian
Base	11.3287	11.3146	11.0622	11.0430
BottomUp	11.9787	11.9570	11.6350	11.6076
BTTH	21.7662	21.7917	21.8574	21.8669
JPP	22.7020	22.7161	22.6538	22.6525
MinTSam	10.9180	10.8976	10.7630	10.7477
MinTShr	10.9011	10.8831	10.7471	10.7314
OLS	11.1304	11.1180	10.8358	10.8170
ScoreOptE	10.8158	10.8259	10.8515	10.8313
ScoreOptEIn	11.2566	11.2402	11.1374	11.1235
ScoreOptV	NA	NA	NA	NA
ScoreOptVIn	NA	NA	NA	NA
WLS	11.2313	11.2143	10.9941	10.9746

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

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

Method	independent_bootstrap	independent_gaussian	joint_bootstrap	joint_gaussian
Base	695.1701	694.9232	694.9747	694.0612
BottomUp	889.6106	892.8524	698.2215	697.1985
BTTH	632.0546	630.9368	630.6953	630.8710
JPP	1032.3632	1037.4478	1031.6352	1036.9701
MinTSam	691.3154	691.1682	677.9639	677.1820
MinTShr	683.8444	683.1749	678.0581	677.1955
OLS	713.9024	713.4806	680.5548	679.6757
ScoreOptE	686.2163	686.2100	683.7427	683.7837
ScoreOptEIn	766.2920	764.4956	792.1941	791.3097
ScoreOptV	NA	NA	NA	NA
ScoreOptVIn	NA	NA	NA	NA
WLS	707.4935	707.3377	683.9656	683.1054

independent_bootstrap

independent_gaussian
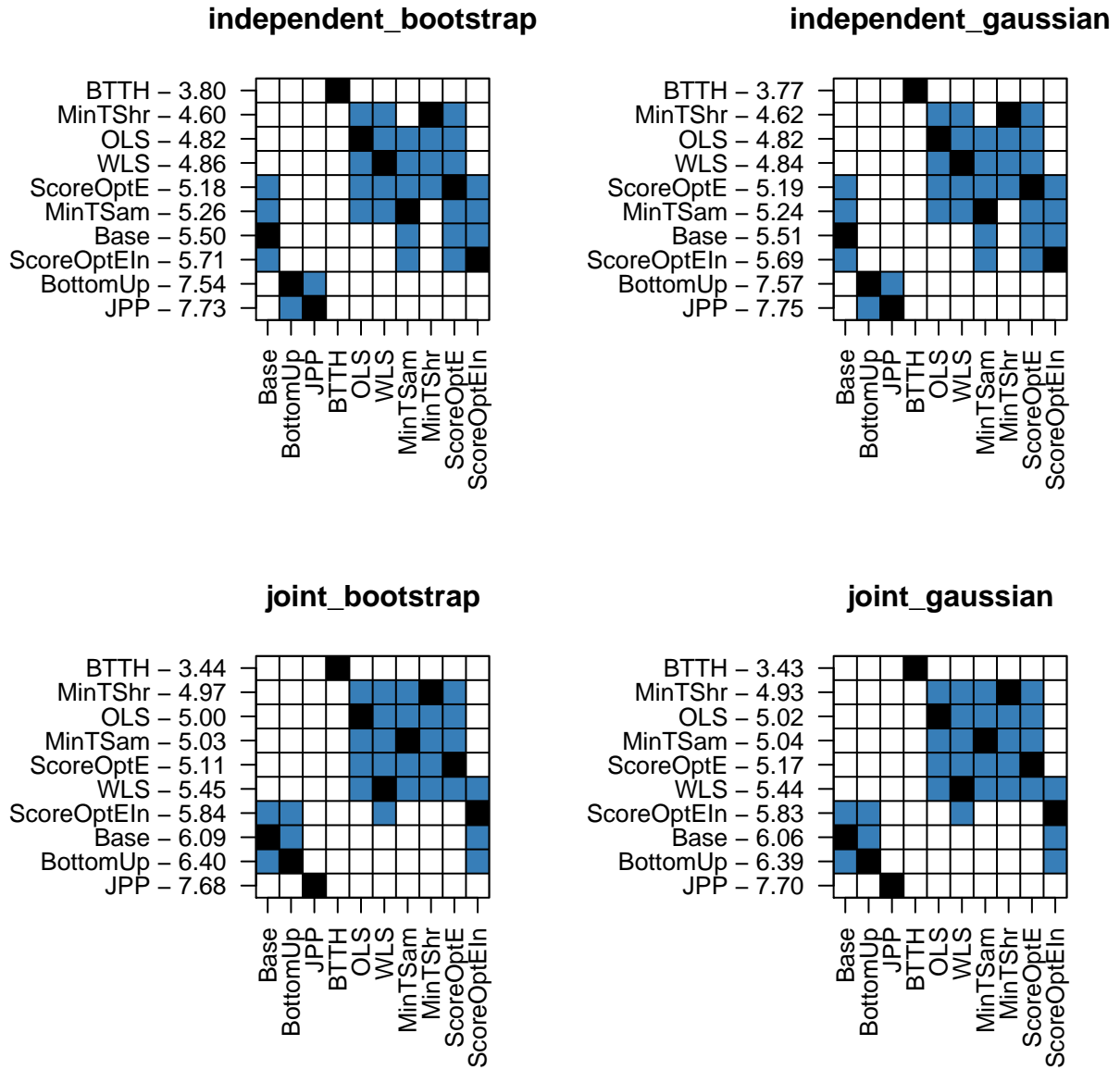

joint_bootstrap

joint_gaussian

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