

# The Relationship between the Magnitudes of $SSR(x_2)$ and $SSR(x_2|x_1)$ : A Geometric Description

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## Abstract

We use geometric methods to investigate the relative magnitudes of  $SSR(x_2)$ , the sum of squares for regression on  $x_2$  alone, and  $SSR(x_2|x_1)$ , the increase in the regression sum of squares resulting from the addition of  $x_2$  to a model that already contains  $x_1$ . We examine a variety of cases, emphasizing those in which  $SSR(x_2|x_1) > SSR(x_2)$ . We also point out that  $SSR(x_2)$  and  $SSR(x_2|x_1)$  can be equal even when  $x_1$  and  $x_2$  are correlated. We present contrived data sets illustrating these points, and examine the relative magnitudes of  $SSR(x_2)$  and  $SSR(x_2|x_1)$  for two real data sets.