Exercise 1

For the ***Seasonally-adjusted*** data *Retail Trade – Turnover – Total (State) – Household goods retailing (Series ID: A3348603J)* available in *Table 1*: Forecast the out-of-sample values for every month in the period February 2022 – July 2023 (both months inclusive) using **one** appropriate exponential smoothing model. Your starting values for any parameter should be 0.6. **Please see the notes on page 5 of this document – regarding seeds. You will need to critically think about forecasting beyond 12 months.**

**Before you begin Exercise 1, let’s check that you have the right data! The average should be 4964.0!**

Once you develop an appropriate exponential smoothing model with starting values for parameter/s = 0.6, what are the following numerical values:

1. **The within-sample forecast for January 2022.**
2. **The RMSE.**
3. **The MAPE.**
4. **The out-of-sample forecast for February 2022.**
5. **The out-of-sample forecast for July 2023.**

By considering the RMSE, 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):

1. **Alpha.**
2. **Beta.**
3. **Gamma.**
4. **The MSE.**
5. **The out-of-sample forecast for July 2023.**

**Exercise 2 – Application (10 marks)**

**For the purposes of this report, only consider the data from February 2017 to January 2022 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 2017 and your last actual observation in your Excel file is from January 2022.**

For the ***Original*** data for data for *Retail Trade – Turnover – Total (State) – Household goods retailing (Series ID: A3348600A)* available in *Table 1*: Forecast the out-of-sample values for every month in the period February 2022 – July 2023 (both months inclusive) using **one** appropriate smoothing model. Your starting values for any parameter should be 0.6. **Please see the notes on page 5 of this document – regarding seeds. You will need to critically think about forecasting beyond 12 months.**

**Before you begin Exercise 2, let’s check that you have the right data! The average should be 4969.2!**

Once you develop an appropriate exponential smoothing model with starting values for parameter/s = 0.6, what are the following numerical values:
**11.** The within-sample forecast for January 2022.
**12.** The RMSE.

**13.** The MAPE.
**14.** The out-of-sample forecast for February 2022. **15.** The out-of-sample forecast for July 2023.

By considering the RMSE, 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 2023.

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

**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 2022 – but you ***do*** have ***some*** data for February 2022 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)

**Attribution –** Consider the marking rubric.

**Scope –** 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.

**Application –** 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.

**Analysis** – Consider the marking rubric, to assist you, you should include:
A plot of the considered sample (February 2017 – January 2022) 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 2022 to the present) and the forecasts.
+ A description of the chart and an analysis your forecast.

**Articulation of Issues** – 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.

**Critique** – 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 your discussion/s 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.