

Results Summary

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19 June 2020

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 nongaussian nonstationary DGP

Method	independent_bootstrap	independent_gaussian	joint_bootstrap	joint_gaussian
Base	1.5831	1.5842	1.5485	1.5479
BottomUp	1.7609	1.7632	1.7395	1.7388
BTTH	3.2929	3.3358	3.3013	3.3410
JPP	3.2022	3.2458	3.2009	3.2232
MinTSam	1.5605	1.5655	1.4176	1.4182
MinTShr	1.4548	1.4553	1.4165	1.4170
OLS	1.4845	1.4831	1.4554	1.4556
ScoreOpt	1.5375	1.5377	1.4779	1.4773
WLS	1.5435	1.5426	1.5165	1.5163

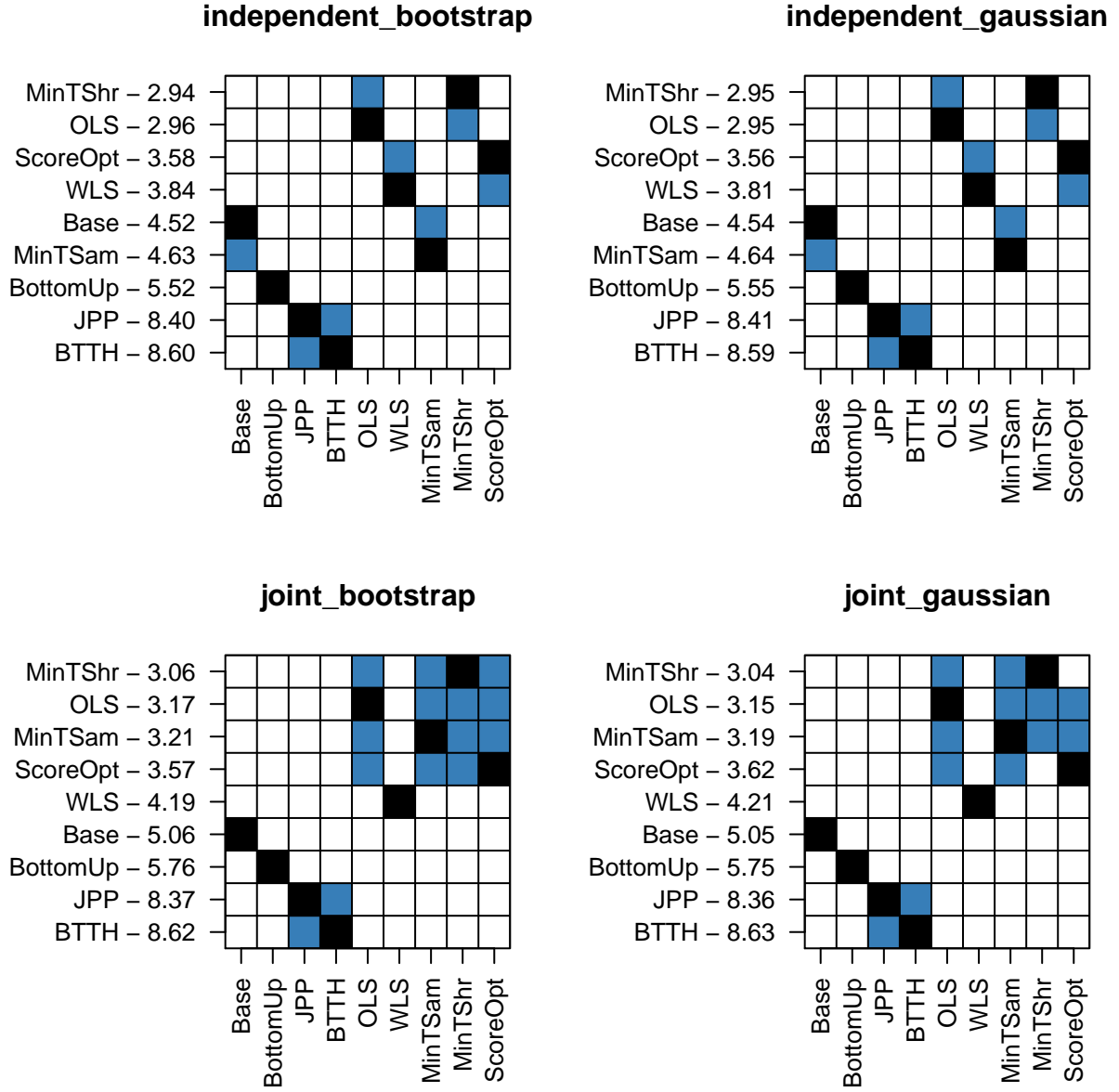


Figure 1: Nemenyi matrix for ets modelling with a nongaussian nonstationary DGP

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

Method	independent_bootstrap	independent_gaussian	joint_bootstrap	joint_gaussian
Base	34.8150	34.7854	34.8247	34.7950
BottomUp	37.2047	37.1984	37.2242	37.1972
BTTH	41.9381	42.0749	41.8682	42.1252
JPP	33.9268	33.9093	33.9370	33.9158
MinTSam	32.3092	32.2625	32.2892	32.3004
MinTShr	32.2752	32.2326	32.2607	32.2576
OLS	33.3459	33.3225	33.3500	33.3289
ScoreOpt	33.9941	33.9718	33.7482	33.6834
WLS	33.9264	33.9088	33.9343	33.9126

