

Seasonal Adjustment in External Trade Statistics

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What is seasonal adjustment?

- Seasonal adjustment is the process of estimating and removing seasonal and calendar effects from a time series in order to better reveal certain non-seasonal features
- The main aim of seasonal adjustment is to filter out usual seasonal fluctuations and typical calendar effects within the movements of the time series under review.
- Seasonal adjustment also includes the elimination of calendar effects insofar as influences deriving from differences in the number of working or trading days or the dates of particular days which can be statistically proven and quantified (e.g. public holidays, weekday on the last day of the month in the case of from differences in the number of working or trading days or the dates of particular days which can be stock series).
- In this way, the seasonally adjusted results do not show “normal” and repeating events, they provide an estimate for what is new in the series (change in the trend, the business cycle or the irregular component). Therefore, seasonally adjusted data help to reveal the “news” contained in a time series, which is the ultimate goal of seasonal adjustment.

Advantages of seasonal adjustment

- Provide more understandable series for analysts revealing the “news” contained in the time series of interest;
- Facilitate the comparison of long-term and short-term movements among sectors and countries;
- Supply users with the necessary input for business cycle analysis (i.e. output gap estimation), trendcycle decomposition and turning points detection;
- Apply quality control through both the input and output orientations, which will allow for better comparability with other series and methods.

WHY IS IT NOT RECOMMENDED TO COMPARE RAW DATA FROM THE SAME PERIOD IN EACH YEAR?

- A comparison of original data from the **same period in each year** does not completely remove all seasonal effects:
 - Year to year values will be biased by any changes in seasonal patterns that occur over time. For example, consider a comparison between two consecutive March months. This comparison ignores the moving holiday effect of Easter. Easter occurs in April for most years but if Easter falls in March, the level of activity can vary greatly for that month.
 - The comparison also ignores trading day effects. If the two consecutive months of March have different composition of trading days, it might reflect different levels of activity in original terms even though the underlying level of activity is unchanged.
- The comparison of **cumulative periods** (eg. from January to the last available month) is also not recommended for the same reasons.
- In addition, these practices often hide for a significant period of time the possible turning points in the trend of the series.

UNSD recommendations on external trade statistics (IMTS 2010) :

Paragraph 11.3 : *Need for seasonally adjusted data.*

Monthly and quarterly data on international merchandise trade statistics ... are often characterized by seasonal fluctuations and other calendar or trading-day effects, which mask other characteristics of the data that are of interest to analysts. Countries are **encouraged** to compile and publish, where appropriate, seasonally adjusted monthly and quarterly international merchandise trade data on a regular basis

Paragraph 11.4 : *Seasonal adjustment method.*

Because national circumstances vary from one country to another, **no preferred seasonal adjustment method is recommended**. If seasonally adjusted data is published, it is recommended that information on the adjustment methods, data quality etc. should be provided by countries in their metadata.

