Transition to JDemetra+ in a centralised system for seasonal adjstment: issues and benefits

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1 Introduction

Seasonal adjustment is a very demanding activity for National Statistical Institutes (NSIs). The required resources, in fact, involve high skilled statisticians and econometricians, efficient IT procedures and a continuous updating of seasonal adjustment methods and tools. In order to conduct the annual campaign, as suggested by the European guidelines on seasonal adjustment (Eurostat [1]), and to assure coherence in the treatment of peculiar situations (such as crisis, short series, seasonal heteroskedasticity, etc.), NSIs generally work through a well-structured organisational system. A unit service deals with time series and seasonal adjustment at central level while several other local units seasonally adjust data routinely. When a problem arises the latter asks for the help of the former. Given this organisation and chosen a common seasonal adjustment method (usually the choice is between the ARIMA model based method and the moving average based method), there may be several and different ways to approach the seasonal adjustment, ranging from the simplest one where common procedures are run on the own domain using personal computers to the most complex one where a unique centralised system is used. The latter approach is implemented in the Italian National Institute of Statistics (Istat) through an informative system hereafter called SITIC. It is aimed at storing, seasonally adjusting and disseminating short term statistics coming from all business surveys.
The aim of this paper is twofold. Firstly the main features of SITIC are described stressing the solutions implemented to cope with some methodological issues concerning the aggregation of chained linked indices and drawing attention to the benefits implied by the management of a centralized system. Secondly the project aimed at introducing JDemetra+ in SITIC is presented. Issues, costs and advantages are listed and the peculiarities of the project are highlighted. In fact the transition to JDemetra+ in SITIC requires neither the use of the graphical interface nor the use of batch procedures like JDemetra+ Cruncher, but it is based on the integration of Java modules avoiding or minimizing any changes in SITIC interface.

2 A centralised system for seasonal adjustment: the Istat experience

An informative system, named SITIC, handles about 39000 unadjusted times series and approximately 1300 seasonally adjusted series (1100 through the direct approach and 200 through the indirect approach). SITIC is structured to manage indicators at different frequencies and represents a centralised tool not only for seasonal adjustment but also for revision analysis and for producing dissemination outputs.
SITIC is based on two main blocks: an Oracle database where data and metadata are stored and several web applications able to uploaddownload metadata and unadjusted data, to carry out directindirect seasonal adjustment, to save seasonally adjusted

vintages and the specifications used to derive them (in accordance to the European guidelines on seasonal adjustment). In fact, several editions of the unadjusted data are collected according to their revision policies, while the whole adjusted time series are stored. Furthermore, centralised procedures allow to produce dissemination outputs using different confidentiality codes depending on the nature of receiver (national or international institutions).

2.1 The indirect approach for seasonal adjustment of aggregated time series

Sitic performs Both direct and indirect approach for the seasonal adjustment of aggregated time series. An interesting point is how can be managed the aggregation of non-additive seasonally adjusted chain-linked indices. In practice, two approaches can be followed:

1) the approach suggested by the new ESS guidelines on SA based on three steps: i) unchaining of the chain-linked SA components to express them as indices in the previous year base; ii) aggregation of the unchained SA components to derive the unchained aggregate; iii) chain-linking of the SA aggregate;

2) the approach based on the direct aggregation of chain-linked SA components deriving a new convenient set of weights from the original set of weights used to aggregate the unchained and unadjusted components.

The main drawback of the first approach is that, when calendar effects are statistically significant and calendar adjusted chain linked indices are compiled, the annual weights to be used to aggregate calendar adjusted and seasonally adjusted unchained indices should be adjusted to remove calendar effects. This requires a procedure for the calendar adjustment of the annual weights and, therefore, the handling of a double set of weights (the one for unadjusted indices and the other for calendar and seasonally adjusted indices).
Although based on the original weights, the second approach avoids the adjustment of annual weights for calendar effects because it works with the direct aggregation of chain-linked calendar and seasonally adjusted components. Since it reduces the aggregation of chain-linked indices to a simple weighted average, it is easily implemented in SITIC. The main drawback in the use of a modified weighting system is the lack of additivity (in a sense the problem is shifted from indices to weights).

