2022 BUSA3015 – BUSINESS FORECASTING
Case Study Report 1

Due: <u>11:59 pm, Tuesday 26th April</u>

Format

The submission of this assessment requires:
- A numerical submission for Exercise 1 and Exercise 2 via an iLearn quiz tool.
- A written submission for Exercise 3 via a PDF submission through Turn-It-In.

The main tables, charts and results should be presented throughout the report to highlight your responses to the questions. There is no need for an appendix.

For the numerical submission: an online quiz tool will be available on iLearn from the 19th of April where you can type in your numerical answers. All answers are to be rounded to 2 decimal places.

For the written submission: 750 words (+/- 15%) not counting labels and numbers on graphs AND no more than four A4 sheets in portrait/vertical mode **(use the template DOC file provided on iLearn).** A Turn-It-In submission link will be available on iLearn from the 19th of April.

Consider the guidelines above as an authentic assessment that mirrors actual business practice of documentation guidelines when preparing applications for jobs or business tenders.

There will be a deduction of **10% of the total available marks** for every page above 4 pages and/or every 50 words above 863 words (whichever gives the greater penalty).

Convert your DOC/X file into a PDF prior to submission. You will also have to upload your XLS/X file through iLearn. Only the PDF file will be marked, the XLS/X file will not be marked.

There will be a deduction of **10% of the total available marks** made from the total awarded mark for each 24-hour period, or part thereof, that the submission is late (for example, 25 hours late in submission – 20% penalty). This penalty does not apply for cases in which an application for Special Consideration is made and approved.

For the written part of this assignment – the answers must be typed on the pre-formatted DOC file that has been uploaded on iLearn.

Please do not alter the formatting of the pre-formatted DOC file:
- Do not change the font size.
- Do not change the line spacing.
- Do not change the paragraph settings.
- Do not change the page margins.
- Do not change the headers or footers.
- Do not edit or delete the questions.
- Do not edit any other component of the file apart from typing your answers and cutting and pasting relevant output.

As per the pre-formatted DOC file on iLearn, your answers will be in Georgia font, size 11. The answers are to be in black font.

Not adhering to the above will results in a penalisation of marks. This includes a 10% penalty per page over the limit and/or every 50 words above 863 words (whichever gives the greater penalty).

A critical thinking skill is about making judgments about the information that is relevant and can be presented in an efficient and effective way.

If you want relevant output to be marked, you can cut-and-paste relevant output into these pages. **Any pages including appendices (beyond the required 4 pages) will not be marked.**

Do not use appendices, all relevant output from Excel or Minitab must be included within the body, within your answer. Appendices will not be marked.

All questions about the assignment must be via the iLearn "General discussion forum".

2022 S1 BUSA3015 – BUSINESS FORECASTING

You have been employed as a consultant for the *Australian Retailers Association.*

As part of your role in the Business Analytics and Data Analytics team, you have been asked to forecast **business turnover for retail trade**, as part of a wider report being commissioned by the *Australian Retailers Association* – on Australia's retail industry.

Questions

- Obtain the ABS statistics for *Business Turnover Index ; Retail trade ; Current Price* – available at: https://www.abs.gov.au/statistics/economy/business-indicators/monthly-business-turnover-indicator/jan-2022

- Download Table 06.

- For the purposes of this report you are to consider the *Business Turnover Index; Retail trade; Current Price* data. There are **three series** in the table: *Original*, *Seasonally-adjusted*, and *Trend* **(please choose carefully throughout this report!)**

- **For the purposes of this report, only consider the data from <u>February 2011 to January 2021</u> as the sample of data that is available to you – that is, ignore any recent observations.**

- **This means that the first actual observation in your Excel file is from February 2011 and your last actual observation in your Excel file is from January 2021.**

- Use Excel and no other statistical software for the purposes of this report.

- You may use Minitab for constructing correlograms.

This report will require two separate submissions.

The numerical responses need to be submitted via a quiz tool in iLearn.

The written responses need to be submitted via a PDF uploaded via Turn-It-In in iLearn.

Instances of plagiarism will be dealt with according to the relevant policies and procedures.

[Please turn over]

Notes for Exponential Smoothing Models for this Report

If you use any Exponential Smoothing Models in this Report, please note:

- **For Simple Exponential Smoothing – for the seed of the level use the first observation, Y_1.**

- **For Holt's Exponential Smoothing – for the seed of the level use the first observation, Y_1. For the seed of the trend – take the difference of the first two observations ($Y_2 - Y_1$).**

- **For Winters' Exponential Smoothing – for the seeds of the level, trend, and seasonal components – utilise the methods described and discussed in class.**

- **Choose Multiplicative over Additive models where applicable.**

Exercise 1 – Application (10 marks)

For the purposes of this report, only consider the data from <u>**February 2011 to January 2021**</u> **as the sample of data that is available to you – that is, ignore any recent observations.**

This means that the first actual observation in your Excel file is from February 2011 and your last actual observation in your Excel file is from January 2021.

For the <u>*Seasonally-adjusted*</u> data for *Business Turnover Index; Retail trade; Current Price (Series ID: A124873965J)* available in *Table 6*: Forecast the out-of-sample values for every month in the period February 2021 – July 2022 (both months inclusive) using <u>**one**</u> appropriate exponential smoothing model. Your starting values for any parameter should be 0.25. **Please see the notes on page 4 of this document – regarding seeds.**

Before you begin Exercise 1, let's check that you have the right data! The average should be 89.7!

