

Evolution de JDemetra+

Paris, 24 octobre 2016

Outline

- JD+ releases
- JD+ 3.0
 - Overview
 - Common REGARIMA modelling
 - High-frequency series
- Final remarks

1. JD+ releases

Versions	Schedule
2.0	1/2015
2.1	4/2016
2.2	Q2/2017
3.0	Q4/2018 (?)

2.1 Towards JD+ 3.0

- IT aspects
 - Java 8
 - WEB services, R interface, batch « language » (?)
- Simplification of the design
- Generalization of extension points
 - Graphical interface
 - I/O
 - Algorithms

2.1 Towards JD+ 3.0 (and higher)

- Statistical aspects
 - High-frequency time series
 - Weekly, daily, ...
 - Equally spaced observations, random observations (?)
 - Seasonal adjustment
 - Common REGARIMA modelling
 - Decomposition/filtering
 - Extension to high-frequency series
 - X11: alternative filters
 - *Structural time series*
 - *STL (?)*

2.1 Towards JD+ 3.0

- Statistical/numerical aspects(cont.)
 - Low-level
 - New state space framework
 - More robust algorithms (-> high-frequency series...)
 - High-level
 - Chain linking (Bundesbank)
 - Temporal disaggregation and benchmarking (SACE, Jecotrim-like)
 - Revisions analysis (SACE)
 - Nowcasting (NBB)
- Detailed statistical documentation

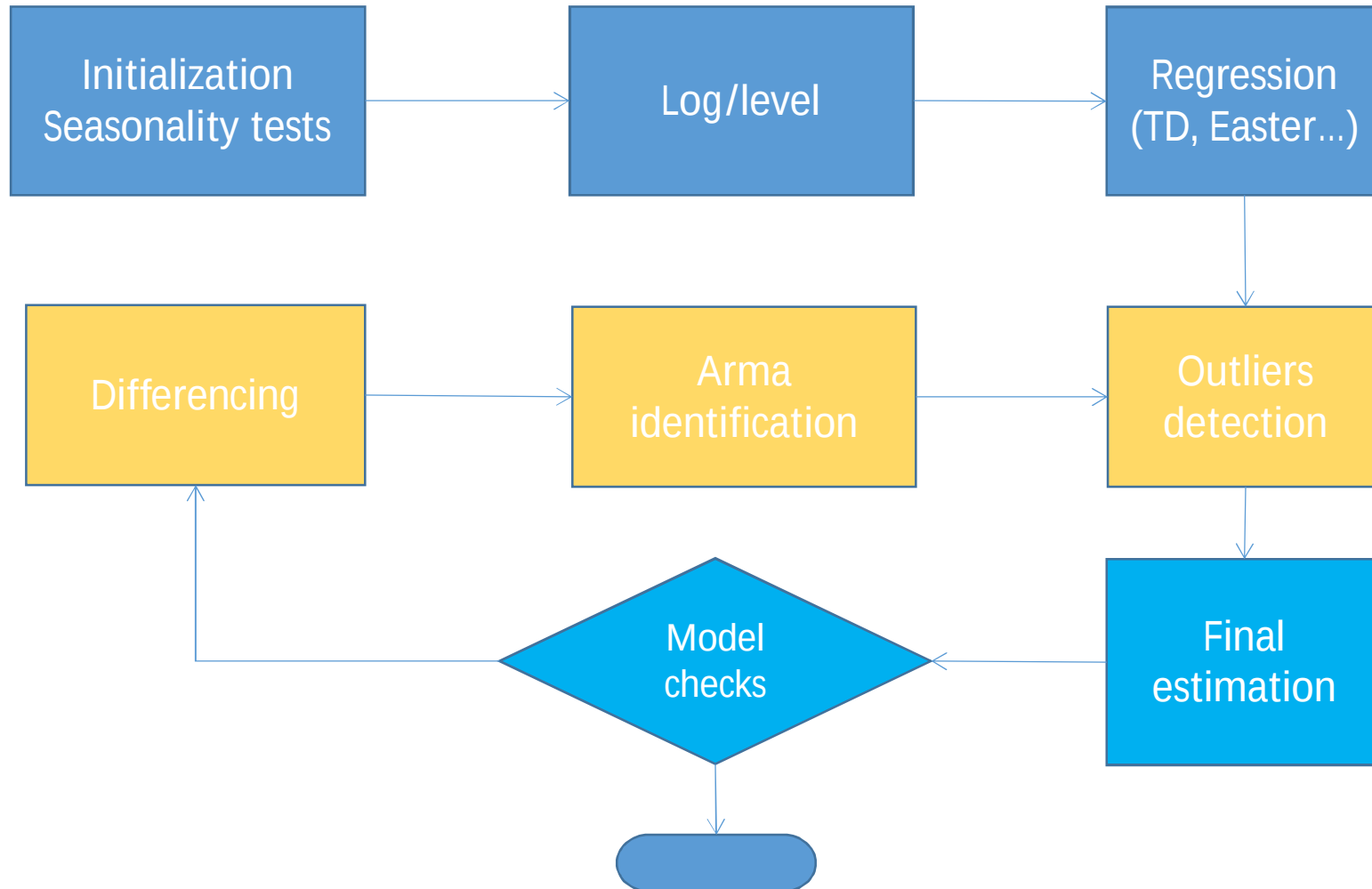
2.2 Common REGARIMA pre-processing

General approach

- Common regression model
- Common estimation procedure
- Decomposition of the algorithm in independant blocks
 - Comparison of Tramo/X13 + alternative implementations
 - Systematic testing
 - Simulated series
 - Real series
- Overall performance
 - Criteria (fit, forecasts, residuals, ...)

