Statistics South Africa

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METHODOLOGICAL NOTE:

Seasonal adjustment of tourist accommodation

March 2016 to February 2017

Methodological note on the seasonal adjustment of tourist accommodation

This document provides a brief explanation of the seasonal adjustment of tourist accommodation statistics.

Monthly and quarterly time series are often characterised by considerable seasonal variations, which might complicate their interpretation. Such time series are therefore subjected to a process of seasonal adjustment in order to remove the effects of these seasonal fluctuations.

Statistics South Africa (Stats SA) uses X-12-ARIMA to estimate trend, seasonal and irregular components as well as length of month (LOM), trading day (TD) and Easter effects.

The time series for tourist accommodation shows LOM, TD and Easter effects. Adjustment was done for these effects as shown in Table 1. As can be seen in Table 1, some components were adjusted for TD without a leap year effect (TDNOLPYEAR) while others were adjusted for TD with a leap year effect.

X-12-ARIMA is a seasonal adjustment program developed at the United States Bureau of Census. The program is based on the Bureau's X11 algorithm. It incorporates regression techniques and also ARIMA modelling to improve estimation of the different time series. The following period was used to identify the parameters:

- September 2004 to February 2016

The identified parameters will be fixed for a period of one year and revised on an annual basis or as necessary.

Table 1 shows metadata for tourist accommodation components. For each component the following is given in the tables below: decomposition scheme, ARIMA model, presence of seasonality, Henderson and seasonal moving average filters, outliers and presence of TD, LOM and Easter effects.

Table 1: Metadata for tourist accommodation time series (September 2004 to February 2016)

Description	Decomposition scheme	ARIMA model	Presence of seasonality	Presence of Easter effect	Presence of TD or LOM effect	Henderson Filter	Seasonal Movement Average Filter	Outliers (AO, LS, TC)*
Hotels: Stay units available (000)	Multiplicative	(0,1,1)(0,0,0)	Not Present	N	N	13	3x5	
Hotels: Stay unit nights sold (000)	Multiplicative	(1,1,0)(1,1,1)	Present	Easter(15)	TDNOLPYEAR	13	3x5	AOJUN2009
Hotels: Income from accommodation (R million)	Multiplicative	(0,1,1)(0,1,1)	Present	N	TDNOLPYEAR	13	3x5	AOJUN2009 TCJUN2010 LS JUL2010 TCAUG2010
Hotels: Income from restaurant and bar sales (R million)	Multiplicative	(0,1,1)(0,1,1)	Present	Easter(8)	TDNOLPYEAR	13	3x9	
Hotels: Other income (R million)	Additive	(0,1,1)(0,1,1)	Present	N	TD	13	3x5	LSAUG2005 LSOCT2005 TCNOV2009
Hotels: Average income per stay unit night sold (Rand)	Multiplicative	(0,1,2)(0,1,1)	Present	N	N	13	3x5	TCJUN2010 TCAUG2010
Hotels: Occupancy rate (%)	Additive	(0,1,1)(1,1,1)	Present	N	TD	13	3x5	AOJUN2010
Caravan parks and camping sites: Stay units available (000)	Multiplicative	(0,1,1)(0,1,1)	Not Present	N	N	13	3x5	
Caravan parks and camping sites: Stay unit nights sold (000)	Multiplicative	(1,0,0)(1,1,0)	Present	Easter(1)	TDNOLPYEAR	13	3x5	AOOCT2004 TCJUL2009

Caravan parks and camping sites: Income from accommodation (R million)	Multiplicative	(0,0,0)(0,1,1)	Present	Easter(1)	N	23	3x5	AOOCT2004 LSDEC2008 AONOV2009 LSDEC2010
Caravan parks and camping sites: Income from restaurant and bar sales (R million)	Additive	(0,1,1)(0,1,1)	Present	Easter(8)	N	23	3x5	AOAPR2010 TCOCT2014 TCAUG2015
Caravan parks and camping sites: Other income (R million)	Multiplicative	(0,1,1)(0,0,0)	Not Present	N	LOM	13	3x5	
Caravan parks and camping sites: Average income per stay unit night sold (Rand)	Additive	(0,1,1)(0,1,1)	Present	N	N	23	3x5	AONOV2009
Caravan parks and camping sites: Occupancy rate (%)	Multiplicative	(1,0,0)(1,1,0)	Present	Easter(8)	N	23	3x5	AOOCT2004 AONOV2010
Guest-houses and guest-farms: Stay unit nights sold (000)	Additive	(0,1,1)(0,1,1)	Present	Easter(8)	LOM	13	3x9	AOJUN2010
Guest-houses and guest-farms: Income from accommodation (R million)	Multiplicative	(1,1,0)(1,1,0)	Present	Easter(1)	TDNOLPYEAR	13	3x5	AOJUN2010
Guest-houses and guest-farms: Income from restaurant and bar sales (R million)	Additive	(0,1,1)(0,1,1)	Present	N	N	13	3x5	
Guest-houses and guest-farms: Other income (R million)	Multiplicative	(0,1,1)(0,1,1)	Present	N	N	13	3x5	
Guest-houses and guest-farms: Stay units available (000)	Additive	(0,1,1)(0,1,1)	Not Present	N	N	13	3x9	
Guest-houses and guest-farms: Average income per stay unit night sold (Rand)	Additive	(1,1,0)(0,1,1)	Not Present	N	N	13	3x5	

