

What is the difference between endogenous and exogenous variables, and what are some examples of each?

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April 27, 2024

RECOMMENDED CITATION

stats writer (2024). *What is the difference between endogenous and exogenous variables, and what are some examples of each?*. PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=140058>

Endogenous and exogenous variables are two types of variables commonly used in statistical modeling and analysis. Endogenous variables are those that are influenced by other variables within the system being studied, while exogenous variables are not affected by other variables within the system.

An example of an endogenous variable would be the price of a product, which can be influenced by factors such as supply and demand, production costs, and consumer preferences. On the other hand, an example of an exogenous variable would be the weather, which may affect consumer behavior but is not directly influenced by the price of the product.

Other examples of endogenous variables include employment rates, stock prices, and academic performance, all of which can be influenced by various internal factors. Exogenous variables, on the other hand, can include factors such as government policies, natural disasters, and global economic conditions, which are external to the system being studied.

Understanding the difference between endogenous and exogenous variables is crucial in statistical analysis as it helps to identify the key factors that impact a particular outcome and allows for more accurate predictions and decision-making.

Endogenous vs. Exogenous Variables: Definition & Examples

Two variables that can occur in regression models are:

- 1. Endogenous variables: Variables that are explained by other variables within a model.**
- 2. Exogenous variables: Variables that are *not* explained by other variables within a model.**

When using regression models, researchers are often interested in understanding the relationship between one or more explanatory variables and a .

And in general:

It's possible to manipulate endogenous variables to produce some effect in the response variable. It's not possible to manipulate exogenous variables.

The following examples illustrate how to identify endogenous vs. exogenous variables in different regression models.

Example 1: Crop Yield

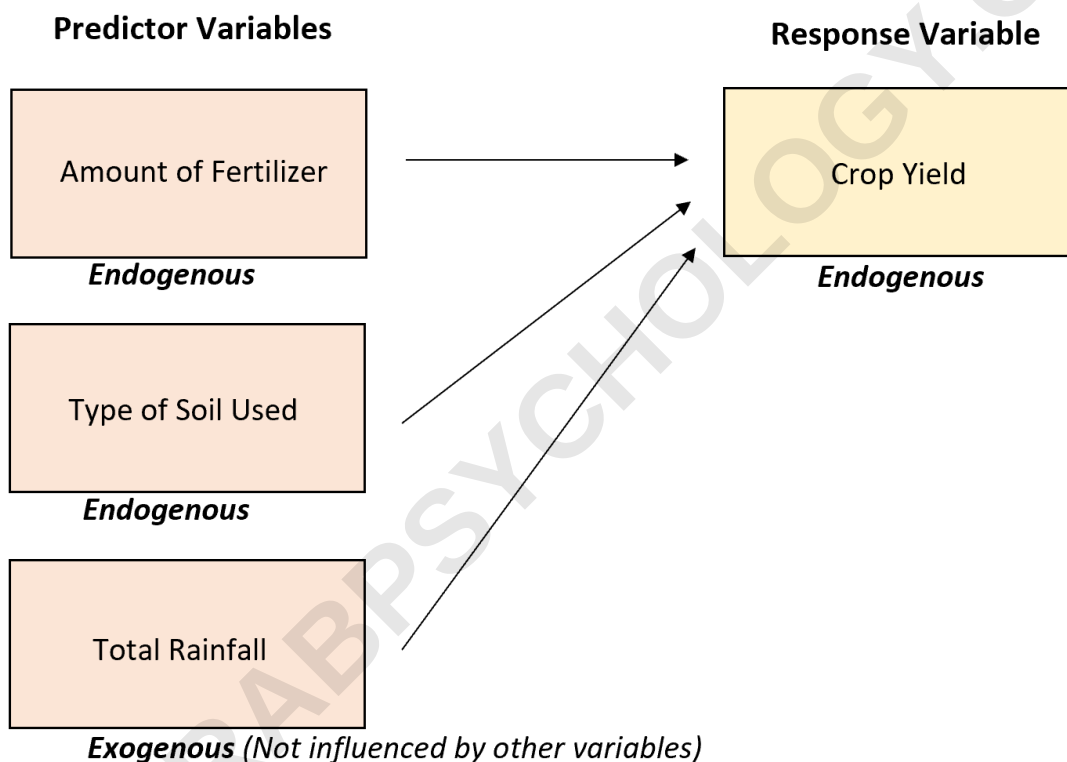
Suppose a farmer is interested in understanding the factors that affect total crop yield. He collects data and builds the following :

Crop Yield = $B_0 + B_1(\text{Fertilizer}) + B_2(\text{Type of Soil Used}) + B_3(\text{Rainfall})$

Here is how to identify each variable in the model:

Crop Yield: This variable is endogenous because it can be explained by fertilizer, type of soil used, and rainfall.
Fertilizer: This variable is endogenous because its effectiveness is influenced by the type of soil used.
Type of Soil Used: This variable is endogenous

because it is influenced by the type of soil used. Rainfall: This variable is exogenous because it is not influenced by the other variables in the model. In other words, the amount of fertilizer used or the type of soil used cannot effect the amount of rainfall in any way.



Example 2: Consumer Spending

Suppose an economist is interested in understanding the factors that affect consumer spending. She collects data and builds the following :

$$\text{Consumer Spending} = B_0 + B_1(\text{Income}) + B_2(\text{Investment Returns}) + B_3(\text{Government Tax Rates})$$

Here is how to identify each variable in the model:

Consumer Spending: This variable is endogenous because it can be explained by income, investment returns, and government spending. **Income:** This variable is endogenous because it is affected by government tax rates. **Investment Returns:** This variable is endogenous because it is influenced government tax rates. **Government tax rates:** This variable is exogenous because it is not influenced by the other variables in the model. In other words, the amount that an individual earns in income or earns in investment returns cannot effect the tax rates set by the government in any way.