2.2 Common REGARIMA pre-processing.

Main blocks



2.2 Common REGARIMA pre-processing (cont.)

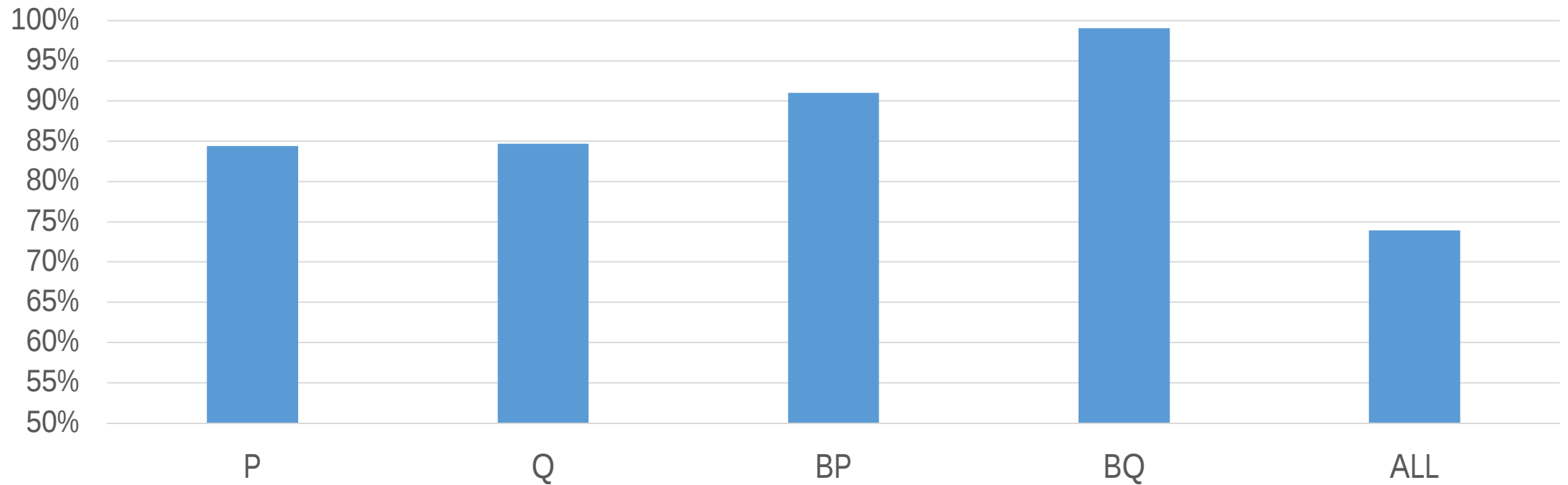
- Initial seasonality tests
 - Systematic analysis of different tests (Ljung-Box, non-parametric, spectral diagnostics, regression-based...)
- Log/level tests
 - Likelihood-based (handling of outliers?)
 - Robust tests (range-mean test...)
- Calendar tests
 - Parsimonious trading days (with automatic identification)
 - Richer moving holidays variables

2.2 Common REGARIMA pre-processing (cont.)

- Outliers detection
 - Approximate approach (Tramo)
 - Exact approach (X13)
 - Alternative approach (Kalman smoother)
 - Extension to other models
- ARIMA identification
 - Approximate approach (Tramo)
 - Exact approach (X13)
- Model validation
 - Tramo-like

Example:

ARMA Modelling (Tramo/X12) (% identical results, German industrial production, 334 series)

