Using R for Quarterly National Accounts

1. Framework

Quarterly National Accounts (QNA) in Austria are currently not compiled at the NSI (Statistics Austria - STAT) but the Austrian Institute of Economic Research (WIFO). This is about to change as QNA will be compiled and published by STAT from 2020 onwards in order to be stronger interlinked with Annual National Accounts (ANA). This gives us the opportunity to set up a new system from scratch and to implement the whole process in R.

Technical Framework:

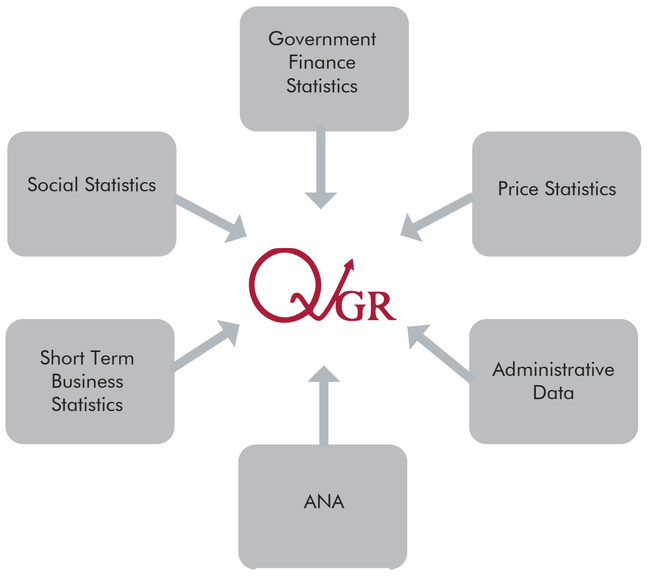
- R on server to access windowsfile system and deal with access authorisation
- Methods Unit maintains system and develops corresponding packages **mountSTAT, dataSTAT, DirVSTAT, graphSTAT, slideSTAT**
- Several internal R packages to read and write to internal system architecture and connect to older versions
- Bitbucket and git for Version Control
- Jira and Confluence to document process and assign tasks

2. Import, process, manipulate Data

It is in the nature of National Accounts that data come from different sources and departments. The use of R is not widespread in most departments. Therefore our input data are often provided in Excel and SAS files, which we import and process in R.

Used R packages:

- To read: **haven** (SAS), **readxl**, **openxls** (Excel)
- To process, manipulate, analyse and visualise: **dplyr, reshape, forecast, tseries, urca, ggplot2**



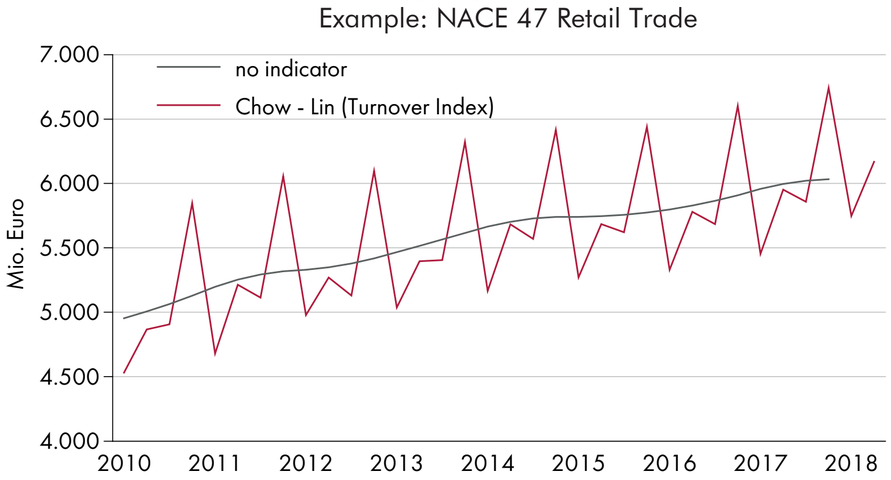
3. Temporal Disaggregation and Compilation of Aggregates

The majority of QNA aggregates is compiled by disaggregating the annual figures with appropriate indicator series (e.g. turnover index). Some aggregates on the expenditure side are estimated by a simplified commodity flow approach using ratios from annual data and SUT to ensure consistency. On the production side output is disaggregated with the corresponding series and value added (VA) is then obtained by input-output-ratios from ANA.

