



**STATISTICS DIRECTORATE**

**STD/STESEG(2003)38**  
**For Official Use**

**OECD Short-Term Economic Statistics Expert Group**

**STESEG TASK FORCE ON DATA PRESENTATION AND SEASONAL ADJUSTMENT**

**PRESENTATION OF SEASONALLY ADJUSTED SERIES**

**Paris, 26 - 27 June 2003**

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*Submitted to the Expert Group under item 4 of the draft agenda*

**JT00146341**

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**English - Or. English**

## PRESENTATION OF SEASONALLY ADJUSTED SERIES

### Early Draft

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#### *Abstract*

This is a preliminary draft paper discussing the issues related to the presentation and dissemination of seasonally adjusted series to be discussed by the Task Force on Data Presentation and Seasonal Adjustment of the OECD Short-Term Economic Statistics Expert Group (STESEG). Section 0 sets the stage by briefly reviewing the need for seasonal adjustment and the associated information required by users of various statistical products. In Section 0 we describe the three main categories of uses of statistical information and the associated dissemination vehicles.

In section 0 we describe how to present seasonally adjusted data, and which information on seasonal adjustment should be provided to users by category of uses. It is likely that this section will overlap with the work of other Task Force members. In section 0 we will compare the current practice of different countries. In section 0 we will summarise the best practices. The last three sections will be expanded with the feedback from other countries, and the recommendations of the STESEG Task Force on Data Presentation and Seasonal Adjustment.

Note that throughout this paper, seasonal adjustment includes all calendar adjustments, including those for seasonal variations, trading-days, and variable holidays such as Easter, unless otherwise specified.

#### **1. Introduction**

Most sub-annual time series show intra-year variations which recur regularly every year, possibly slowly evolving. In order to gain insight into the current developments measured by a seasonally varying time series, it is necessary to correct it for these regularly repeating intra-year variations. For instance, if a monthly time series decreases every July because of holidays, there is little to be gained by noting that it decreased once more last July as it always does. What analysts are interested in, is whether this last decrease itself was larger or smaller than usual.

Another difficulty with the analysis of seasonal time series is obtaining statistically meaningful comparisons of different periods within the same year; for example, comparing the January sales level to that of September say. Seasonal variations, irrespective of their causes, are a reflection of the fact that each period has its own basis of comparison across the years that differs from those of the other periods. Hence, the direct comparison of periods of the same year for seasonal time series is generally not statistically meaningful.

Hence the need for seasonal adjustment. Seasonal adjustment methods are numerous, and vary in sophistication. At the low end, one finds the simple year-over-year change (or percentage change), while at

the more sophisticated end one finds techniques such as X-12-Arima<sup>1</sup> and Tramo-Seats.<sup>2</sup> For the great majority of time series, only the most sophisticated techniques can produce series adequately seasonally adjusted for most purposes.

However, because seasonal adjustment can only be achieved through a model of the seasonal behaviour of the series to be adjusted, and since each of the best seasonal adjustment methods encapsulates a broad but restricted family of seasonal models, there cannot be a unique method that would be applicable to all series.

Users of statistical information vary in their needs. In section 0 we identify three broad categories of users for a given piece of statistical information. To each of these groups is associated a limited set of dissemination vehicles for the statistical information. With respect to seasonal adjustment, the amount of information required and how the information is presented will vary according to the intended audience.

For instance, for the general public, their needs with respect to a given statistical information will generally be satisfied with the statistical agency's press release about it. We cannot expect these users to perform their own seasonal adjustment, nor should we expect that they be interested in, say, the standard error of the trading-day regression that was part of that particular seasonal adjustment.

It is also for the general public that issues related to the presentation of seasonally adjusted become paramount. The presentation of seasonally adjusted data will be taken up in section 0. As we shall discuss, for other users the presentation is less relevant as compared to the information provided about the seasonal adjustment.

## 2. Categories of use

With respect to seasonal adjustment, the amount of information required and how the information is presented will vary according to the intended audience. To establish how and what should be presented, it is helpful to distinguish users by category of uses. To each category of uses are associated a limited set of dissemination vehicles. Note that this categorization is with respect to a given piece of statistical information. Actual users will switch between the three categories according to their needs.