Once you develop an appropriate exponential smoothing model with starting values for parameter/s = 0.25, what are the following numerical values:

1. The within-sample forecast for January 2021.

2. The MSE.

3. The MAE.

4. The out-of-sample forecast for February 2021.

5. The out-of-sample forecast for July 2022.

By considering the MSE, critically think of a way to optimise the model by altering the parameters, and report the following values after your optimisation (your answer can be zero if a parameter is not applicable):

6. Alpha.

7. Beta.

8. Gamma.

9. The MSE.

10. The out-of-sample forecast for July 2022.

[Please turn over]

Exercise 2 – Application (10 marks)

For the purposes of this report, only consider the data from <u>February 2011 to January 2021</u> as the sample of data that is available to you – that is, ignore any recent observations.

This means that the first actual observation in your Excel file is from February 2011 and your last actual observation in your Excel file is from January 2021.

For the <u>*Original*</u> data for data for *Business Turnover Index; Retail trade; Current Price (Series ID: A124908165V)* available in *Table 6*: Forecast the out-of-sample values for every month in the period February 2021 – July 2022 (both months inclusive) using **one** appropriate smoothing model. Your starting values for any parameter should be 0.25. **Please see the notes on page 4 of this document – regarding seeds.**

Before you begin Exercise 2, let's check that you have the right data! The average should be 88.0!

Once you develop an appropriate exponential smoothing model with starting values for parameter/s = 0.25, what are the following numerical values:

11. The within-sample forecast for January 2021.

12. The MSE.

13. The MAE.

14. The out-of-sample forecast for February 2021.

15. The out-of-sample forecast for July 2022.

By considering the MSE, critically think of a way to optimise the model by altering the parameters, and report the following values after your optimisation (your answer can be zero if a parameter is not applicable):

16. Alpha.

17. Beta.

18. Gamma.

19. The MSE.

20. The out-of-sample forecast for July 2022.

Exercise 1 (10 marks) + Exercise 2 (10 marks) + Exercise 3 (60 marks) = Report 1 (80 marks)

[Please turn over]

<u>Written responses submitted via a PDF upload via Turn-It-In in iLearn:</u>

Exercise 3 (60 marks)

750 words (+/- 15%) not counting labels and numbers on graphs AND no more than four A4 sheets in portrait/vertical mode (use the template DOC file provided on iLearn):

Your Exercise 3 responses should refer to Exercise 2. In addition to this, you may refer to Exercise 1.

For the model in Exercise 2, given that you have the actual data for the out-of-sample period (you considered the within-sample period to end in January 2021 – but you **_do_** have **_some_** data for February 2021 and onwards) – discuss your forecasting method, your forecasts, and the business insights from these, using the following steps:

- Attribution (5 marks)
- Scope (5 marks)
- Application (5 marks)
- Analysis (10 marks)
- Articulation of Issues (10 marks)
- Critique (15 marks)
- Position (10 marks)

You must use the above steps as sub-headings in your response. Failure to do so will result in a loss of marks.

Note in the rubric on iLearn – "sources" are from within the assignment including your own sources of generated results. You do not need to cite the materials provided via iLearn. Given the nature of this task, you will not be penalised for not referring to other sources (although other sources may give you unique insights for your responses). However, in your report, you should consider referring to the information provided by the ABS on the site that is used to download the data

Please turn over for pointers for Exercise 3.

<u>**Attribution**</u> **–** Consider the marking rubric.

<u>**Scope**</u> **–** Explain the model in Exercise 2 by using language that is understood by a **non**-technical audience. You will need to critically think about whether you discuss the pre-optimised or post-optimised models.

<u>**Application**</u> **–** Describe and explain how you applied the data and your knowledge to perform the forecasts in Exercise 2. Describe and explain using language that is understood by a **technical** audience. You will need to critically think about whether you discuss the pre-optimised or post-optimised models.

<u>**Analysis**</u> – Consider the marking rubric, to assist you, you should include:
A plot of the considered sample (February 2011 – January 2021) from Exercise 2 and the forecasts (within and out-of-sample) on one chart. You will need to critically think about whether you plot the pre-optimised or post-optimised models.
A description of the chart and an analysis of your forecast.
Another plot of the actual data that is beyond the considered sample (February 2021 to the present) and the forecasts.
A description of the chart and an analysis your forecast.

<u>**Articulation of Issues**</u> – Consider the marking rubric, to assist you, you should:
Perform the appropriate check/s and test/s – provide some of this evidence.
What are the issues based on your check/s and test/s above?
Note: we have discussed and conducted several check/s and test/s when we are forecasting in this unit – and it is up to you to determine which checks and tests are appropriate – to determine issues, if any.

<u>**Critique**</u> – Consider the marking rubric, to assist you, you should:
Critically evaluate your model, and critically evaluate the factors you would need to consider when forecasting in light of recent events.
Compare and contrast alternative models.
In the context of business forecasting, critically think and discuss any other considerations that need to be taken into account for your forecasts / forecasting to be useful for business purposes.

Position – Consider the marking rubric, to assist you, you should consider:

This is an informed and justified conclusion that draws upon your discussion above. Given all of the discussion above, state your position regarding the business insights to be obtained by your forecasts, by referring to the evidence and ideas that you have discussed above.

Exercise 1 (10 marks) + Exercise 2 (10 marks) + Exercise 3 (60 marks) = Report 1 (80 marks)