Used R packages:

- To disaggregate, benchmark and extrapolate: **tempdisagg, forecast, tseries**
- To analyse and visualise: **forecast, tseries, urca, ggplot2**

Disaggreagated Production
Example: NACE 47 Retail Trade



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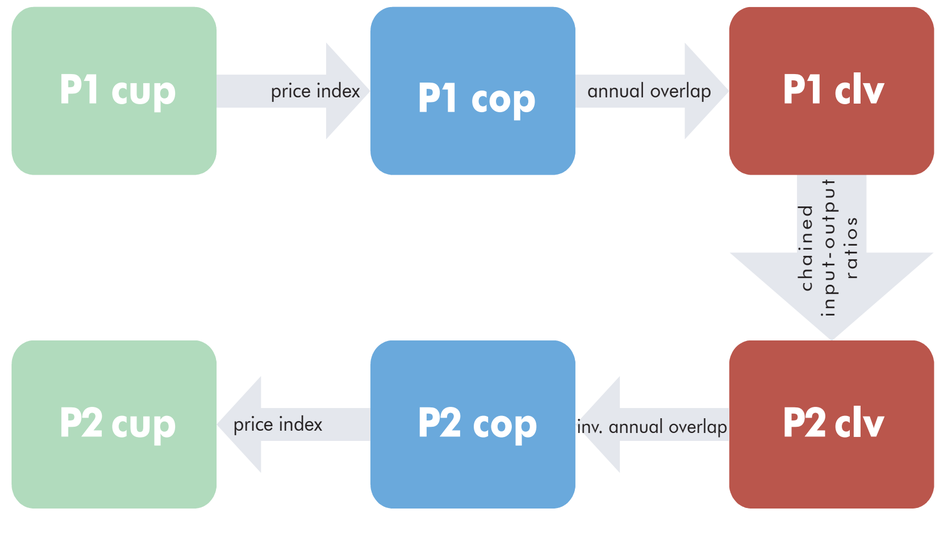
4. Chain-Linked Volume Estimates

The data base for price indices is based on ANA framework and gives us weighted quarterly Laspeyers price indices for every compiled aggregate. Weights come from IO tables and ANA. On the production side, where output is disaggregated, we obtain chain-linked volumes (clv) of VA through chained input-output relations and go back to current prices (cup) and constant prices (cop) via an inverse annual overlap approach. This approach rules out price effects. We wrote functions for chain-linking according to the annual overlap approach, and to `de-chain' chain-linked agegates. If you are interested, we are happy to share them.

Used functions from package DirVSTAT:

- `chainlinkAO (cup, cop, base = 2010, index = F)`
- `chainlinkINVAO (vol, cupANA, copANA, base = 2010, index = F)`



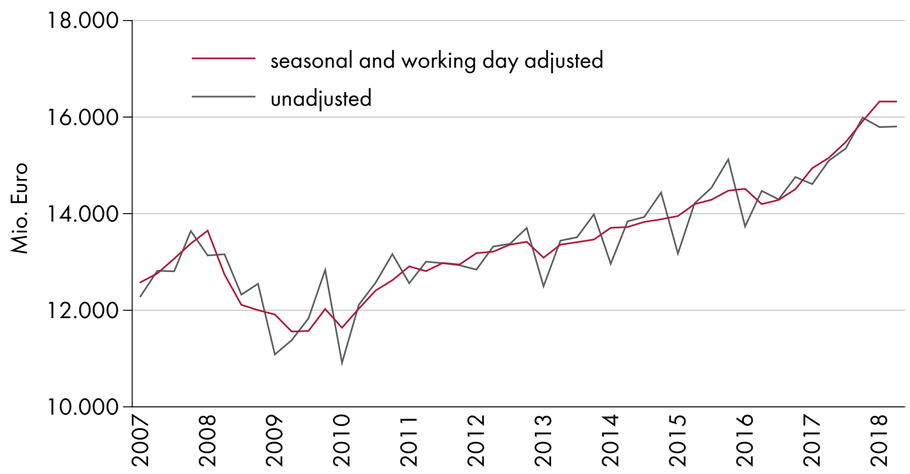
5. Reconciliation and Seasonal Adjustment

So far we do not have much experience with quarterly reconciliation, so we are happy to learn from your experiences. Most probably we will reconcile via a two-step procedure. Seasonal adjustment is performed by the Methods Unit, which generally uses an X13 ARIMA approach. Series are in most cases indirectly adjusted.
Further, they are checked for trading day influences. If trading-day regressors are significant and plausible the series will be adjusted for trading day effects.

Used Software:

- Upcoming: R with **Persephone** Package **RJDemetra**
- Currently: **JDemetra+** for seasonal adjustment and R for indirect adjustment

Seasonal Adjustment
Example: NACE C Manufactoring



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