Assignment #5

This assignment is due in class next Thursday, March 4, 1999. As with previous assignments, I expect that you will talk to classmates about the assignment, but expect each of you to do the work yourself.

For this assignment, you will be forecasting the cellular telephone data series that we have been discussing in class. You can find the data for this assignment in the assignments area of the class web page. This data cover the cellular market through the end of 1995.

Imagine that you have the task of forecasting the number of cellular subscribers (as defined by this data) for the next four periods into the "future", through the end of 1997. The reason for this task is that your company is contemplating offering a new type of cellular service. Various members of the company believe that in order for this new service to be profitable, the cellular market must grow to 50 million by the end of 1997. "Currently" at the end of 1995, there are about 34 million subscribers.

(**1**) As noted in the regression casebook (page 34), a 4th order polynomial fits this data quite well. Use this model to

    (a) Estimate the number of cellular subscribers at the end of 1997 (period 27 in the data).

    (b) What is the "nominal" accuracy of this prediction (i.e., the usual statistical summary that is the sum of random variation plus fitting error)?

    (c) Do you believe this assessment of the forecast accuracy of the model? Briefly explain your answer in a couple of sentences.

(**2**) An alternative approach to this problem is to study the percentage growth of the series.

    (a) Again estimate the number of cellular subscribers at the end of 1997 (period 27), but now use a model for the percentage growth series. Pages 36-37 of the regression casebook describe one such model (you don't have to use it).

    (b) What is the accuracy of the forecast produced in "a"? It is up to you to decide how to estimate the accuracy of this forecast.

(**3**) What's the bottom line? Will the subscriber series make it to 50 million by the end of 1997? What would you recommend to management, and why?

(**4**) At the last minute, someone arrives with a new data series that can be used to prepare the forecasts of the number of subscribers. This data series, labeled "Cell Sites", measures the coverage of the nationwide cellular network.

    (a) How is the number of cell sites related to the number of subscribers? Be brief.

    (b) Does knowing the number of cell sites improve the fit obtained with the polynomial regression of question #1? (Hint: You need to use multiple regression to answer this question.)

    (c) Will whatever benefits that are realized in "b" translate into improved forecast accuracy for the polynomial model when predicting the number of subscribers at the end of 1997? Explain.