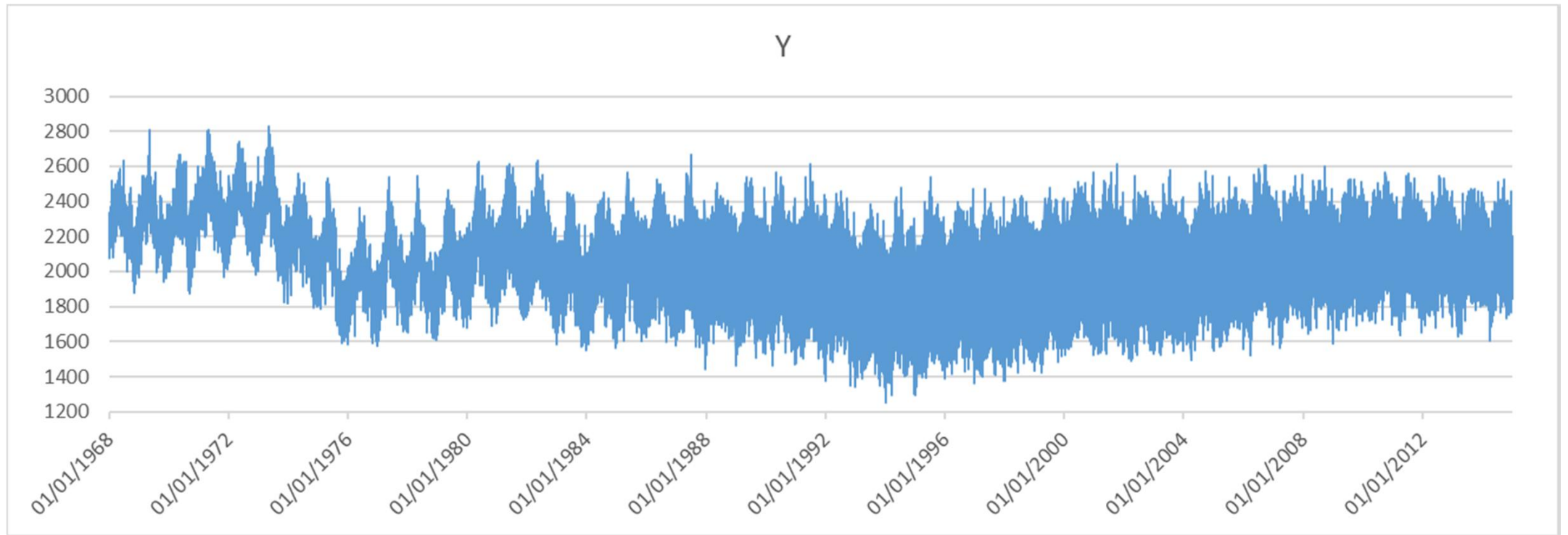


2.3 High-frequency series

- Adaptation of Tramo-Seats to weekly and daily series
- Many challenges
 - Theoretical
 - Technical
 - Numerical problems
 - Performances
 - Memory constraints
 - Presentation

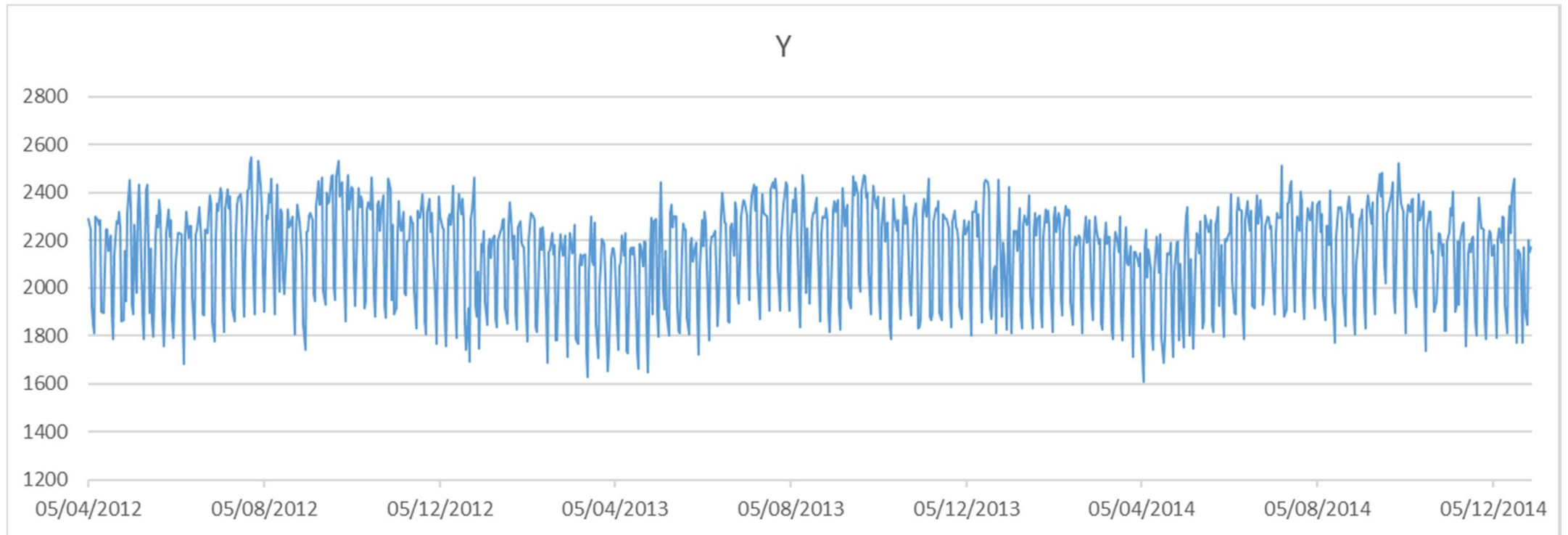
Births in France (daily observations)

- From 1/1/68 to 31/12/2014 (17.168 obs)



