MATHEMATICS IN ECONOMICS

WASSILY LEONTIEF

1. **Gibbs and mathematical economics.** American economists have a good and special reason to honor J. Willard Gibbs. The late Professor Irving Fisher—the author of the earliest monograph on Mathematical Economics published on this side of the Atlantic and one of the truly great economists this country has produced—was a pupil of Gibbs. He was in 1929 the first to represent social sciences in this series of memorial lectures. The second was Professor Edwin B. Wilson, mathematician and economist, also one of Gibbs' immediate disciples, and author of the early treatise on Vector Analysis based on his teacher's original lectures on that subject.

Professor Fisher and Professor Wilson were leading spirits in the organization—twenty-three years ago—of the international Econometric Society which now unites 2500 economic statisticians and economists who claim the ability to speak—or at least to understand when spoken to—the "language of mathematics" which Josiah Gibbs used with such compelling and poetic power.

I did not know Gibbs and I am not a mathematician. I cannot present to you personal reminiscences about this great man nor am I able to develop before you any one particular application of mathematics to economics—which could possibly be of technical interest to a professional mathematician. I will try instead to survey the logical structure of the present day economic theory emphasizing formal aspects of some of the problems which it faces and pointing out the mathematical procedures used for their solution. The views to be presented are, of course, not necessarily shared by other economists. Even leaving out those who feel with Lord Keynes that mathematical economics is "mere concoctions," theoretical disagreements and methodological controversies keep us from sinking into the state of complacent unanimity.

2. **The general structure of economic theory.** The object of economic analysis is the observed, or at least the observable, economic process. The typical variables in terms of which an economic system is described are the amounts of various goods and services produced, consumed, added to and subtracted from existing stocks, sold and