**Method Description**

**General Information**

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| --- | --- |
| Type of Entry (*Academic, Practitioner, Researcher, Student*) | **Academic** |
| First Name | **Jurgen** |
| Last Name | **Doornik** |
| Country | **UK** |
| Type of Affiliation (*University, Company-Organization, Individual*) | **University** |
| Affiliation | **University of Oxford** |

**Team Members (*if applicable*):**

|  |  |
| --- | --- |
| **1st Member** | |
| First Name | David |
| Last Name | Hendry |
| Country | UK |
| Affiliation | University of Oxford |
| **2nd Member** | |
| First Name | Jennie |
| Last Name | Castle |
| Country | UK |
| Affiliation | University of Oxford |

**Information about the method utilized**

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| --- | --- |
| Name of Method | **Card** |
| Type of Method (*Statistical, Machine Learning, Combination, Other*) | **statistical** |
| Short Description (up to 200 words) | Calibrated average of rho and delta method (**Card**). The aim was to find an autoregressive method that works well. We designed the **delta** method based on first differences: overdifferencing seems less serious than underdifferencing and step shifts are changed into outliers. Growth rates are damped by removing large values. The seasonal component is extracted from the differenced values, there is no smoothing to obtain a trend. The **rho** method estimates the autoregressive coefficient, but this requires decision rules for large and small values. Seasonality is handled through seasonal dummies and seasonal autoregression, a possible second frequency with sine/cosine. The forecasts are **averaged** with equal weights. **Calibration** treats these forecasts as observed data, then estimates a more elaborate model: adding the frequency+1 lag (airline type) is now feasible. Also, with enough observations, a lag at the second frequency. The forecasts are replaced by fitted values from the calibration model. Unstable roots can be ignored when they are (pseudo) insample. The calibration model is used to create forecast intervals. Levels are used when they have less variability than differences. Logs are used by default. Some tweaks are made for monthly, weekly and hourly data. The code is implemented in Ox 8: generation of the forecasts takes half a minute (including loading the M4 data and saving the results).  . |

**Extended Description:**

*Apart from the textural description, please consider including an informative flowchart to help researchers better understand the exact steps followed for generating the forecasts. Please also try to clarify any assumptions made, the initialization and parameterization process used, etc., to facilitate reproducibility and replicability.*