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# User Guide to Seasonal Adjustment

# What is an economic time series?

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- An economic time series is a sequence of successive measurements of an economic activity (that is, a variable) obtained at regular time intervals (such as every month or every quarter). The data must be comparable over time, so they must be consistent in the way that the measurement is constructed.

# What is seasonal adjustment?

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- Seasonal adjustment is the process of estimating and removing seasonal effects from a time series in order to better reveal non-seasonal features. Examples of seasonal effects include a July drop in automobile production as factories retool for new models or increases in heating oil production during September in anticipation of the winter heating season. The process may also estimate and remove trading day (business or shipping day) effects and moving holiday effects during the seasonal adjustment process.

# Why do you seasonally adjust data?

- Seasonal movements are often large enough that they mask other characteristics of the data that are of interest to analysts of current economic trends. For example, if each month has a different seasonal tendency toward high or low values it can be difficult to detect the general trend of a time series' recent monthly movement (increase, decrease, turning point, no change, consistency with another economic indicator, etc.). Seasonal adjustment produces data in which the values of neighboring months are usually easier to compare. *Many data users prefer seasonally adjusted data because they want to see those characteristics that seasonal movements tend to mask, especially changes in the trend of the series.*

# What kinds of seasonal effects are removed during seasonal adjustment?

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- Seasonal adjustment procedures for monthly time series estimate effects that occur in the same calendar month with similar magnitude and direction from year to year. In series whose seasonal effects come primarily from weather (rather than from, say, Christmas sales or economic activity tied to the school year or the travel season), the seasonal factors are estimates of average weather effects for each month, for example, the average January decrease in new home construction in the Northeastern region of the U.S. due to cold and storms. Seasonal adjustment does not account for abnormal weather conditions or for year-to-year changes in weather. It is important to note that seasonal factors are estimates based on present and past experience and that future data may show a different pattern of seasonal factors.

# What is the seasonal adjustment process?

- The mechanics of seasonal adjustment involve breaking down a series into trend-cycle, seasonal, and irregular components.
- *Trend-Cycle:*
- Level estimate for each month derived from the surrounding year-or-two of observations.
- *Seasonal Effects:*
- Effects that are reasonably stable in terms of annual timing, direction, and magnitude. Possible causes include natural factors (the weather), administrative measures (starting and ending dates of the school year), and social/cultural/religious traditions (fixed holidays such as Christmas). Effects associated with the dates of moving holidays like Easter are not seasonal in this sense, because they occur in different calendar months depending on the date of the holiday.
- *Irregular Component:*
- Anything not included in the trend-cycle or the seasonal effects (or in estimated trading day or holiday effects). Its values are unpredictable as regards timing, impact, and duration. It can arise from sampling error, non-sampling error, unseasonable weather, natural disasters, strikes, etc.

# What are trading day effects and trading day adjustments?

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- Monthly (or quarterly) time series that are totals of daily activities can be influenced by each calendar month's weekday composition. This influence is revealed when monthly values consistently depend on which days of the week occur five times in the month. For example, building permit offices are usually closed on Saturday and Sunday. Thus, the number of building permits issued in a given month is likely to be higher if the month contains a surplus of weekdays and lower if the month contains a surplus of weekend days. Recurring effects associated with individual days of the week are called trading-day effects.

Trading-day effects can make it difficult to compare series values or to compare movements in one series with movements in another. For this reason, when estimates of trading-day effects are statistically significant, we adjust them out of the series. The removal of such estimates is called trading day adjustment

# How do I interpret the difference between unadjusted and adjusted numbers

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- **Example: what if this year's April value is larger than the March value, but the seasonally adjusted series shows a decrease from March to April this year? What does this difference mean?**
- **This difference in direction can happen only when the seasonal factor for April is larger than the seasonal factor for March, indicating that when the underlying level of the series isn't changing, the April value will typically be larger than the March value. This year, the original series' April increase over the March value must be smaller than usual, either because the underlying level of the series is decreasing or because some special event or events, abnormally increased the March value somewhat, or decreased the April value somewhat.**