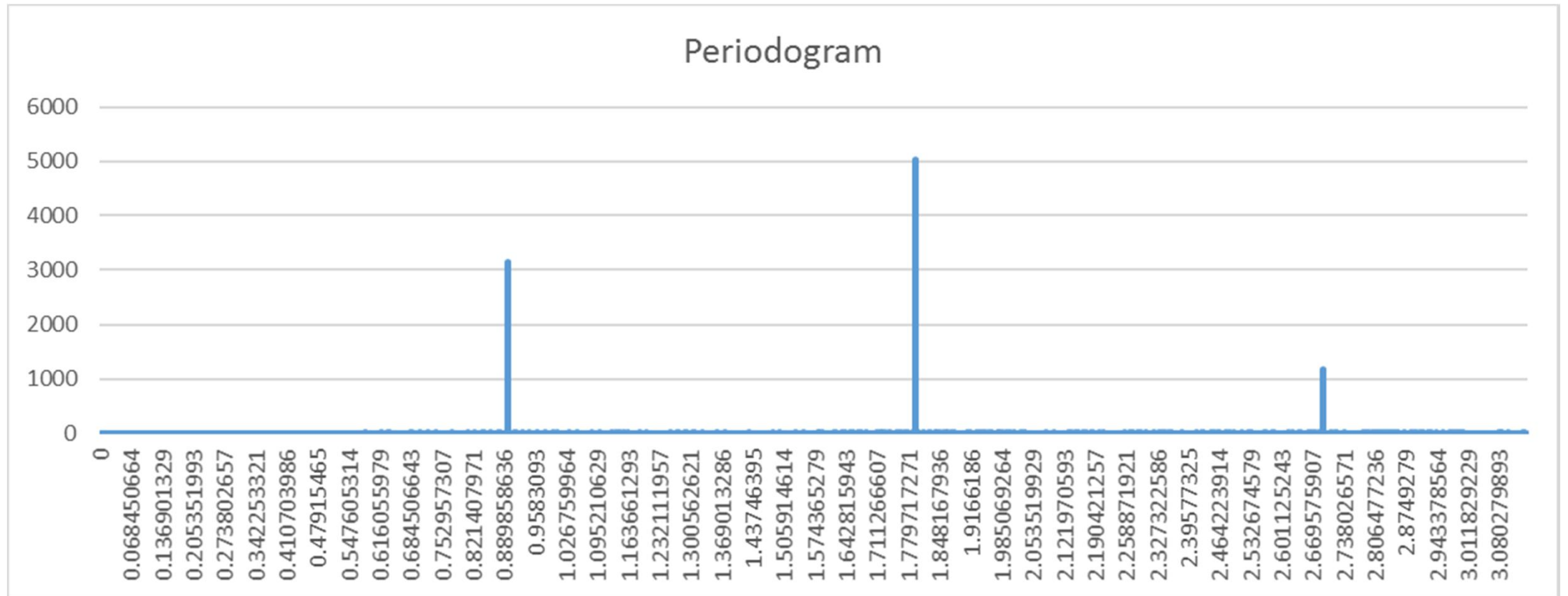
Births in France (daily observations)

- From 1/1/68 to 31/12/2014 (17.168 obs)



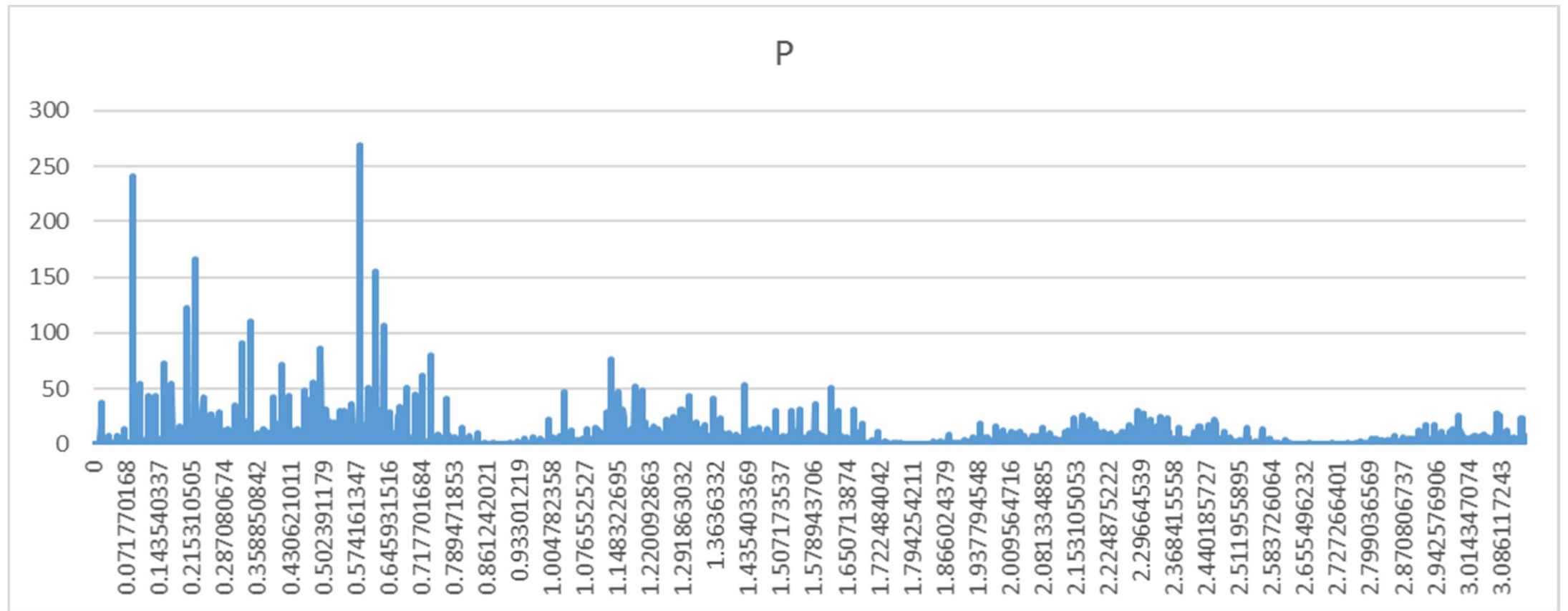
Births in France (spectral analysis)

