Box 1: Seasonally adjusting the official unemployment rate

Economic time series are often subject to seasonal fluctuations and other calendar effects, such as the number of trading days, weekends and public holidays in a month or quarter. These seasonal and calendar effects often mask the underlying movements in an economic time series, possibly resulting in an erroneous interpretation and analysis of the particular economic indicator. The aim of seasonal adjustment[1] is to filter out seasonal and calendar effects that occur *repeatedly* in the same season and with similar intensity on an annual basis in an economic time series, thereby facilitating more accurate economic analysis of the time series. At the same time it is inappropriate to make any seasonal or calendar adjustment to a time series in the absence of clear statistical evidence and economic interpretation of the effect.

The unemployment rate is an extremely important macroeconomic indicator, particularly in the South African context, given government's overarching policy objective of eradicating unemployment, inequality and poverty. The official South African unemployment rate has been available on a quarterly basis since the first quarter of 2008[2] and is calculated as the ratio of those persons who are classified as being unemployed to the total economically active population, expressed as a percentage. The calculation is depicted in the formulas below.

Employed + Unemployed = Economically Active Population

Unemployment Rate = (Unemployed / Economically Active Population) * 100

In seasonally adjusting the official unemployment rate, the Bank employed the *indirect* method of seasonal adjustment, since the components comprising the total economically active population (i.e., employed and unemployed persons) could exhibit different seasonal patterns. Thus the two time series – the number of unemployed and employed persons – were tested separately for seasonality.[3] Where seasonality was found to be present it was adjusted for, and the seasonally adjusted component time series were then used to calculate the seasonally adjusted unemployment rate, according to the formula above.

1 According to the European Statistical System *Guidelines on Seasonal Adjustment* (2009 edition by Eurostat, European Commission), seasonal adjustment also includes the adjustment for calendar effects, such as the number of working days or trading days in a month, or particular dates that can statistically be shown to make a difference in the data, such as public holidays, or the number of weekends in a month.

2 Published by Statistics South Africa in the *Quarterly Labour Force Survey*.

3 Seasonal adjustment was done using the X12-ARIMA approach (supported by the Bureau of Census in the United States).

Figure 1 shows that the number of unemployed persons usually decreases notably in the fourth quarter of each year and subsequently increases markedly in every first quarter. This can largely be explained by the temporary employment of casual workers in the trade, catering and accommodation services sector in the fourth quarter of each year. In addition to these temporary employees then becoming unemployed again in the first quarter of the following year, the large number of school leavers becoming economically active contributes further to the increase in the number of unemployed persons in the first quarter of each year.

