

13.5: Hypotheses

Hypotheses for regression can be directional or they can be non-directional. Directional hypotheses require a one-tailed test of the hypothesis and non-directional hypotheses require a two-tailed test of the hypothesis. Regression is used to assess whether one variable is useful in predicting another and, if so, in which way and how accurately. As noted, the predictions and the direction of the relationship are estimated and summarized using the slope (β_1). When β_1 is positive, the slope is positive. When β_1 is negative, the slope is negative. When β_1 is 0, it means that there is no discernable slope and that the variables are unrelated. Thus, directions are interpreted with slopes in regression in a similar way to how directions are interpreted with r -values in correlation.

We will focus on the non-directional hypothesis for this chapter. For simple linear regression, the non-directional research hypothesis is that the X -variable will be a significant predictor of the Y -variable. This means that the slope will not be 0. The corresponding null hypothesis is that the X -variable will not be a significant predictor of the Y -variable. The null hypothesis, therefore, states that the slope will be 0. The non-directional research and corresponding null hypotheses for simple linear regression can be summarized as follows:

Non-Directional Hypothesis for Simple Linear Regression

Research hypothesis	Variable X will predict Variable Y .	$H_A : \beta_1 \neq 0$
Null hypothesis	Variable X will not predict Variable Y .	$H_0 : \beta_1 = 0$

Keep in mind that we estimate and approximate in statistics. Therefore, the slope does not have to be exactly 0 to retain the null. Instead, it is presumed that the slope should be treated as 0 and that the null hypothesis should be retained unless the results are statistically significant. We will see how this is visualized and significance is tested in the remaining sections of this chapter.

Reading Review 13.1

1. What does prediction mean in regression?
2. Which variable is being predicted in regression?
3. How is a regression line created?
4. How would $\beta_1 = 0.75$ be interpreted?
5. How would $\beta_1 = -2.50$ be interpreted?

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