Genaro Sucarrat
(BI Norwegian Business School)

Economic causality as a reduction

Economic models are simplifications of a large and complex reality. But how simple are the models? And what exactly is the nature of the simplifications? Econometric (or statistical) reduction theory provides answers to these questions. It is the study, in terms of probability concepts, of the simplifications implicit or explicit in theoretical and empirical economic models. A reduction is thus the probability structure that results from a simplification (broadly defined) of the complex reality it pertains to represent. The starting point of econometric reduction theory can therefore be viewed as an "ontology" in terms of probability concepts. The starting point tries to provide the most complete, accurate, detailed and correct representation as possible (in terms of probability concepts) of wordly reality, both empirical and non-empirical (i.e. counterfactual). Accordingly, all theoretical and empirical economic models can − at least conceptually − be obtained via sequential simplifications of the initial structure. Econometric reduction theory thus provides a comprehensive probabilistic framework for the analysis and classification of the reductions (simplifications) associated with economic models.

Until recently the available approaches to econometric reduction theory were unable to satisfactory accommodate a commonplace theory of social reality, namely that the outcome set consists of indeterministic possible worlds made up of historically inherited particulars, see Sucarrat (2009, 2010). In other words, that in each possible world the course of history is indeterministic, history does not repeat itself and that the future depends on the past. With the probabilistic "ontology" proposed in that paper as a starting point, we propose a reduction-theoretic approach in terms of probability concepts to the analysis of the simplifications associated with economic causality in particular. However, the analysis also applies to other fields, both within the social and natural sciences. The starting point of our analysis of causality is a definition of potential causality which, in the vein of Salmon (1993), takes processes (time-continuous states-of-affairs) as basic entities. The definition of potential causality that we propose is very flexible in that it accommodates both discrete time and

continuous time accounts of causality, interval accounts, and even combinations of them. Next, we distinguish between six main stages of simplifications (formulated in terms of probability concepts) in which causal information is lost:

1. The finiteness reduction: Initially, any event has, at least conceptually, an infinite number of causes. If a finite limit is imposed, say, due to a thesis about imaginative finiteness among agents (e.g. a non-finite version of a "free will" thesis) is introduced, then this can be viewed as a reduction.
2. The explanatory reduction: Some scholars (e.g. the historian Carr, 1961) have argued that counterfactual causes should not count as causes. This limitation might be referred to as the "explanatory reduction".
3. The likeliness reduction: Some scholars argue that only "important" causes should be considered as causes. If importance is defined in terms of the likeliness of ocurring, then this may be referred to as the likeliness reduction.
4. The perspective reduction: Economic theories and models are local in that they only limit themselves to a subset of causes. This may be referred to as the perspective reduction.
5. The consequent similarity reduction (i.e. a frequency reduction): Only causes that cause events that occur more than once − i.e. consequent events are deemed sufficiently similar to be considered as being of the same type − should be considered as causes.
6. The antecedent similarity reduction (i.e. a frequency reduction): Only causes that occur more than once − i.e. the antecedent events are deemed sufficiently similar to be considered as being of the same type − should be considered as causes.

For some of the stages the order is somewhat arbitrary, and a different ordering might even give rise to additional reductions. Furthermore, the stages are not necessarily mutually exclusive nor exhaustive. In particular, both additional substages between them and additional subsequent stages can be outlined. Finally, the paper provides an analysis of a commonly applied notion of econometric causality, Granger causality (Granger, 1969), in terms of the six stages.

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