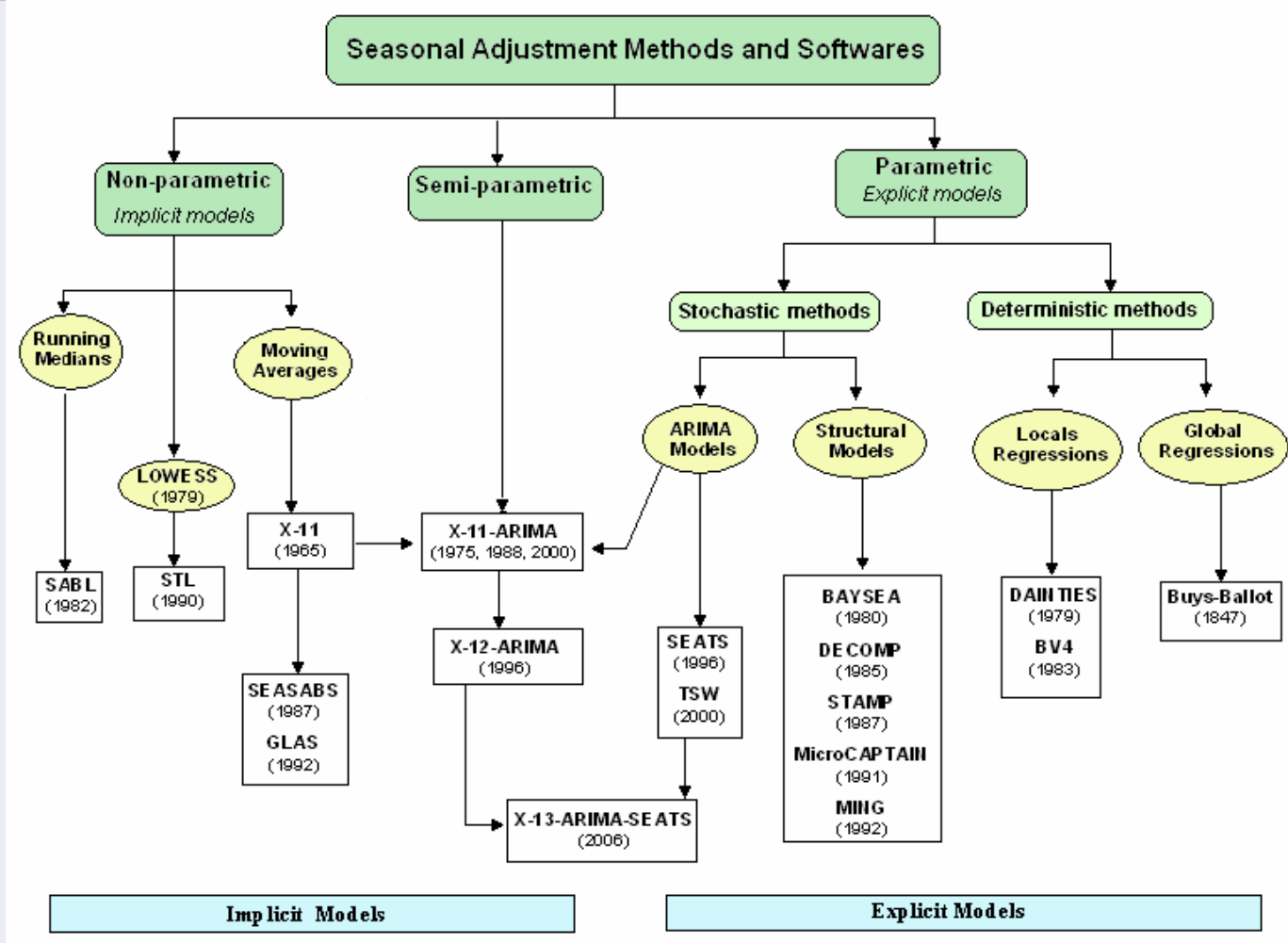
Model

Seasonal adjustment is based on modelisation of time series

Remark: the equation $X_t = TC_t + S_t + \varepsilon_t$ has no unique solution...

- **several decompositions ...**
- **several methodologies**
- **several software**

Various software and methods...



Source: Dominique Ladiray (INSEE)

ESS guidelines on seasonal adjustment

ESS guidelines endorsed in 2008 and published in 2009

Main objectives :

- Define best practices in the field of seasonal adjustment
- Increase harmonization and comparability of Principal European Economic Indicators (including Trade aggregated data...)
- Foster transparency of methods and encourage documentation of seasonal adjustment steps

ESS guidelines on seasonal adjustment

Guidelines are proposed on 6 main topics:

- Pre-treatment of series
- Seasonal adjustment
- Revision Policies
- Quality of seasonal adjustment
- Specific issues
- Data presentation issues

For each item, the various options are listed and 3 alternatives are proposed:

- Best approach to be aimed at
- Acceptable approach to be used if the first alternative is too costly
- Practices to be avoided

The following slides show some examples of guidelines for each topic:

