METHODOLOGICAL NOTE:

Seasonal adjustment of tourist accommodation

Methodological note on the seasonal adjustment of tourist accommodation

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

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 or length-of-quarter, trading day, leap year and Easter effects.

X-12-ARIMA is a seasonal adjustment program developed at the United States Census Bureau. It incorporates regression techniques and also ARIMA modelling to improve estimation of the different time series components. Further information is available at the following link:
https://www.census.gov/topics/research/seasonal-adjustment.html.

Indirect seasonal adjustment was applied for total by type of accommodation and the industry totals while the direct approach was adopted for the components. The period from January 2007 to March 2021 was used to identify the parameters.

The parameters will be revised every one to two years, or as necessary.

Table 1 below shows metadata for the individual components for tourist accommodation at current prices. For each component the following are given in the table below: decomposition scheme, ARIMA model, presence of seasonality, Easter, length-of-month and trading effects, Henderson and seasonal moving average filters, and outliers.

Table 1: Metadata for tourist accommodation by type of accommodation for the period January 2007 to March 2021

Variable	Decomposition scheme	ARIMA model	Presence of seasonality	Presence of Easter effect	Presence of length-of-month and trading day effects	Henderson filter	Seasonal movement average filter	Outliers (AO, LS, TC)
Hotels								
Stay unit nights sold	Multiplicative	(0,1,1)(1,1,1)	Present	Easter(8)	LPYEAR	13	3x5	
Occupancy rate	Multiplicative	(2,1,0)(0,1,1)	Present	Easter(1)		13	3x5	TCJUN2010
Average income per stay unit night sold	Multiplicative	(0,1,1)(0,1,1)	Present			13	3x5	TCAUG2010
Income from accommodation	Multiplicative	(0,1,1)(0,1,1)	Present			13	3x5	LSMAR2020
Income from restaurant and bar sales	Multiplicative	(2,1,0)(0,1,1)	Present			13	3x5	AOAPR2020
Other income	Multiplicative	(0,1,1)(0,1,1)	Present			13	3x5	TCAPR2020
Total income	Multiplicative	(0,1,1)(0,1,1)	Present		LPYEAR	13	3x5	TCJAN2021
Caravan parks and camping sites								
Stay unit nights sold	Multiplicative	(0,1,1)(0,1,1)	Present			23	3x5	
Occupancy rate	Multiplicative	(0,1,1)(0,1,1)	Present			23	3x5	AONOV2009
Average income per stay unit night sold	Multiplicative	(0,1,1)(0,1,1)	Present			23	3x5	LSDEC2010
Income from accommodation	Multiplicative	(0,0,0)(0,1,1)	Present			23	3x5	TCAPR2020
Income from restaurant and bar sales	Multiplicative	(0,1,1)(0,1,1)	Present			23	3x5	TCMAY2020
Other income	Multiplicative	(0,1,1)(0,1,1)	Not Present			23	3x5	AOJUN2020
Total income	Multiplicative	(0,0,0)(0,1,1)	Present			23	3x5	AOJUL2020
Guest-houses and guest-farms								
Stay unit nights sold	Multiplicative	(0,1,1)(0,1,1)	Present			13	3x5	
Occupancy rate	Multiplicative	(0,1,1)(0,1,1)	Present	Easter(15)		13	3x5	AOJUN2010
Average income per stay unit night sold	Multiplicative	(1,1,0)(1,0,1)	Present			13	3x5	TCMAR2020
Income from accommodation	Multiplicative	(0,1,1)(0,1,1)	Present			13	3x5	LSAPR2020
Income from restaurant and bar sales	Multiplicative	(0,1,1)(0,1,1)	Present			13	3x5	AOMAY2020
Other income	Multiplicative	(0,1,1)(0,1,1)	Present			13	3x5	LSJUN2020
Total income	Multiplicative	(0,1,1)(0,1,1)	Present			13	3x5	TCJUN2020
								LSJAN2021

Variable	Decomposition scheme	ARIMA model	Presence of seasonality	Presence of Easter effect	Presence of length-of-month and trading day effects	Henderson filter	Seasonal movement average filter	Outliers (AO, LS, TC)
Other accommodation								
Stay unit nights sold	Multiplicative	(2,1,0)(0,1,1)	Present			13	3x5	TCMAY2008 AOJUN2010 LSMAR2020 TCMAR2020 AOAPR2020 TCAPR2020 TCAUG2020 TCSEP2020 AODEC2020
Occupancy rate	Multiplicative	(0,1,1)(0,1,1)	Present	Easter(15)		13	3x5	
Average income per stay unit night sold	Multiplicative	(0,1,1)(0,1,1)	Present		LOM	13	3x5	
Income from accommodation	Multiplicative	(0,1,1)(0,1,1)	Present		LOM	13	3x5	
Income from restaurant and bar sales	Multiplicative	(0,1,1)(0,1,1)	Present			13	3x5	
Other income	Multiplicative	(0,1,1)(0,1,1)	Present		LOM	13	3x5	
Total income	Multiplicative	(0,1,1)(0,1,1)	Present		LOM	13	3x5	
Total industry								
Stay unit nights sold	Multiplicative	(0,1,1)(1,1,1)	Present		LPYEAR	13	3x5	LSAPR2008 LSNOV2008 LSJUL2009 TCJUN2010 LSJUL2010 TCAUG2010 LSMAR2020 AOAPR2020 TCAPR2020 TCNOV2020 TCJAN2021 TCFEB2021
Occupancy rate	Multiplicative	(0,1,1)(1,1,1)	Present			13	3x5	
Average income per stay unit night sold	Multiplicative	(0,1,1)(0,1,1)	Present			13	3x5	
Income from accommodation	Multiplicative	(0,1,1)(0,1,1)	Present		LPYEAR	13	3x5	
Income from restaurant and bar sales	Multiplicative	(2,1,0)(0,1,1)	Present			13	3x5	
Other income	Multiplicative	(0,1,1)(0,1,1)	Present			13	3x5	
Total income	Multiplicative	(0,1,1)(0,1,1)	Present		LPYEAR	13	3x5	

Tourist accommodation

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.