# *SCMA 669*

Forecasting Methods

Take-at-Home Exam

Due May 11, 2021

**Instructions:**

1. You may not discuss this test or general topics which may significantly apply to the test with anyone except the instructor.
2. You may use passive support materials (notes, text, internet, etc.), but you may not use any active sources, that is, either human or electronic sources that answer specific questions.
3. A Word copy of the test is posted on Blackboard under Assignments. You may insert your answers in the Word document.
4. An Excel document (Data File ’21) containing data for the exam is also posted on Blackboard. You can download the file. You do not need to include the data or your Excel worksheets with the test, just the results requested.
5. **The completed test is due May 11.** Please e-mail your completed exam to my VCU e-mail ([swcuster@vcu.edu](mailto:swcuster@vcu.edu)). I will acknowledge receipt of your test within 24 hours.
6. If you have questions call (702-526-8154) or e-mail ([swcuster@vcu.edu](mailto:swcuster@vcu.edu)).

**I pledge to comply with the above instructions and will neither give or receive any help on this test:**

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Forecasting Methods

Take-at-Home Exam

1. Briefly discuss the differences and the relationship between forecasting, planning and goal/objective setting.
2. Nat Silver reviewed a large number of professional forecasts. He found that less than 50% of the future values fell within the forecasted 95% confidence intervals. Why is this?

1. You are on the staff of the District Manager for the Mid-Atlantic Region of a major company. Over the last year, working with the District Manager and his sales managers, you’ve developed a time-series forecasting system for the District. Previously, sales had been forecast based on the sales managers’ judgment. Your system has greatly improved forecasting. The Corporate Vice President of Sales asks you to implement a similar system in the other Districts. How do you response to the Vice President?
2. You are doing a monthly production forecast for a manufacturer using classical decomposition and exponential smoothing. The historical production data shows three consecutive months with zero production. Checking with management you find the data is correct; the plant was closed those months due to a labor dispute.

Must you adjust for these three months? (You may adjust either the data or the forecast model. The question is not how you should adjust, but, given that the data is correct, should you adjust.)

If you said you should adjust, what would the consequences be for your forecast if you had not adjusted?

If you said you should not adjust, what would the consequences be for your forecast if you had adjusted?

1. You are creating a forecasting system for monthly demand of parts. A number of the part numbers have intermittent demand, that is, no demand most months and significant demand in those months where there is a demand. Both the quantity of the demand and the time between months with demand appear random. What is the best approach for forecasting these intermittent demand parts?
2. You are developing a forecast for the time series shown below. You use Holt’s Exponential Smoothing with a starting value equal to the first data point for L1, and 0 for b1. When you minimize the MSE to find  and , you get  = 1.00, and  = 0.00.
   * 1. What does this tell you about the series?
     2. What is your best forecast for the next 6 periods?
3. Series 1 on the Final Exam Worksheet (Data File ’21) gives 56 months of monthly data. Calculate the 12 month multiplicative seasonal indexes (or factors) for the series and the seasonal adjusted series. You do not need to create a forecast. Multiplicative seasonal factors are usually appropriate when there is a meaningful zero for the data series. For example revenue, sales or production quantities. We used multiplicative factors for most of the examples we did in class.
4. Series 2 on the Final Exam Worksheet gives 132 months of monthly data. Create a 12 month forecast using Holt’s Exponential Smoothing. Do not adjust the series for seasonality. For starting value of L and b use the first series value and the difference of the first two series values respectively. That is L1 = 5922 and

b1 = -281. Determine  and  by minimizing MSE using all the data.

* 1. What are  and 
  2. What are the final values for L and b?
  3. What is the 12 month forecast?

1. Series 2 (the same series you used on the previous problem) on the Final Exam Worksheet gives 132 months of monthly data. Create a 12 month forecast using Holt’s Exponential Smoothing with a Damped Trend. Use a Damping Coefficient  of 0.95.

As in the previous problem do not adjust the series for seasonality. For starting value of L and b use the first series value and the difference of the first two series values respectively. That is L1 = 5922 and b1 = -281. Determine  and  by minimizing MSE using all the data.

* 1. What are  and 
  2. What are the final values for L and b?
  3. What is the 12 month forecast?

1. Series 3 on the Final Exam Worksheet gives 60 periods of data.
   1. Show the Autocorrelation chart for this data.
   2. Does the chart indicate seasonality? If so, what is the period (length) of the seasonality?
2. Series 4 on the Final Exam Worksheet gives 60 periods of data. Make the last 12 periods out-of-sample data (periods 85 – 96). The first 84 periods are training data. Do not adjust the for seasonality.
   1. Using the training data, create a 12-period simple Exponential Smoothing forecast. Use the first data point as your stating value. Use MSE for all the training data to obtain.
   2. Using the out-of-sample data do a Quick & Dirty Analysis of the goodness of fit for your forecast. Use MAPE as your measure of fit
3. Using the same data as the previous problem (Series 4) and your Simple Exponential Smoothing model, perform a complete analysis with your out-of-sample data. Use take-off points periods 84, 87 and 90. Make your forecasting horizons 2, 4, 6 & 8 periods. Show the MAPE for each take-off point and forecasting horizon.

**I pledge that I have neither given or received on this test:**

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