Choice of seasonal adjustment approach

| Description |
|---|
| <p>TRAMO-SEATS and X-12-ARIMA are currently the most commonly used seasonal adjustment approaches. TRAMO-SEATS is based on a parametric approach while X-12-ARIMA is based on a non-parametric approach. Structural time series models represent a reasonable alternative, provided they allow for a complete calendar and outlier treatment and include an adequate set of diagnostics. The consistent use of a common set of seasonal adjustment packages will improve transparency and comparability of seasonally adjusted time series across countries.</p> |
| Options |
| <ul style="list-style-type: none"> • X-12-ARIMA; • TRAMO-SEATS; • Structural time series models. |
| Alternatives * |
| <p>A) TRAMO-SEATS, X-12-ARIMA together with well-documented and stable interfaces to these tools should be used for seasonal adjustment. The choice between TRAMO-SEATS and X-12-ARIMA can be based on past experience, subjective appreciation and characteristics of the time series. Production tools should be updated on a regular basis after satisfactory testing. Methods and tools versions currently used in data production should be clearly communicated to users.</p> <p>B) Use of structural time series models based on simultaneous representation of the unobserved components of the series. The chosen software has to estimate calendar and outlier effects with diagnostics for all components and effects. For mass data production the chosen software should offer automatic modelling procedures that can reliably identify the presence of the effects mentioned.</p> <p>C) Use of other production tools.</p> |

Direct versus indirect approach

Options

- Direct approach where the raw data are aggregated and the aggregates and components are then directly seasonally adjusted using the same approach and software. Any discrepancies across the aggregation structure are not removed;
- Direct approach, as described above, with the distribution of discrepancies across the aggregation structure. If the discrepancies are small enough, it is possible to apply appropriate procedures to ensure additivity;
- Indirect approach where the seasonal adjustment of components occurs using the same approach and software, and then totals are derived by aggregation of the seasonally adjusted components;
- Mixed indirect approach where the seasonal adjustment of components occurs using different approaches and software, and totals are derived by aggregation of the seasonally adjusted components without enough information on options and parameters used.

Alternatives *

A) Users should carefully consider the application of either direct or indirect and make an informed choice relating to all known requirements. The direct approach is preferred for transparency and accuracy, especially when component series show similar seasonal patterns. The indirect approach is preferred when components series show seasonal patterns differing in a significant way. The presence of residual seasonality should always be checked in all of the indirectly seasonally adjusted aggregates.

B) The use of either the direct approach associated with benchmarking techniques to remove discrepancies, or the indirect approach is acceptable for consistency especially when there are strong user requirements for consistency between lower and higher level aggregates (e.g. additivity). The presence of residual seasonality should always be checked in all of the indirectly seasonally adjusted aggregates.

C) Any other alternative approach which is not consistent or transparent for all individual time series.

Conclusions/Recommendations

- **Aggregated trade infra-annual time series present very often seasonal/trading days fluctuations**
- **It is therefore necessary to apply seasonal adjustment techniques in order to provide users with relevant time series**
- **ESS guidelines provide useful recommendations on each step of the SA process, based on best practices within the ESS**
- **Specific software to apply seasonal adjustment are available on a free basis**
- **Specific training on seasonal adjustment is recommended before applying such tools**

Seasonal Adjustment in Turkey

- TurkStat publishes seasonally and calendar adjusted data both for external trade statistics and trade indices

Which Method Used?

- Tramo&Seats and X-12-ARIMA are two methods which are suggested by ESS Guideline on Seasonal Adjustment to use. Turkstat adopted Tramo&Seats method in all application.
- In order to adjust external trade statistics from seasonal and calendar effects **direct method** was used.
- In order to adjust short term economical series from calendar effect, **calendar effect regressor** was used which was made by collaboration with TR Central Bank and Turkstat.

Model revision and Publishing

- Calendar and seasonal adjusted series published in
- “November Press Release, 2010”
- first including figures from 1997 up to now.

- The model to be used in the seasonal and calendar adjustment process is selected at the end of each year and used for next year.

