

Endogenous

BY ERIC NIELSEN

At most stores, prices are not negotiable. If you want a new television, you pay the price the store is asking. But an economist might look at this situation differently. That's because the actual price of all consumer goods is partially determined by the purchasing decisions of consumers. In the economist's view, prices are not so fixed.

This is a classic case of distinguishing between factors that are either "endogenous" or "exogenous." The distinction is crucial to understanding the economy and economic models. Roughly speaking, exogenous quantities are those which are determined from the "outside." In the example above, prices are exogenous for the individual consumer, since one person's impact on the equilibrium market price is negligible. By contrast, prices are not exogenous for the entire market; they are determined by the interaction of supply and demand. Thus, for the economy as a whole an economist would say that prices are endogenously determined — that is, determined "from the inside."

In any useful economic model, the distinction between endogenous and exogenous must be clear. All models must have at least one exogenously determined element to prevent the model from becoming hopelessly circular and self-referential.

An economist wishing to create a model of consumer behavior might take prices, preferences, and budgetary constraints as "exogenous" inputs to determine which goods are purchased and in what quantities. Yet an economist wishing to model the overall market for a group of goods would not take prices as exogenous. He would construct a model in which exogenous factors in the overall economy, such as productivity, tax rates, and other determinants of supply interact with "endogenous" demand to yield a market price for the good. The challenge is to construct a model that accurately identifies factors as endogenous or exogenous. What is endogenous or exogenous may change depending on what question is being asked.

In real life it is not always so easy to divide everything into endogenous and exogenous categories. For instance, is it better to take government structure as exogenous to economic life, or to model government structure as emerging, along with the economy, from still more fundamental factors? Indeed, much economic debate centers on what one can reasonably take as exogenous. In many cases the "art" of economics is to find reasonable assumptions about exogenous factors that greatly simplify analysis.

When comparing the economic performance of nations, economists often look to the structure of government. Places with healthy economies tend to have well-defined property rights, advanced legal infrastructures, and democratic governance. Economists have labeled such factors "institutions," and a major area of research is finding ways of isolating the differential effects such institutions have on economic performance. But isolating these effects can be complicated. For instance, it's

possible that good economic performance leads to the development of good institutions (reverse causation) and that past institutions tend to affect present institutions.

One way out of this dilemma has been to use instrumented regression. The actual definition of instrumented regression is fairly technical, but the basic idea is simple: Find an exogenous condition that is correlated with the variable of interest — in this case, institutions — and uncorrelated with any other aspect of the economy. Then,

through the lens of the exogenous condition, one may examine the effects of institutions.

For example, in a series of papers on colonial development, economist Daron Acemoglu at the Massachusetts Institute of Technology has argued that, during the colonial era, disease conditions determined the type of institutions imperial powers established in their overseas possessions. Since it seems unlikely that disease conditions hundreds of years ago could have some other effect on current economic performance, one can attempt to ascertain the importance of institutions by examining historical disease rates.

"Many economists and social scientists believe that differences in institutions and state policies are at the root of large differences in income per capita across countries," write Acemoglu and two co-authors in a paper published in 2001. "There is little agreement, however, about what determines institutions and government attitudes towards economic progress, making it difficult to isolate exogenous sources of variation in institutions to estimate their effect on performance. [We argue] that differences in colonial experience could be a source of exogenous differences in institutions."

At their core, many economic debates focus on whether to call a variable exogenous or endogenous. Does democracy promote economic growth? Does capital punishment deter crime? The most reliable answers come from models in which economists have properly decided what to put in — or leave out. **RF**

