On mathematical and statistical tools for data analysis

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Abstract

The Cobb-Douglas production function was introduced in 1928 by C. W. Cobb and P. H. Douglas, while studying the data for the US manufacturing sector for 1899-1922. Their goal was "(1) to measure the changes in the amount of labor and capital which have been used to turn out this volume of goods, and (2) to determine what relationships existed between the three factors of labor, capital, and product."

We will revisit the celebrated Cobb-Douglas production function and investigate, using various mathematical and statistical tools, its properties, as well as the properties of the original data set studied by Cobb and Douglas. In particular, we will explain why the economic data that can be accurately fitted to the Cobb-Douglas function is almost always multicollinear.

Next, we will adjust the definition of the Cobb-Douglas production function and consider possible generalizations that can be used in fitting the economic data when the Cobb-Douglas function fails to provide an accurate fit.