- So, the model is revised once a year.

Number of observations

- While it is recommended for Seasonal Adjustment that the Times Series have to be **at least 3 years-long** (36 observations) for monthly series,
- 183 values are used for Turkish External Trade Statistics in both imports and exports

To define how to treat unusual observations (moving holidays, working and trading days)

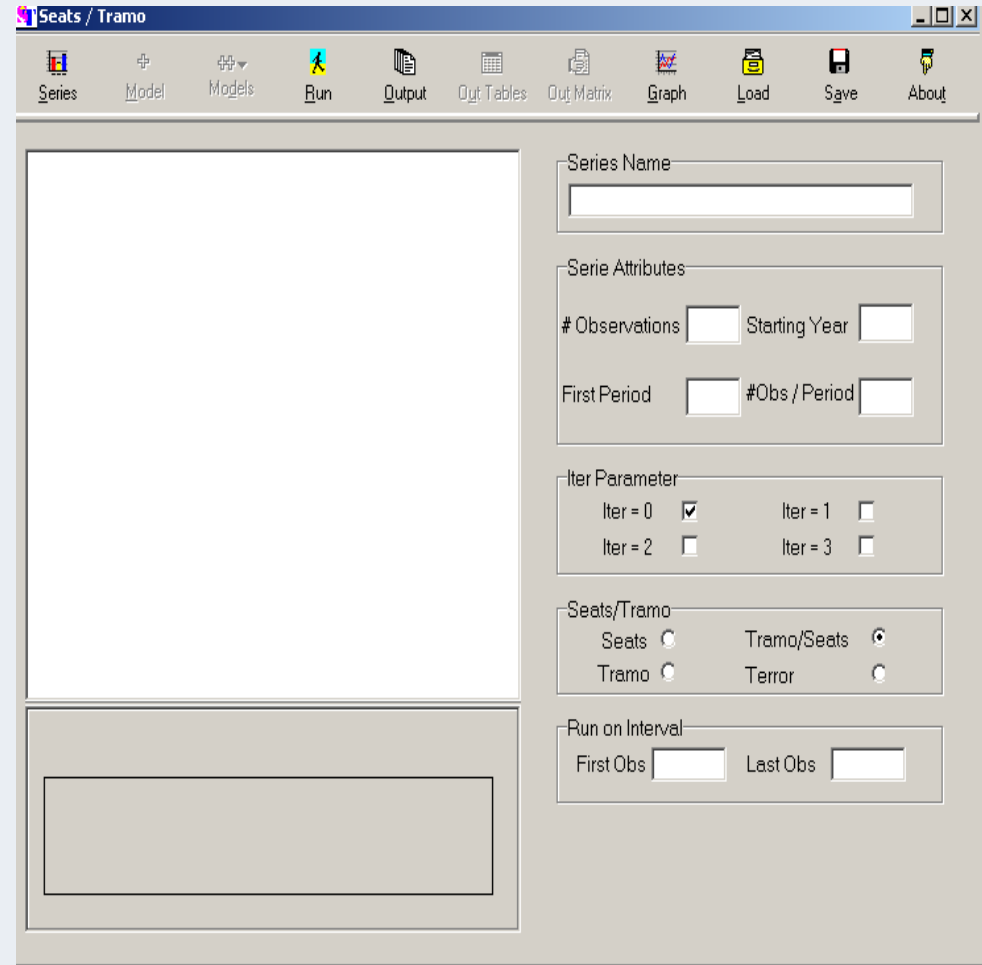
- It is important to determine which regression effects, such as **Trading/Working Day**, **Leap Year**, **Moving Holidays** (e.g. Ramadan) and national holidays, are possible for the series
- If an activity is higher on some days compared to others, then the series can have a Trading Day effect.
- If the coefficients for the effects are marginally significant, then it should be determined if there is a reason to keep the effects in the model

For External Trade Statistics

- The regressor which was used by external trade statistics by subtracting,
 - ***Sunday's*** numbers for exports and
 - ***Saturday's*** and ***Sunday's*** for import,
- This decision was taken by analyzing daily data,
- Official holiday's numbers and religious gala day's numbers from the related month's day number.

