

Excel Regression Tutorials Topics and Scenarios

Tutorial (File name)	Topics	Scenario(s)
1 (Reg1.xlsx)	One quantitative predictor variable.	Predicting sales Predicting weight Predicting time to relief Predicting power usage
2 (Reg2.xlsx)	More than one predictor variable: Case 1: Two quantitative predictor variables Case 2: Allowing a curvilinear relationship	Predicting sales Predicting final grade Predicting power usage
3 (Reg3.xlsx)	Including qualitative predictor variables: Case 1: Where there are only two possible outcomes for the qualitative variable Case 2: Where there are more than two possible outcomes for the qualitative variable	Predicting weight Predicting weight Predicting time to relief
4 (Reg4.xlsx)	Including interaction in the model: Case 1: Between one quantitative variable and another quantitative variable Case 2: Between one quantitative variable and one qualitative variable (where there are only two possible outcomes for the qualitative variable) Case 3: Between one quantitative variable and one qualitative variable (where there are more than two possible outcomes for the qualitative variable)	Predicting sales Predicting final grade Predicting weight Predicting time to relief

Sales Scenario

Retail stores like to estimate the income from a product and like to know how certain decisions they make about how they present the product to customers might impact sales. Two specific decisions deal with money spent on advertising the product and how much exposure the product has in the store (square feet of shelf space). The data for this example comes from one product—a canned good that would be considered by most people as “a staple” (something they keep on hand). The sale price of the product was not varied during the study. (Sales represents the dollars received from the sale of the product during a week period.)

- Would the company expect sales to increase if more money were devoted to advertising?
- Would it be better to estimate sales based on advertising and amount of visibility of the product in the store?
 - Can we estimate the impact of additional space on sales?
 - Can we estimate the impact of additional advertising expenditures on sales?
- Is the impact of advertising expenses the same regardless of the amount of visibility of the product in the store? Likewise, is the impact of additional shelf space the same regardless of the amount spent on advertising?

Weight Scenario

Suppose we want to predict the weight of sophomore students at North Georgia. Data were collected in two sections of a large sophomore level class that is a required course for BBA students and available in the Core Curriculum for any other major.

- Can we use height as a predictor of weight?
- Do taller people tend to weigh more?
- Should we consider both height and gender as a predictor? If so, do males and females tend to gain weight at the same rate as they get taller? Or said another way as individuals increase in height, does the expected amount of change in weight depend on the gender of the individual?
 - Case 1: Knowing someone's height and gender is useful; and each characteristic can be described without knowing the other characteristic.
 - Case 2: Knowing someone's height and gender is useful; but to describe how a change in one characteristic relates to an expected change in weight depends on the other characteristic.
- [This one is a little "off the wall" but helps illustrate a point.] Should we consider both height and the amount of change someone was carrying the day the data were collected when estimating their weight?
- If we already know a person's height and gender, we should not need to consider their major.

Time to Relief Scenario [Modified from a problem originally published in *Statistics for Business and Economics* by McClave, Benson, and Sincich]

A pharmaceutical company wants to predict the mean time to relief (in minutes) after the administration of a certain drug. Two important independent variables are considered to be good predictors of relief time. They are age of the patient and method of administration of the drug. Physicians administer a standard dose of a drug to a patient in one of three different ways: orally in liquid form, orally in pill form, and as a shot. We want to explore the following possible theories:

- Age is a predictor of time to relief.
- The method of administration is a predictor of time to relief.
- Age and method of administration should both be used to predict time to relief.
- The choice of most effective method of administration depends on the age of the patient.

Power Usage Scenario

One of the major questions for power companies (e.g., Georgia Power) is how much power will be needed on a given day. Lots of theories have been explored, but the most common theory is one related to predicting demand for electricity based on the weather forecast.

- Can the forecasted high temperature for a day be used to estimate the demand for power?
- Do changes in the forecasted high temperature have the same impact across the entire range of temperature expected for a region? Said another way, does each additional degree of heat equate to the same expected amount of change in the demand for power?

Final Grade Scenario

Often students (and faculty) want to predict how students are going to perform in a class. Some universities assign formal "midterm grades" to communicate to students how they are performing in a class. But do midterm grades provide a good indicator of the final outcome for the course; or should other factors be included in any assessment of the expected final grade?

- Can we expect students with higher midterm grades to have higher final grades?
- Would it help to consider attendance (or absences) in addition to performance at midterm when predicting the final grade?
- Does the impact (on the final grade) of missing class depend on how a student is performing in the class (as measured by the midterm grade)?