

University of Notre Dame
Department of Finance
Economics of the Firm
Fall 2009

Project #3: Due in class, Saturday, November 21st.

You will need to download the data from the class website for this project. Go to www.nd.edu/~jstiver and click on “Economics of the Firm”. The dataset is called project_3.

- 1) You have data on ice cream sales in 200 counties. Also, for each county, you have data on prices, income (in thousands), advertising expenditures (in thousands), average temperature, and some age data. Your job is to forecast sales for a county with the following characteristics:

Variable	Value
Your Price	\$2.50
Competitor's Price	\$2.60
Average Income	\$40,000
Advertising	\$20,000
% of Population over 65	20%
% of Population under 16	15%
Average Temperature	70

- a) First try a linear regression. Insert whatever variables you want, but use the descriptive statistics to decide if you have a good fit. What are the interpretations of your coefficients?
- b) Now, try experimenting with logs (i.e. take the natural logs of some or all of the variables and run a new regression). Remember, the idea is to get the best fit possible. Again, what are the interpretations of the coefficients?
- c) Once you have a regression that you are satisfied with, calculate the price elasticity of demand at the values given above. Calculate the income elasticity at the values given above.
- d) Now, calculate a forecast for sales at the values given above.

- 2) You have some data on e-commerce retail sales for the past 10 years (quarterly observations). Your job is to forecast e-commerce retail sales for the second quarter of 2009.
 - a) First, plot the data. Do you see a trend in the data?
 - b) Estimate a forecasting equation with a linear trend (you will need to create a time variable). What interpretation would you give the coefficient on the time variable?
 - c) Now, estimate an exponential (constant percentage growth) trend. (You will need to convert the data to logs – leave the time variable as is). Again, what is the interpretation of the coefficient on the time variable?
 - d) Now, let's check for seasonality using your regressions in part (a) and (b), add dummy variables (you will need to create these) for the first three quarters. Does your regression fit improve?
 - e) Forecast E-commerce retail sales for the second quarter of 2009 using each of your four models (linear, exponential, with dummies, without). Which of these forecasts do you have the most confidence in? Why?

- 3) You have data on the interest rate for a 1 year treasury bill from 1953 to 2009. Your job is to forecast the rate for October 2009.
 - a) First, plot the data. Do you see an obvious trend?
 - b) Try a few moving average models (i.e. with different lengths). Calculate the RMSE to find the best fitting moving average.
 - c) Now, try exponential smoothing but experiment with several weights. Again, calculate the RMSE to determine the best one.
 - d) Finally, calculate a forecast using your best MA model and your best exponential smoothing model. Which forecast are you most confident in? Why?