2.2 Benefits from a centralised system

Despite high initial efforts needed to standardise and harmonise many processes, to generate a common set of nomenclatures and to encode different policies and practices, as well as to support relevant costs of maintenance and updating, working with a centralised system like SITIC offers many advantages. Being based on a harmonized and standardised system of nomenclatures and other metadata, it enables:

1) the storage of a great deal of information from all surveys producing short term business statistics (unadjusted data at very disaggregated breakdowns in accordance with their own revision policies, structure of weights, seasonal adjustment specifications, vintages of calendar and seasonally adjusted data, etc.);

2) timeless and efficiency of the seasonal adjustment processes;

3) reduction in costs due to the maintenance of several information system;

4) statistical analysis using official statistics from several domains, coded and stored according to a common set of codes and rules;

5) easy implementation of best practices suggested by European guidelines on both seasonal adjustment and revision policy (Eurostat [2]).

3 The introduction of JDemetra+ in SITIC

In SITIC the seasonal adjustment is implemented through Tramo-Seats for Linux. The latest available release (corrected to fix some bugs) has been using for some months and it assures very coherent results with JDemetra+ (see the website https://ec.europa.eu/eurostat/cros/content/software-jdemetra_en). Currently, the specification of ARIMA models, calendar variables, outliers and other intervention variables is interactively performed through JDemetra+ available on personal computers. Once the reg-Arima models have been specified, the identified options are "translated" into Tramo-Seats language and then uploaded in the Oracle database. The introduction of JDemetra+ would allow two main advantages:

1) to simplify the previous step avoiding handling two procedures and any possible inconsistency in their outputs;

2) to store the seasonally adjusted data and the complete set of diagnostics and other pieces of information on seasonal adjustment (also those not available in the standard current output of the software) in the Oracle database using some facilities partly available for JDemetra+.

The latter item, in turn, would allow to derive standard and customized statistics for a quality report on seasonal adjustment, to monitor ARIMA fitting and decomposition over time (given the availability of a history of diagnostics) and to fill in the metadata template required by the European guidelines on seasonal adjustment automatically. The idea is to use neither the graphical interface of JDemetra+ nor batch procedures such as SACruncher, but to include objects, modules and plug-ins of JDemetra+ in SITIC reaching higher level of flexibility and customization. As a consequence SITIC could be improved introducing the moving averages method implemented in X13Arima, many graphical facilities and other tools like benchmarking techniques.

4 Conclusions

The experience acquired over some years of SITIC in Istat has showed how centralisation of the information systems for seasonal adjustment purposes, but not only, could be a powerful strategy for NSIs. SITIC showed to be a powerful tool not only for seasonal adjustment but also for many other goals, revision analysis, dissemination policy, storage of data, implementation of best practices suggested by European guidelines and so on. Despite the relevant costs of organisation and the initial efforts made to standardise, its flexibility, based on a harmonized system of nomenclatures and metadata, allowed for a rapid enlargement to all surveys producing short term business statistics.
The next step of improving SITIC is to introduce JDemetra+ for seasonal adjustment, to overcome the actual practice of specifying the Reg-Arima models through JDemetra+ on personal computers and to perform seasonal adjustment through Tramo-Seats language at centralised level. The main obstacles to the implementation of this project could be the lack of knowledge of the Java language among statisticians and the complexity of both seasonal adjustment and JDemetra+ for Java experts approaching

these matters. As a consequence it could be too much demanding in terms of specialized human resources.

References

[1] *ESS Guidelines on Seasonal Adjustment*, 2015. https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-GQ-15-001.

[2] *ESS Guidelines on Revision Policy for PEEIs*, 2013. https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-RA-13-016.