**Multiple Regression**

Multiple regression models the relationship between one dependent variable, , and two or more independent variables (IVs), which we will notate (Note: here the subscripts on the ’s signify different independent variables, not individual observations of.) So, multiple regression is linear regression with more than one independent variable. Everything we have learned in Simple Linear Regression applies to Multiple Regression as well, because Simple Linear Regression is just the special case of multiple regression in which there is only one .

The **Regression Model** describes the relationship between the DV and the IVs in the population, and it is given by the following equation:

where

The betas, (), are population parameters. In other words, they are characteristics of the population as a whole, and so we cannot know their values without observing the entire population. When using regression, we take a random sample from the population of interest and we use that sample to estimate these parameters (the betas). That process results in the ***estimated regression equation (ERE)*:**

where

Multiple regression is based on the idea that the relationship between and each is linear, so you still must examine the scatterplot of against each to check for non-linear patterns. If you see non-linear patterns, you cannot use linear regression to model the relationship without modifying the variables to make the relationship linear (techniques for this exist, but are beyond the scope of this class).

The equations to calculate the coefficients in multiple regression require calculus or matrix algebra, so we will not be calculating these by hand. Instead, we will use Excel to produce output for multiple regression and interpret that output. See **Chapter 14: Handout #3 – Interpreting Linear Regression Output** which includes interpretations for Multiple Regression as well as Simple Linear Regression.