Figure 1: Quarter-to-quarter change in the number of unemployed persons

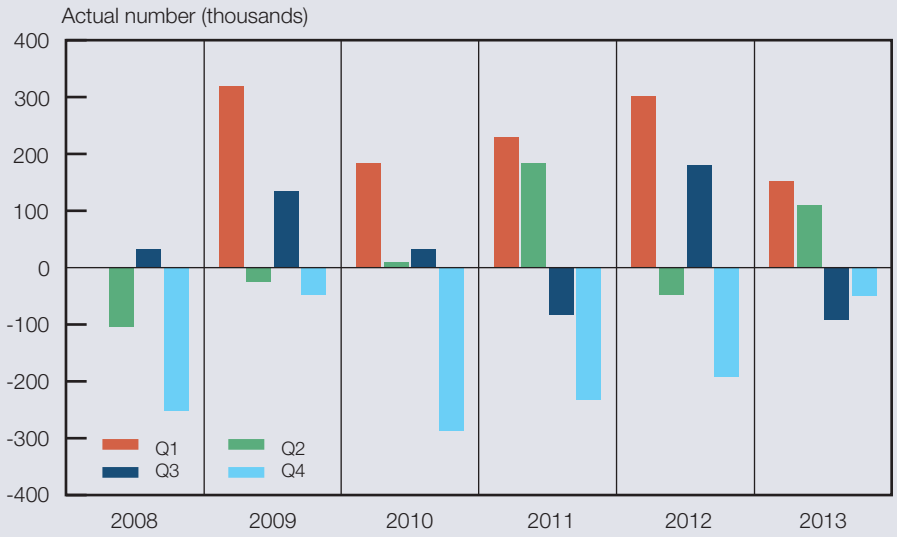
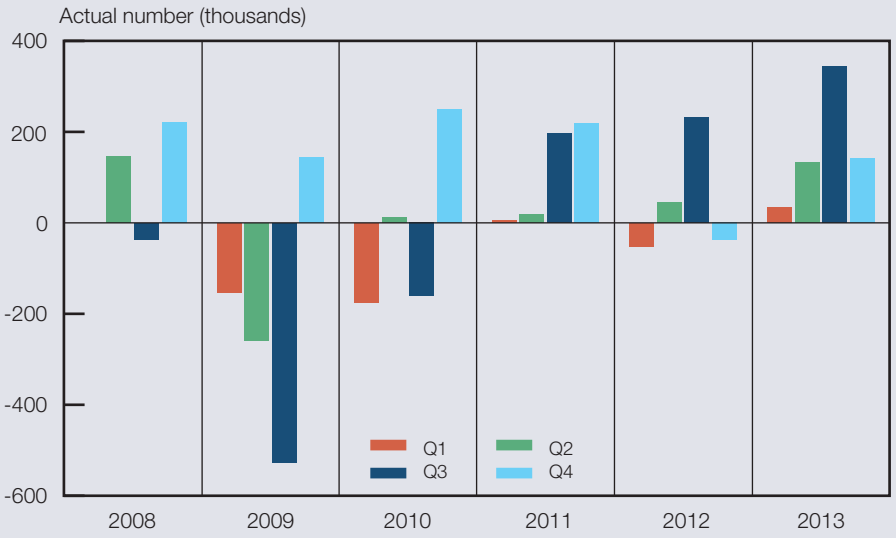


Figure 2 depicts the quarter-to-quarter change in the number of employed persons. The increase in employment in the fourth quarter of each year and the subsequent decrease in the first quarter of each year are neither as pronounced nor as consistent as that observed in the number of unemployed persons in Figure 1. As such, the statistical results show that the time series measuring the number of unemployed persons is influenced by seasonality, while the time series measuring the number of employed persons is not.

Figure 2: Quarter-to-quarter change in the number of employed persons



Individual tests for seasonality indicated significant seasonality in the time series measuring the number of unemployed persons at the 1 per cent confidence level for the Friedman test, the Kruskal-Wallis test, as well as the test for the presence of seasonality assuming stability. However, due to the relatively short data span the Evolutive seasonality test revealed no evidence of a change in the seasonal pattern over time, resulting in the combined test for significant seasonality to be inconclusive. As more data become available the combined test for significant seasonality should become more reliable and conclusive. However, due to the statistical evidence indicating a stable seasonal pattern, it seems prudent to seasonally adjust the time series measuring the number of unemployed persons.

The seasonally adjusted unemployment rate was obtained by substituting the non-seasonally adjusted time series measuring the number of unemployed persons by its seasonally adjusted version in the formula calculating the unemployment rate. The seasonally adjusted unemployment rate is shown in Figure 3, together with the official unemployment rate. The seasonally adjusted unemployment rate is consistently lower than the official unemployment rate in the first quarter of each year, while it is consistently higher than the official unemployment rate in the fourth quarter of each year, thereby reducing the overall volatility in the indicator and providing a more steady measure of the domestic unemployment rate. Henceforth, both the official and the seasonally adjusted unemployment rate will be included in table KB814 on page S–154 of the *Quarterly Bulletin*. As with all seasonally adjusted data, the seasonally adjusted unemployment rate is subject to revision as further observations are added to the time series.

Figure 3: Unemployment rate