

ANSWERS CHAPTER 15

THINK IT OVER

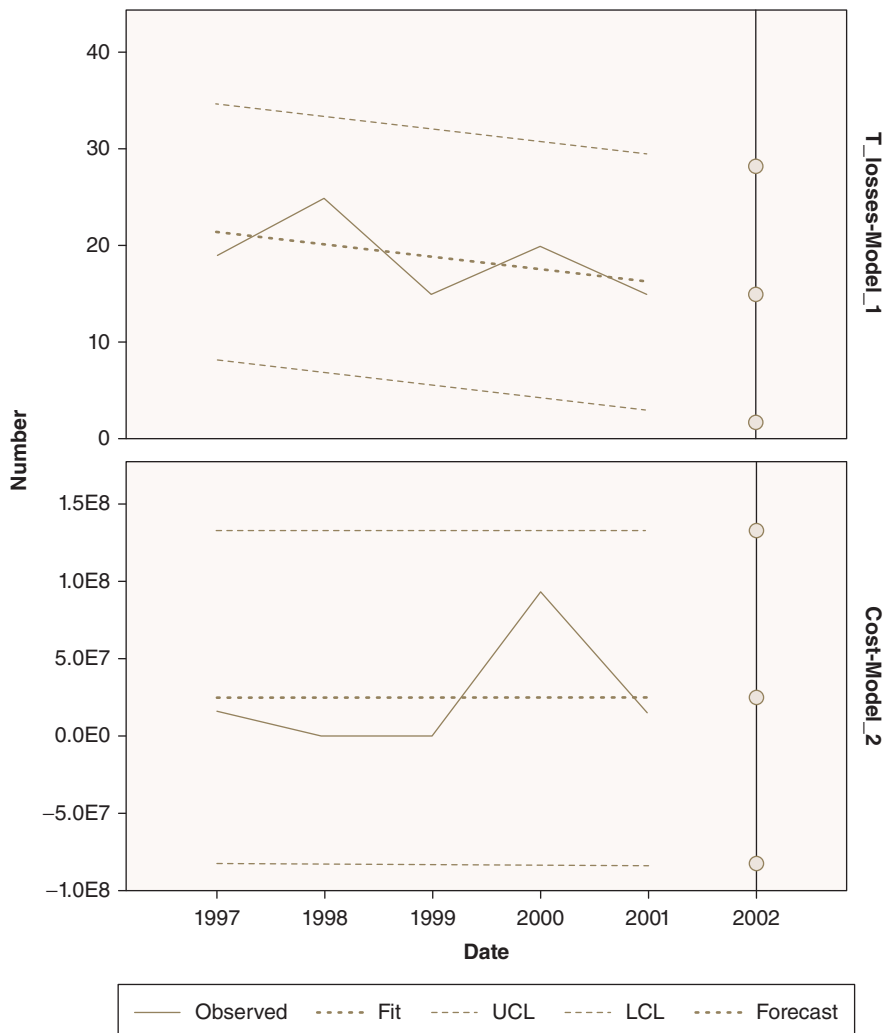


think it over

No answers required.

EXERCISES

- (a) Yes it could but you would have to be careful in interpreting the results. Transformers tend to be situated outside and are therefore subject to the weather. Moving averages and similar techniques do not account for exceptional events, e.g. hurricanes, blizzards, etc.