- Differenced series



Births in France (spectral analysis)

- Differences at lag 7



Arima modelling

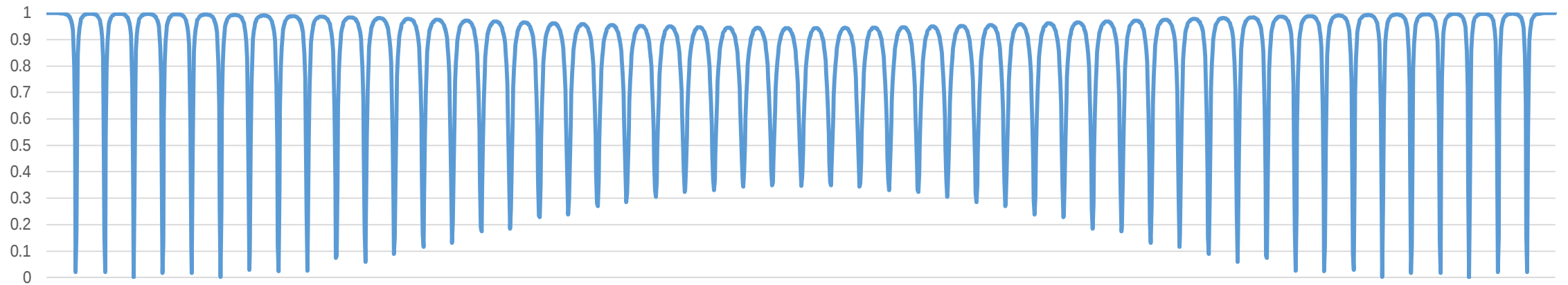
- $\Delta_s y_t = (1 - B^s)y_t = y_t - y_{t-s}$
- $\tilde{\Delta}_s y_t = (1 - (1 - \alpha)B^{\underline{s}} - \alpha B^{\underline{s}+1})y_t$, where $\alpha = s - \underline{s}$
- Weekly example
 - Average number of weeks by year: $365.25/7 \approx 52.18$
 - $\tilde{\Delta}_w y_t = y_t - 0.82y_{t-52} - 0.18y_{t-53}$
- Daily example
 - $\tilde{\Delta}_y y_t = y_t - 0.75y_{t-365} - 0.25y_{t-366}$