Users of statistical information can be grouped into three broad categories: *general public*, *informed users*, and *analytic users*. For the first category, the *general public*, knowledge of the main results of a statistical program is sufficient. The dissemination vehicles generally used to deliver this information are press releases, and the equivalent web pages. In Canada, for example, one vehicle serves both purposes. It is called **The Daily** and is available in various formats: on the main Statistics Canada's web page, and as a downloadable Acrobat's file among others.<sup>3</sup>

We cannot expect the general public to perform their own seasonal adjustment, nor to be interested in, say, the standard error of the trading-day regression that was part of the seasonal adjustment of a particular series. However, we should expect that they be interested in the meaning of seasonal adjustment. Accordingly, statistical agencies should provide "popular" metadata on seasonal adjustment, i.e. a layperson's explanation of this adjustment.

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<sup>1</sup> See Findley et al. (1998), Ladiray & Quenneville (2001) and U.S. Census Bureau (2002).

<sup>2</sup> See Gomez & Maravall (1996).

<sup>3</sup> Note that with the advent of the Internet and its widespread use across Canada, Statistics Canada's publication model has evolved toward eschewing paper products, to replace them with electronic publications.

The second category consists of *informed users*. These are users whose needs regarding a specific statistical information are not satisfied by a press release. They need more detailed results, such as the unemployment rate for a specific subgroup of the population, or they need more information on how the statistical program was carried, or on its reliability. For this category of users, statistical agencies generally provide at least one comprehensive document per statistical program. At Statistics Canada, for the monthly Gross Domestic Product by industry for example, we provide a monthly publication, as well as a separate sources and methods document, in various formats (Acrobat file, e-publication<sup>4</sup>).

For this group of users, the information required is likely to be which seasonal adjustment method was used, as well as statistics on the validity of the adjustment for specific series. The statistics to present will be discussed in section 0.

The third category consists of *analytic users*. These users need some of the results of the statistical program to reprocess them for their own uses. For these users, statistical agencies provide them with central databases that can be accessed externally, data files pertinent to their demands in various formats (e.g. Lotus spreadsheets, MS-Access databases, Beyond 20/20 tables), and stand-alone self-contained computer readable products, generally on CD-ROM. Two examples of these stand-alone products available from Statistics Canada are **Labour Force Historical Review** (71F0004XCB) and **Financial Performance Indicators for Canadian Business** (61F0059XCB).

This last group of users, especially those accessing a central database, are those who are the most in need of metadata information, i.e. information relevant for the interpretation and analysis of the data extracted.

One final point about the above categories of users is that they are inclusive. For example, informed users will also look at the information provided to the general public when looking for the detailed information they need.

### 3. Relevant seasonal information

In this section we will first discuss how to present seasonally adjusted data, and then what information should be provided about seasonal adjustment for each of the three types of users described in the previous section. It is likely that some of our discussion in this section will overlap with the work of other Task Force members.

#### 3.1 How to present seasonally adjusted data

The presentation of seasonally adjusted data concerns, in the main, members of the general public. Since the most appropriate seasonal adjustment techniques are very sophisticated statistical transformations, we cannot expect the general public to have the ability to perform these transformations on their own.

Hence, the general public should expect from statistical agencies that the main sub-annual indicators that appear in their press releases be seasonally adjusted appropriately when needed. This is not always the case at Statistics Canada. An example is provided by the quarterly estimates of the Canadian population.<sup>5</sup> Although a demographic indicator, it has its importance when calculating economic indicators per capita, such as GDP.

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<sup>4</sup> An "e-publication" consists of a self-contained set of web pages that constitute a publication.

<sup>5</sup> See <http://www.statcan.ca/Daily/English/030326/d030326c.htm>.

In addition, given that the statistical information reported in press releases is by nature limited, and concentrates on the meaning of the results of a statistical program, the following presentational issues become important and need to be addressed by the Task Force. In a revised version of this draft document we will list the main advantages and disadvantages for each issue, and propose a recommendation for the Task Force.