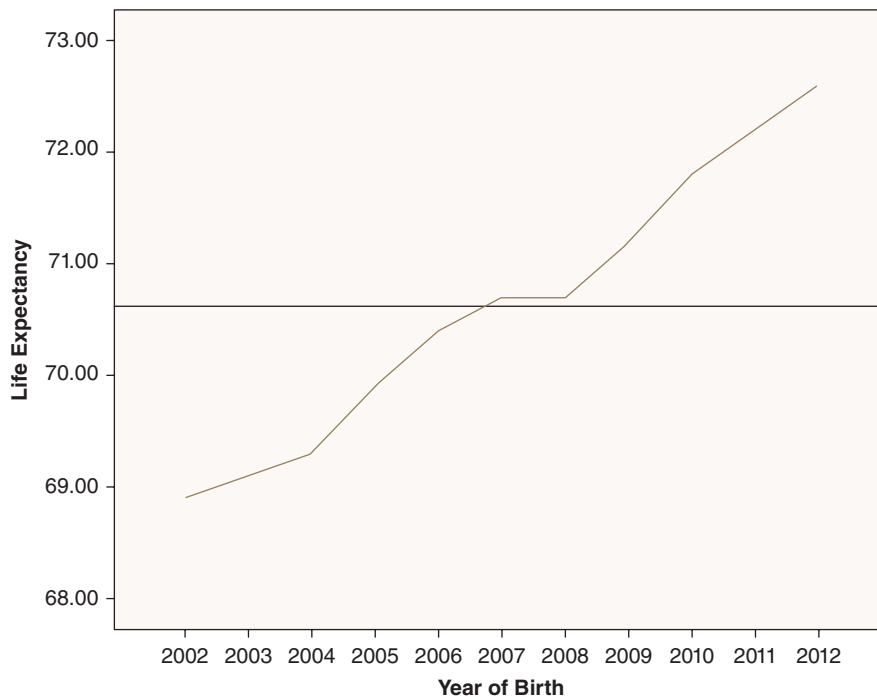


- (b) You could run the analysis on the first three known data and see how closely the model predicts year 4.
- (c) The charts below show the output from SPSS. It looks like there is a downward trend in transformer losses which could be the result of better preventive maintenance. The cost, on average, doesn't change; but it is an average and therefore high losses in one year will be compensated by lower losses in another.
- (d) Based on the supplied data, and the confidence intervals for the model, the industry could expect between 2 and 29 transformers to fail with a cost of £24,677,945. Such a range shows the unreliability of the model.

Forecast		
Model		2002
transformer losses-Model_1	Forecast	15.00
	UCL	28.25
	LCL	1.75
Cost-Model_2	Forecast	24,677,945
	UCL	1E+8
	LCL	-83,792,389

For each model, forecasts start after the last non-missing in the range of the requested estimation period, and end at the last period for which non-missing values of all the predictors are available or at the end date of the requested forecast period, whichever is earlier.

2. (a)



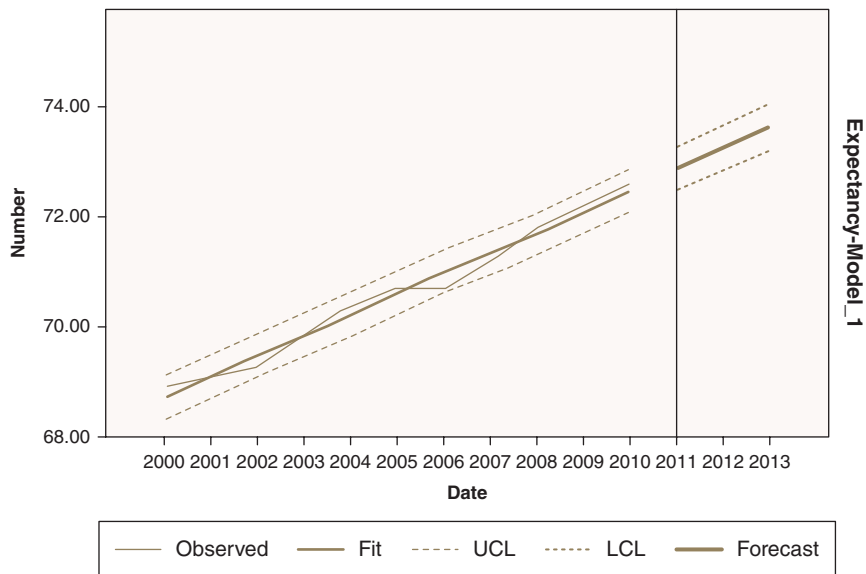
The trend appears to be rising steeply, i.e. life expectancy is increasing dramatically. Check the scale on the axes: vertical is in steps of 1 year. The mean life expectancy is shown by the horizontal line and is about 70.7 years.

(b)

Forecast		2011	2012	2013
Life Expectancy-Model_1	Forecast	72.88	73.25	73.63
	UCL	73.27	73.66	74.04
	LCL	72.48	72.85	73.22

For each model, forecasts start after the last non-missing in the range of the requested estimation period, and end at the last period for which non-missing values of all the predictors are available or at the end date of the requested forecast period, whichever is earlier.