Extended airline models for weekly and daily series

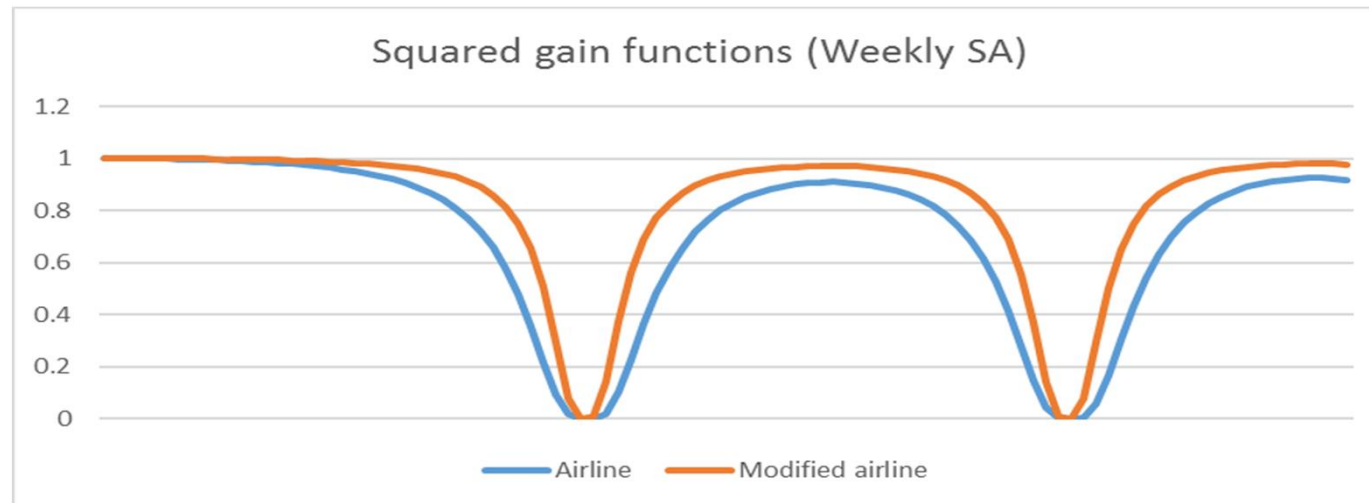
- $\Delta\Delta_{52}y_t = (1 - \alpha_1 B)(1 - \alpha_{52}B^{52})\varepsilon_t$
- $\Delta\Delta_7\Delta_{365}y_t = (1 - \alpha_1 B)(1 - \alpha_7 B^7)(1 - \alpha_{365}B^{365})\varepsilon_t$
- $\Delta\tilde{\Delta}_{52.18}y_t = (1 - \alpha_1 B)(1 - \alpha_{52.18}\tilde{B}^{52.18})\varepsilon_t$
- $\Delta\Delta_7\tilde{\Delta}_{365.25}y_t = (1 - \alpha_1 B)(1 - \alpha_7 B^7)(1 - \alpha_{365.25}\tilde{B}^{365.25})\varepsilon_t$
- Modified airline:
 - Better fit
 - More stable seasonal components

Properties of the filters

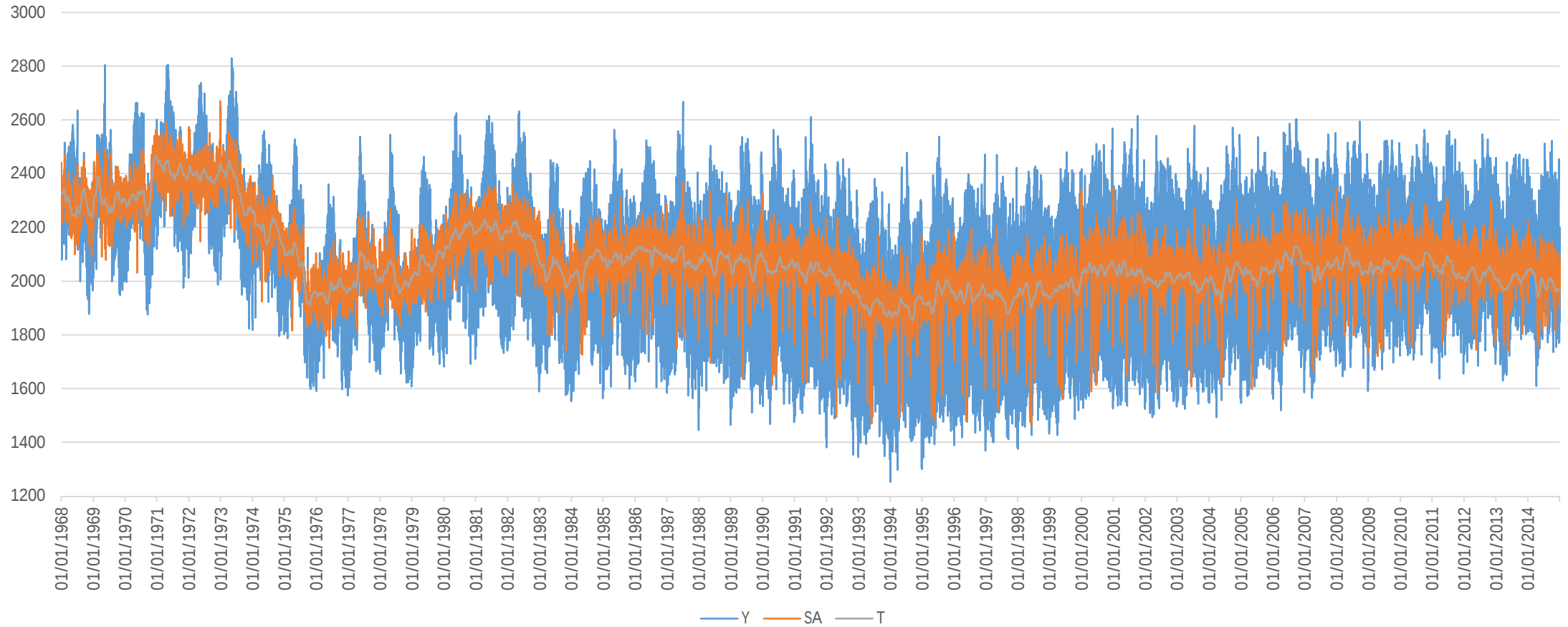
Squared gain function (modified airline, weekly SA)