1. Should the levels of seasonally adjusted (SA) series be presented at annual rates, as is currently the case only for National Accounts' data, but not for other programs?
2. Should the period-to-period growth rates of SA data be annualized, and, if so, how? Again, currently the practice of annualizing growth rates is restricted to National Accounts data and to some countries. For example, in the United States the Bureau of Economic Analysis emphasizes the annualized quarterly growth rate of GDP in its press releases.<sup>6</sup> In Canada by contrast, it is the quarterly growth rate itself that is emphasized.

In both countries, annualization consists of compounding four times the quarterly growth rate ( $q$ ), i.e.  $(1+q)^4$ . In other contexts the annualized growth rate was simply obtained by multiplying by four the quarterly growth rate.

Note however that for monthly series, annualization is very rarely seen, and it would clearly be not appropriate to do so.

3. Should year-over-year growth rates (differences) be computed on seasonally adjusted data? Although this practice raises serious questions of interpretations, it is nonetheless the official measure of the growth in the monthly Consumer Price Index that is monitored by the Bank of Canada, Canada's central bank, to assess one of the aspects of the inflation situation in the country.
4. Should "raw" (i.e. not seasonally adjusted) figures be included with the seasonally adjusted data in press releases?
5. For series not requiring seasonal adjustment, and for those that cannot be seasonally adjusted, should low-end seasonal adjustment methods be applied, such as year-over-year growth rates or year-to-date totals?

### ***3.2 What to provide about seasonal adjustment***

The general public has an interest in understanding what seasonal adjustment is all about. However, given the sophisticated nature of seasonal adjustment methods, we cannot expect the general public to possess the mathematical and statistical background for understanding a technical description of any particular adjustment method. An example of a description that is too technical for the general public is that of the Fisher index that can be found on Statistics Canada's web site.<sup>7</sup>

Accordingly, statistical agencies should provide "popular" metadata on seasonal adjustment, i.e. a layperson's explanation of this adjustment. Two examples are provided by the U.S. Bureau of Economic Analysis<sup>8</sup> and by Statistics New Zealand,<sup>9</sup> the latter being more technical than the former.

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<sup>6</sup> See <http://www.bea.gov/bea/newsrel/gdp103a.pdf>.

<sup>7</sup> See <http://www.statcan.ca/english/concepts/chainfisher/methodology.htm>.

<sup>8</sup> See <http://www.census.gov/mcd/mcdfaqs.html>

For the second group of users, i.e. the informed users, the Statistics New Zealand's description of seasonal adjustment appears appropriate. However, the more relevant questions with respect to their needs are: which components, if any, of the seasonal adjustment decomposition should be included in a detailed publication, and which statistics describing the quality of seasonal adjustment should be included?

Note that no matter which seasonal adjustment method is used, one can obtain the fundamental seasonal decomposition model ( $X = T + S + I$ ), from which pertinent statistics can be computed. We believe that a good starting point is provided by the U.S. Bureau of the Census publication *Manufacturers' Shipments, Inventories, and Orders*.<sup>10</sup> We note that the information may be summarized in a more compact form with no loss for the users. In a revised version of this report we will make specific proposals on the components and statistics to include.

Finally, for analytic users, we believe that no additional elements than those listed for informed users and presented in the publication (whatever its format) dedicated to the statistical program need be added. But for analytic users, metadata is of paramount importance.

The main elements of this metadata could include the following: a short standardize descriptor of the method used, the main parameters of the adjustment (e.g. additive versus multiplicative decomposition model), and some of the derived information (e.g. the trading-day weights). The principle to be followed would be that the metadata provided should be of sufficient extent to enable an analytic user to seasonally adjust in a consistent way other series from the same statistical program which may not have been adjusted, or to compare the results obtained from using different options or methods for seasonally adjusting the same series.

#### 4. National practices

To be expanded with the feedback from the STESEG Task Force on Data Presentation and Seasonal Adjustment. This will consist of listing the most common practices in presenting and informing users about seasonally adjusted data.

#### 5. Recommended best practices

To be expanded with the feedback from the STESEG Task Force on Data Presentation and Seasonal Adjustment and after section 4 is completed.

### REFERENCES

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<sup>9</sup> See [Seasonal adjustment in New Zealand](#).

<sup>10</sup> Available at: <http://www.census.gov/indicator/www/m3/bench/bench.htm>. See the accompanying document *Pages from m3-01 on seasonal adjustment.pdf*.