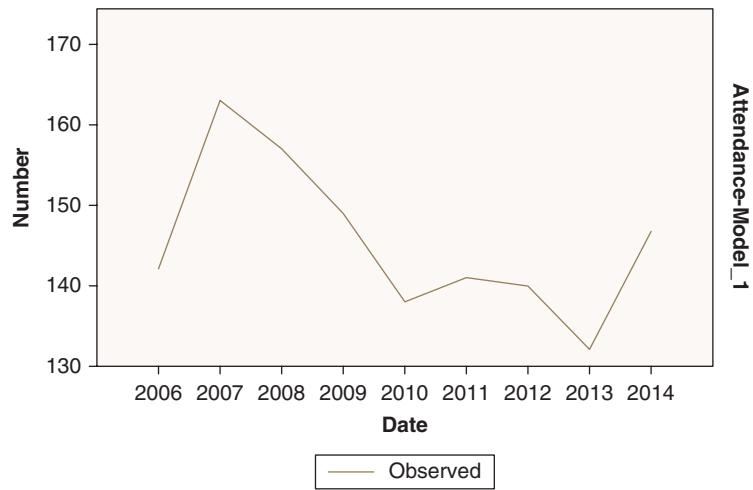
The life expectancy ranges between 73.22 years and 74.04 years with a forecast of 73.63 years. The chart shows the trend.



(c) The upward trend in life expectancy is due to improved medical care, better diet and a general improvement in prosperity. But, as with all averaging techniques, it should be borne in mind that many individuals fall outside of the 'average citizen's' profile. In the future there could be an exceptional event like an epidemic (e.g. the unforeseen Ebola outbreak in West Africa in 2014) which is unpredictable. Also, unless the aging process can be stopped, life expectancy will reach a plateau and improvements in prosperity, etc., will not have much of an effect.

(d) Insurance companies, politicians, health care organisations, etc.

3.

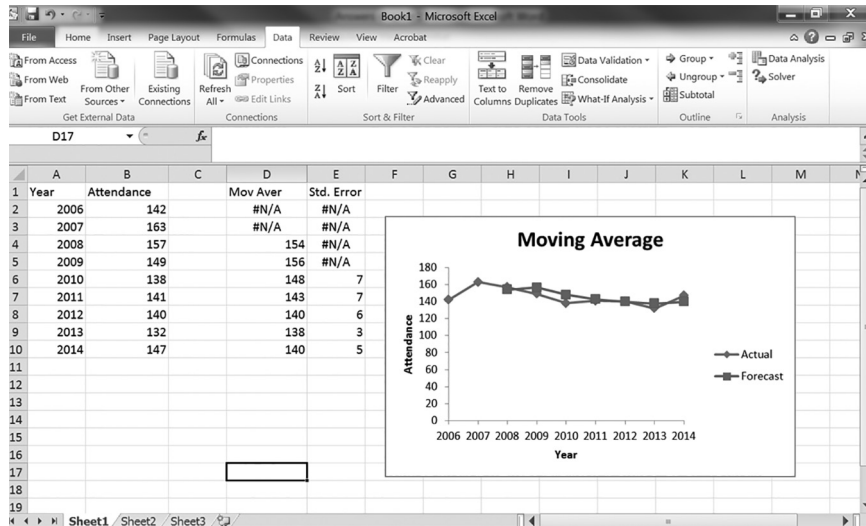


$$(a) Y_{2009} = \frac{142 + 163 + 157}{3} = 154$$

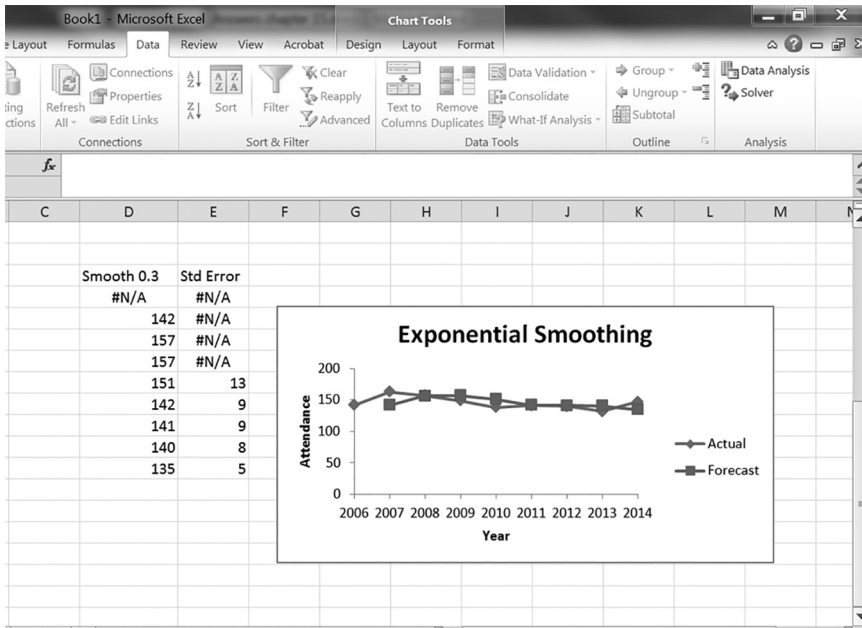
$$Y_{2010} = \frac{163 + 157 + 149}{3} = 156$$

$$Y_{2011} = \frac{157 + 149 + 138}{3} = 148 \text{ and so on for 2012, 2013, 2014.}$$