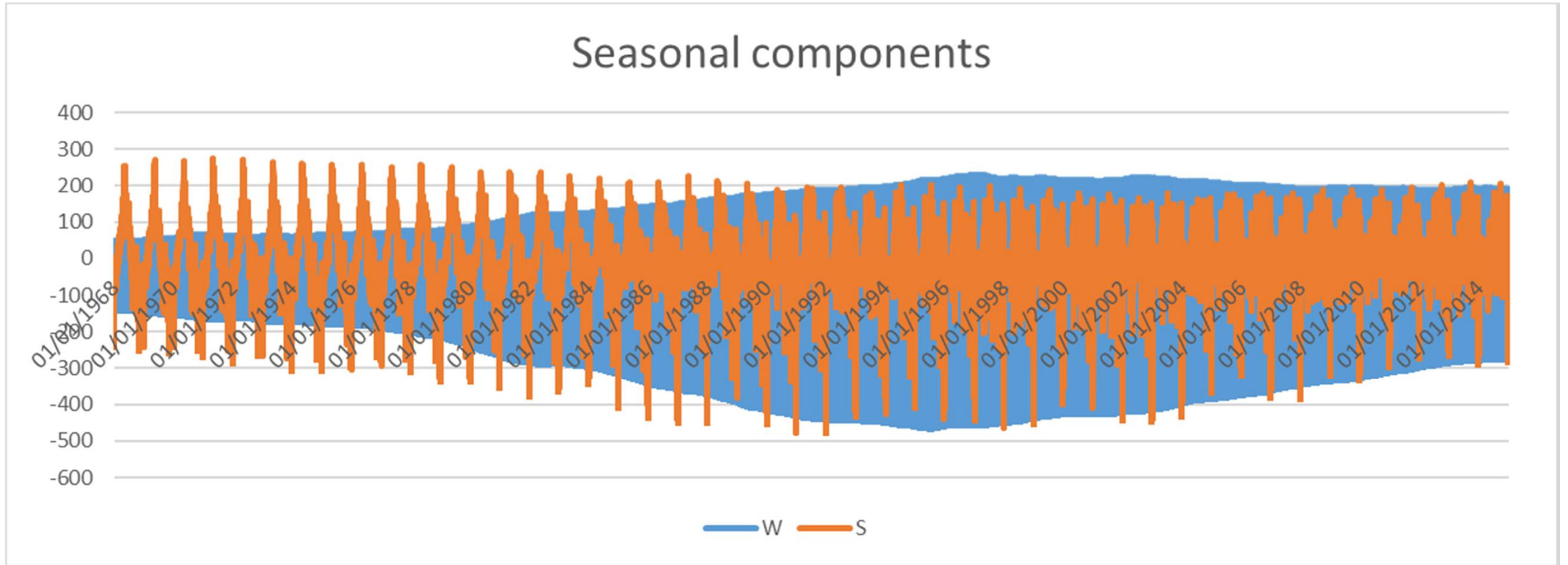
Squared gain functions (Weekly SA)



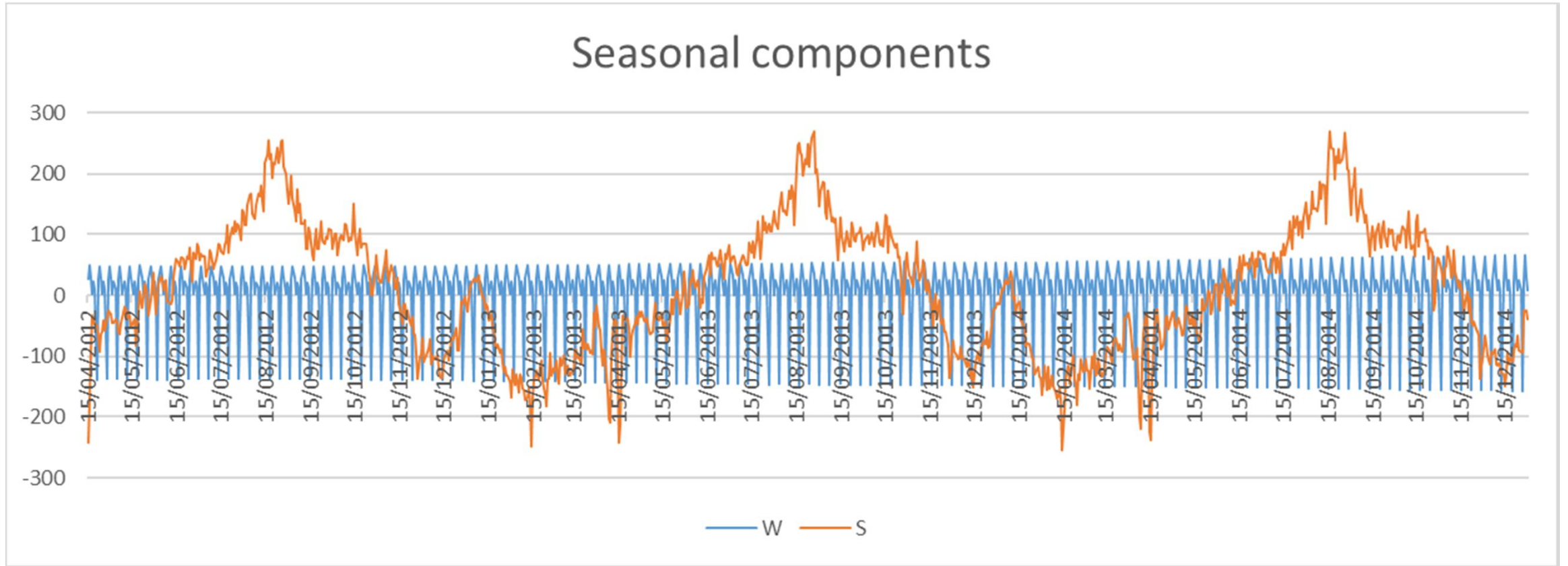
Births in France (main components)