Guest-houses and guest-farms: Occupancy rate (%)	Multiplicative	(1,0,1)(0,1,1)	Present	Easter(8)	N	13	3x5	AOJUN2010
Other accommodation: Stay unit nights sold (000)	Additive	(0,1,1)(0,1,1)	Present	Easter(1)	N	13	3x5	
Other accommodation: Income from accommodation (R million)	Multiplicative	(0,1,1)(0,1,1)	Present	Easter(8)	LOM	13	3x5	TCAPR2005 TCJUN2010
Other accommodation: Income from restaurant and bar sales (R million)	Multiplicative	(0,1,1)(0,1,1)	Present	N	N	13	3x5	
Other accommodation: Other income (R million)	Multiplicative	(0,1,1)(0,1,1)	Present	N	N	13	3x5	AOJAN2006 LSNOV2008
Other accommodation: Stay units available (000)	Additive	(0,1,1)(0,0,0)	Not Present	N	N	13	3x9	
Other accommodation: Average income per stay unit night sold (Rand)	Additive	(2,1,0)(0,1,1)	Present	N	TDNOLPYEAR	13	3x5	AONOV2009
Other accommodation: Occupancy rate (%)	Multiplicative	(0,1,1)(0,1,1)	Present	Easter(1)	N	13	3x5	
Total industry: Average income per stay unit night sold (Rand)	Multiplicative	(0,1,2)(1,0,0)	Present	N	N	13	3x5	TCJUN2010 TCAUG2010
Total industry: Occupancy rate (%)	Additive	(0,1,1)(1,1,1)	Present	Easter(8)	TD	13	3x5	AOJUN2010

* Note: Various economic reasons were provided for the existence of all outliers listed in the table above and hence no adjustment was done for them.

Definitions:

Additive decomposition – An additive decomposition is appropriate if the magnitude of the seasonal fluctuations does not vary with the level of the series. Under the additive decomposition scheme, the original series (Y) is expressed as Y = T + (TD + S) + I, where T = trend, TD = trading day effect, S=seasonal component and I=irregular component.

Multiplicative decomposition – A multiplicative decomposition is usually appropriate for series of positive values where the size of the seasonal oscillations increases with the level of the series. The original series (Y) is expressed as Y = T * (TD * S) * I.

Additive Outlier (AO) – This refers to unusually high or low singular values in the time series.

Level Shift (LS) – This refers to an abrupt but sustained change in the level of the time series.

Transitory Changes (TC) – This refers to a series of outliers with transitory effects on the level of the series.

Easter effect – The Easter holidays may regularly affect economic activity before, during or after the holiday period. Unlike other public holidays which occur on the same date each year, the dates for Easter are not fixed and may occur in March or April. Such an effect, if it is present, is known as the Easter effect.

Trading day effect (TD) – An effect associated with the composition of the calendar. For example, different months have different numbers of working days and also the number of specific days of the week can occur in differing frequency in the same month over different years. Days of the week can have different levels of activity.

Length of month effect (LOM) – An effect arising from the fact that some months are longer than others e.g. 28, 29, 30 or 31 days.

Seasonal adjustment approaches – In seasonal adjustment, the direct approach refers to the adjustment of a total (aggregate of unadjusted components), and the indirect approach is the aggregation of seasonally adjusted components to obtain a total.

Trend component – An estimate of the local level of the series derived from the surrounding recent (a year or two) observations. The trend is generally fairly smooth and includes movements and cycles longer than a year.

Seasonal component – An estimate of 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).

Irregular component – An estimate of any effect not included in the trend-cycle or the seasonal effects (or in estimated trading day or holiday effects). Its values are unpredictable with regard to timing, impact and duration. It can arise from sampling error, non-sampling error, unseasonal weather patterns, natural disasters, strikes, etc.

Parameters – This refers to the decomposition scheme, ARIMA model, seasonal moving average and Henderson filters, outliers and trading day, Easter and length of month regressors.