The method used in our statistics

- The seasonal and calendar adjustment of external trade statistics is carried out by applying TRAMO-SEATS (Gomez and Maravall, 1996) which is based on ARIMA (Autoregressive Integrated Moving Average) model.
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- ***It is recommend by Eurostat (ESS Guideline on Seasonal Adjustment)***

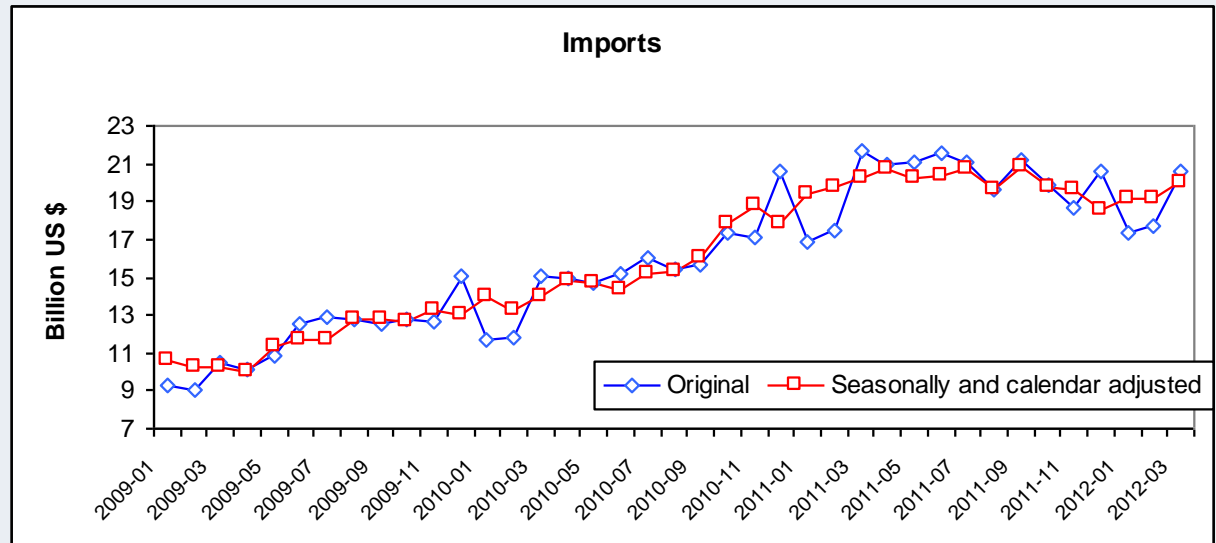
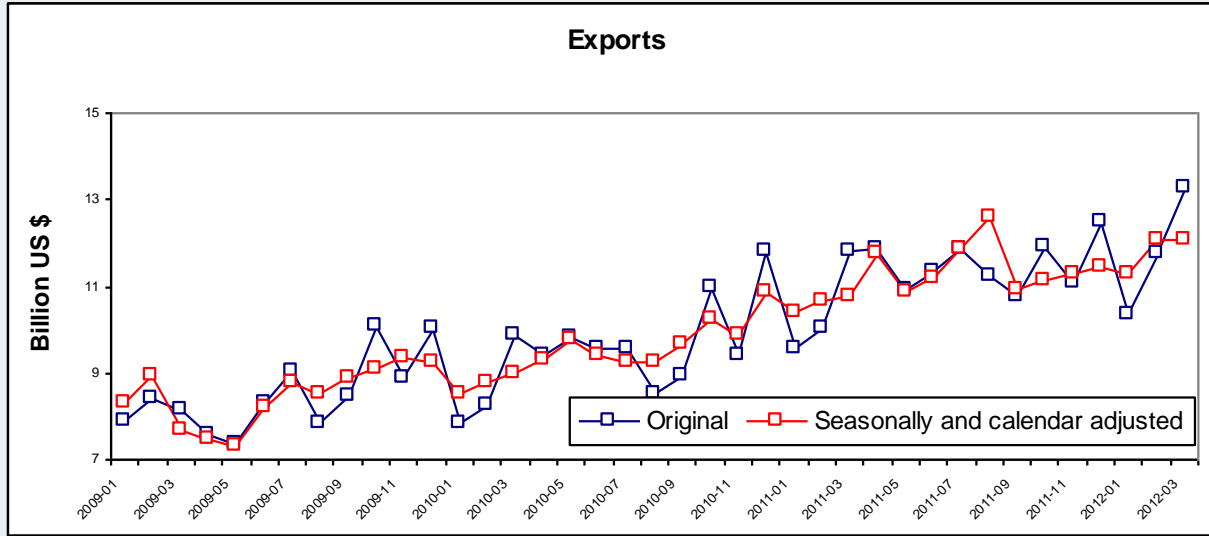


