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PRESENTATION OF GROWTH RATES

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PRESENTATION OF GROWTH RATES

Growth rates express the change in values of a time series between two different periods of time. For example, the percentage change of a time series value X_t from X_{t-d} is expressed as $X_t / X_{t-d} * 100 - 100$. Depending on the question to be answered using growth rates, it is advisable to use various intervals d between the original values or to relate the growth rates to the seasonally-adjusted results.

1. Actual change from previous period

If, for example, the idea is to present the actual change of a monthly variable from the value of the previous month, the percentage growth rate based on the original values is $X_t / X_{t-1} * 100 - 100$. The Federal Statistical Office in Germany uses this formula to show, for instance, short-term consumer price movements. The general public is also interested in the actual monthly change in unemployment (expressed as an absolute change $X_t - X_{t-1}$).

When analysing cyclical developments, however, such changes have no informative value if they primarily reflect seasonal and/or calendar-induced influences. For example, unemployment in Germany goes up every winter, one of the reasons being that when the weather is colder there are fewer employment prospects in outdoor occupations. Therefore, temporary increases in unemployment by themselves do not reveal anything about cyclical movements.

Conclusion Monthly change, quarterly change or other change in the space of less than a year and based on original series subject to seasonal changes, should only be used to present actual developments and not to describe cyclical movements.

2. Actual change from previous year

The presentation of current economic statistics is frequently accompanied by a comparison of the present situation with that of the previous year (in the case of monthly time series, usually with the percentage year-on-year change $X_t / X_{t-12} * 100 - 100$).

In cyclical analyses, too, this measure is frequently used. Assuming that the conditions responsible for the seasonal variation this year and last year are equal, the year-on-year rate is free from seasonal influences. However, the year-on-year difference may be influenced by calendar effects. For example, if a given month has one more working day than the same month in the previous year, German industrial production will be 3%. It would be wrong to interpret this growth as a result of a cyclical movement. Year-on-year comparisons also have less informative value for cyclical observations if the year-on-year change is either particularly high or unusually low as a result of special factors which occurred in the last year (base effect). Above all, it should be borne in mind that year-on-year change depends on movements over the last twelve months and not solely on the most recent developments, which is what cyclical analyses actually seek to measure.

Conclusion Year-on-year rates of change based on original series subject to calendar changes should only be used to present actual developments and not to describe cyclical developments. Where necessary, special effects contained in the base period should be pointed out when presenting year-on-year rates of change.

3. Change in seasonally-adjusted and calendar-adjusted data

Percentage changes based on seasonally-adjusted and calendar-adjusted data serve primarily to describe economic developments. These rates are intended to describe new phenomena which do not occur in the same season each year with almost the same intensity or which are not attributable to calendar regularities. Besides cyclical movements, these rates also include “irregular” influences, such as reactions to fiscal policy measures, the placing of large orders, the effects of strikes, unusual weather conditions, purely random disruptions or even errors when estimating seasonally adjusted results. Where such irregular effects contribute in relevant measure to changes in values from one month to the next, particular account of them should be taken when interpreting such movements. If these influences balance out over several months, it is advisable to summarise the values of several months in order to clarify underlying cyclical movements (such as percentage changes based on two or three months’ worth of values: $(X_t + X_{t-1}) / (X_{t-2} + X_{t-3}) * 100 - 100$ or $(X_t + X_{t-1} + X_{t-2}) / (X_{t-3} + X_{t-4} + X_{t-5}) * 100 - 100$).

Conclusion Percentage changes based on seasonally-adjusted and calendar-adjusted values serve to describe new phenomena and are used as an tool for analysing current economic developments.

4. Percentage changes of trend data

Percentage changes based on the trend cycle component of a time series (estimated with sophisticated mathematical methods or simply with a 12-term moving average) are designed to make the cyclical change clearer. However, since the trend cycle values at the current end of the series are usually estimated by extrapolating the underlying trend of the recent past, it often takes months until the interesting economic turning points are shown.

Conclusion Percentage changes based on the trend cycle component of a time series illustrate past economic developments; they are, however, unsuited to describing current economic movements.

5. Annual growth rates

Annual rates help to answer the question of which annual percentage change would occur if the development established during the year were to continue unchanged. Technically, the annual percentage change extrapolated from the monthly change is $(X_t / X_{t-1})^{12} * 100 - 100$.

Annual growth rates should not be calculated on the basis of seasonally-influenced or calendar-influenced original series. For example, if for German construction output the climate-induced change in results from a normal warm autumn to a typically cold winter were annualised, this would imply that spring would be significantly colder than winter and summer then colder than spring, which would be nonsense. Annual growth rates are therefore generally calculated on the basis of seasonally-adjusted and calendar-adjusted values. However, since they also reflect one-off irregularities, care should also be taken when annualising the figures. If, for example, the seasonally-adjusted data are influenced by a one-off strike, when annualising the data it would be wrong to assume that additional strikes would occur in subsequent months. In addition, current trend data are not suited to calculating annual growth rates since they derive from the condition of the current trend estimate which is explained under item 4 and states that the past trend will continue unchanged until the end of the series – at the most interesting turning points in the cycle, this is wrong.

Conclusion Particular caution should be exercised when annualising changes that occur within the space of a year. The shorter the base period for the extrapolation is, the more uncertain the results are (annualised monthly changes are more problematic than annualised six-month changes). The data should only be annualised on the basis of seasonally-adjusted and calendar-adjusted time series which only contain minor irregularities. If special effects result in problems when annualising, the limited informative value of these annual growth rates would have to be indicated separately.