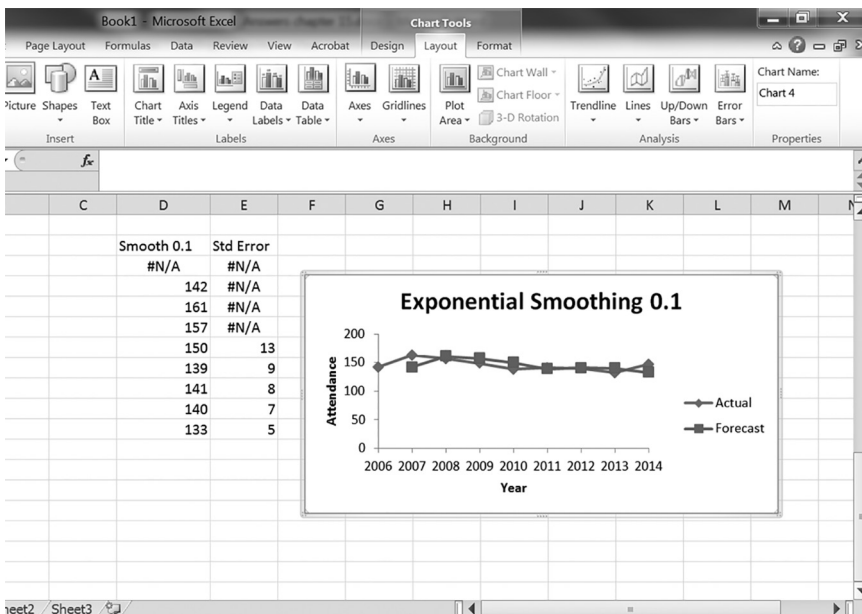
Output from Excel for three-year moving average.



(b) Exponential smoothing constant 0.3.



(c) Exponential smoothing constant 0.1.



(d) Only slight difference in predicted values.

4. Output from SPSS using ARIMA models with a three-year moving average specified.

Forecast				
Model		2011	2012	2013
Life Expectancy-Model_1	Forecast	72.88	73.25	73.63
	UCL	73.27	73.66	74.04
	LCL	72.48	72.85	73.22

For each model, forecasts start after the last non-missing in the range of the requested estimation period, and end at the last period for which non-missing values of all the predictors are available or at the end date of the requested forecast period, whichever is earlier.

- (b) Comparing the last three years when the salary was constant, the upper and lower confidence levels predict the salary could be anywhere between £18,109 and £37,117.
- (c) The lower limit is unrealistic, since salaries tend not to drop by such significant amounts. The prediction is based on a zero increase over the past 3 years.
- (d) The UK government imposed a salary freeze on all public sector workers in 2011.
5. (a) The projected economic climate, big events, profiles of holiday makers who have visited the county in previous years, projected events (political, etc.) in popular overseas destinations.
- (b) Profiles of future holiday makers would be similar to previous years. The climatic conditions would be similar.
- (c) Economic downturn. The value of the pound dramatically falls against other currencies making holidays abroad cheaper. Climatic conditions change drastically, e.g. the jet stream in the upper atmosphere changes significantly.
6. (a) Seasonal adjustment is performed to allow for things like summer jobs which have an influence on employment statistics. Seasonality effects can be different for different regions. For example, in the summer months tourism is a major employer and if the employment statistics are not seasonally adjusted, then an overall yearly statistic would be distorted.
- (b) Seasonal adjustment can be performed using dummy variables. For example, if you are investigating sales over annual periods divided into four quarters, then you would require 4 - 1 dummy variables. They can be coded as: $Q_{tr1} = \begin{cases} 1 & \text{if } q_{tr1} \\ 0 & \text{otherwise} \end{cases}$, $Q_{tr2} = \begin{cases} 1 & \text{if } q_{tr2} \\ 0 & \text{otherwise} \end{cases}$, $Q_{tr3} = \begin{cases} 1 & \text{if } q_{tr3} \\ 0 & \text{otherwise} \end{cases}$.
- (c) No answer required.
- (d) No answer required.