Results

Seasonally and Calendar Adjusted External Trade and Change (%)

Value: 000\$

| Months | EXPORTS | | | | IMPORTS | | | |
|---------|-------------------|--|----------------------------------|------------------------------------|-------------------|--|----------------------------------|------------------------------------|
| | Calendar adjusted | Change on the same months of the preceding year in % | Seasonally and calendar adjusted | Change on the previous months in % | Calendar adjusted | Change on the same months of the preceding year in % | Seasonally and calendar adjusted | Change on the previous months in % |
| 2011-01 | 9 580 999 | 22,0 | 10 420 720 | -4,0 | 16 953 509 | 38,9 | 19 382 831 | 8,9 |
| 2011-02 | 10 002 798 | 21,7 | 10 661 453 | 2,3 | 17 403 190 | 48,7 | 19 748 615 | 1,9 |
| 2011-03 | 11 477 198 | 19,5 | 10 754 114 | 0,9 | 20 573 945 | 44,1 | 20 208 860 | 2,3 |
| 2011-04 | 11 611 208 | 26,4 | 11 732 312 | 9,1 | 20 458 458 | 40,2 | 20 699 041 | 2,4 |
| 2011-05 | 11 022 156 | 11,7 | 10 886 935 | -7,2 | 21 046 199 | 37,7 | 20 239 150 | -2,2 |
| 2011-06 | 11 082 569 | 18,9 | 11 166 528 | 2,6 | 20 813 554 | 41,8 | 20 305 217 | 0,3 |
| 2011-07 | 11 891 481 | 28,3 | 11 856 716 | 6,2 | 21 694 766 | 36,4 | 20 707 052 | 2,0 |
| 2011-08 | 11 609 899 | 36,4 | 12 604 524 | 6,3 | 19 641 773 | 27,5 | 19 576 281 | -5,5 |
| 2011-09 | 10 759 392 | 12,9 | 10 897 430 | -13,5 | 21 122 477 | 30,2 | 20 813 993 | 6,3 |
| 2011-10 | 11 861 137 | 8,6 | 11 105 399 | 1,9 | 19 786 277 | 10,6 | 19 755 524 | -5,1 |
| 2011-11 | 11 855 815 | 14,2 | 11 268 939 | 1,5 | 20 054 779 | 4,6 | 19 584 952 | -0,9 |
| 2011-12 | 12 078 905 | 5,6 | 11 460 749 | 1,7 | 20 378 432 | 4,3 | 18 574 237 | -5,2 |
| 2012-01 | 10 390 459 | 8,4 | 11 309 226 | -1,3 | 16 739 019 | -1,3 | 19 146 749 | 3,1 |
| 2012-02 | 11 308 504 | 13,1 | 12 051 439 | 6,6 | 16 908 194 | -2,8 | 19 196 362 | 0,3 |
| 2012-03 | 12 875 826 | 12,2 | 12 064 628 | 0,1 | 20 381 161 | -0,9 | 20 020 064 | 4,3 |



Thank you
for your attention!