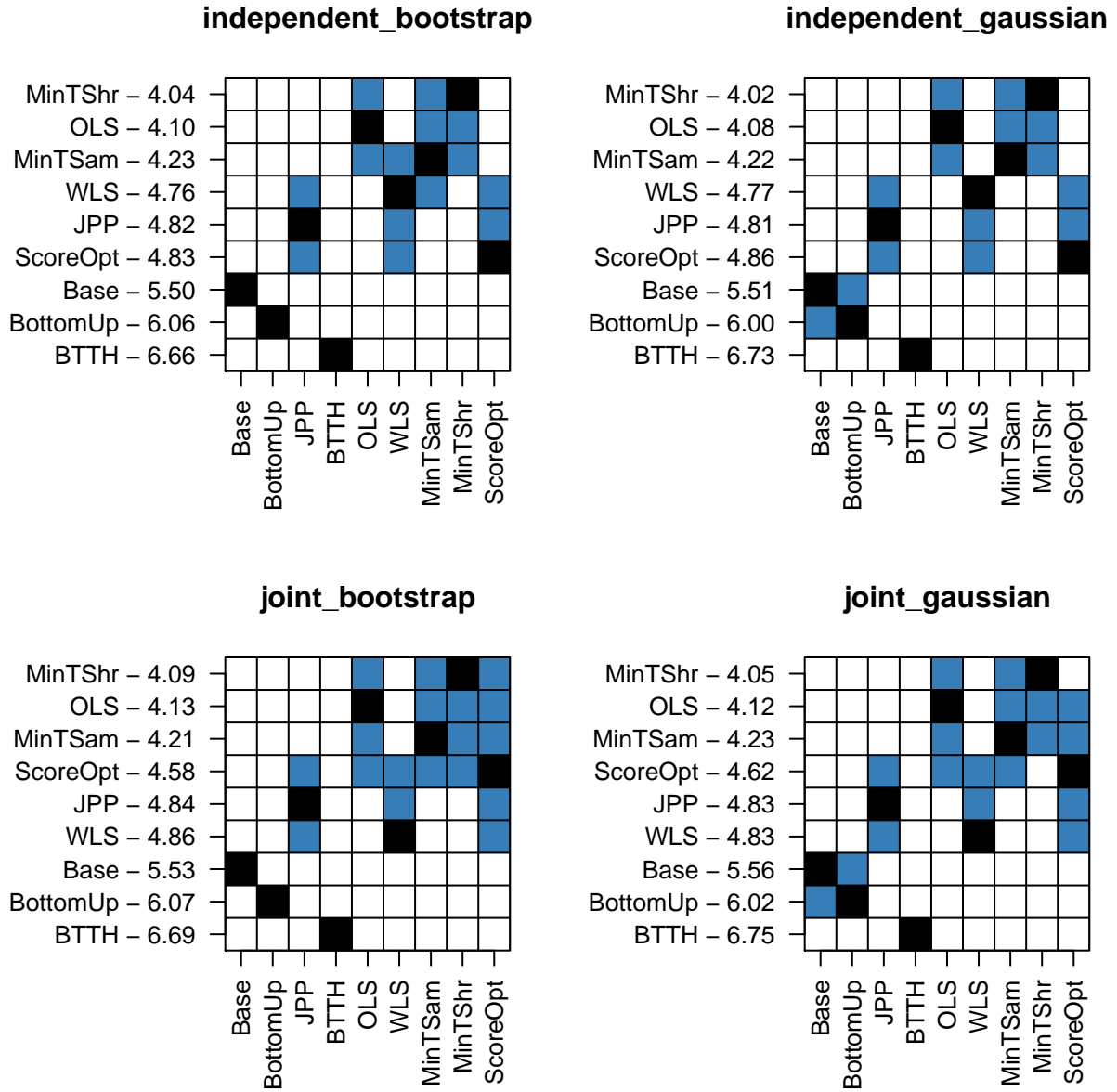


Figure 2: Nemenyi matrix for ets modelling with a nongaussian nonstationary DGP