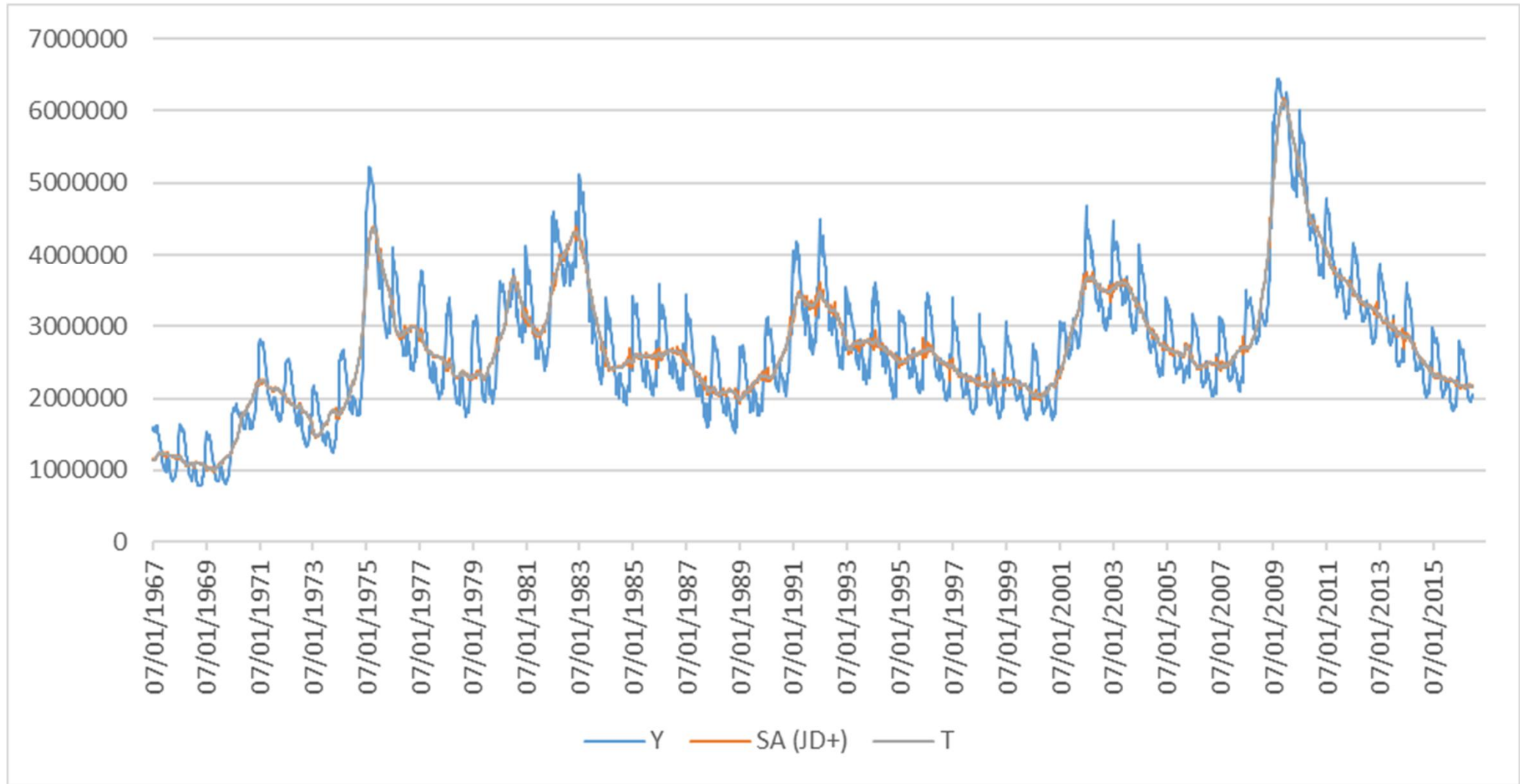
Births in France (components)



Births in France (components)



Weekly US claims



Final remarks on JD+ 3.0

- Very significant changes in comparison of JD+ 2.x
- Still many challenges
- Importance of the JD+ community
 - SACE
 - Github
 - ...