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Endogenous Variable

Contributors: Daniel Little

Edited by: Michael S. Lewis-Beck, Alan Bryman & Tim Futing Liao

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An endogenous variable is a factor in a causal model or a causal system whose value is determined by the states of other variables in the system, in contrast with an *exogenous variable*, the value of which is determined outside the system. Related but non-equivalent distinctions are those between dependent and independent variables and between explanandum and explanans. A factor can be classified as endogenous or exogenous only relative to a specification of a model representing the causal relationships producing the outcome \mathbf{y} among a set of causal factors $\mathbf{X}(x_1, x_2, \dots, x_k)$ where $\mathbf{y} = \mathbf{M}(\mathbf{X})$. A variable x^j is said to be endogenous within the causal model \mathbf{M} if its value is determined or influenced by one or more of the independent variables \mathbf{X} (excluding itself). A purely endogenous variable is a factor that is entirely determined by the states of other variables in the system. (If a factor is purely endogenous, then in theory we could replace the occurrence of this factor with the functional form representing the composition of x^j as a function of \mathbf{X} .) In real causal systems, however, there can be a range of endogeneity. Some factors are causally influenced by factors within the system but also by factors not included in the model. A given factor therefore may be partially endogenous and partially exogenous—partially but not wholly determined by the values of other variables in the model.

Consider a simple causal system—farming. The outcome we are interested in explaining (the dependent variable or the explanandum) is crop output. Many factors (independent variables, explanans) influence crop output: labor, farmer skill, availability of seed varieties, availability of credit, climate, weather, soil quality and type, irrigation, pests, temperature, pesticides and fertilizers, animal practices, and availability of traction, among others. These variables are all causally relevant to crop yield, in a specifiable sense: If we alter the levels of these variables over a series of tests, the level of crop yield will vary as well (up or down). These factors have real causal influence on crop yield, and it is a reasonable scientific problem to attempt to assess the nature and weight of the various factors. We can also notice, however, that there are causal relations among some of but not all these factors. For example, the level of pest infestation is influenced by rainfall and fertilizer (positively) and pesticide, labor, and skill (negatively). Pest infestation therefore is partially endogenous within this system and partially exogenous, in that it is also influenced by factors that are external to this system (e.g., average temperature, presence of pest vectors, decline of predators).

The concept of endogeneity is particularly relevant in the context of time series analysis of causal processes. It is common for some factors within a causal system to be dependent for their value in period n on the values of other factors in the causal system in period $n - 1$. Suppose that the level of pest infestation is independent of all other factors within a given period but is influenced by the level of rainfall and fertilizer in the preceding period. In this instance, it would be correct to say that infestation is exogenous within the period but endogenous over time.

Daniel Little
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See also

- [Exogenous Variable](#)

References

Hendry, D. F.(1995). *Dynamic econometrics*. Oxford, UK: Oxford University Press.
Pearl, J.(2000). *Causality: Models, reasoning, and inference*. Cambridge, UK: Cambridge University Press.