

Comments about the Mathematical Treatment of Economic Problems

by Ludwig von Mises

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Prefatory Remarks

It is not possible to examine thoroughly the question of the mathematical treatment of economic problems within the frame of a brief essay. Fundamental questions of philosophy and epistemology, impossible to dispose of in a few sentences, would have to be raised. Therefore, only a few points will be presented here and aphoristically discussed. For the rest, we must refer the reader to the books of Cairnes, Boehm-Bawerk, Cuhel, Rickert and Max Weber and the author's own writings.<sup>(1)</sup>

The Problem of Measurement

The slogan of the Econometric Society is the positivist statement: "Science is measurement." The society wishes to set up an exact mathematical science of economics to replace the supposedly inexact, expository, or logical economics which the positivists deride as "literary." What are they measuring?

In the seventh volume of the Econometrica, the periodical of the society, Senator (formerly professor) Paul H. Douglas says of the book by the late Henry Schultz, The Theory and Measurement of Demand, that it is "a work as necessary to help make economics a more or less exact science as was the determination of atomic weights for the development of chemistry."<sup>(2)</sup> Turning to Schultz's work, we find that his investigations do not deal with any commodity in general, but with the prices and supply of definite commodities within a certain area and during a definite period of the past. For example, he does not speak of potatoes in general, but about potatoes in the United States from 1875 to 1929. His book is a contribution to Economic history, a statement with which those can also agree who view his book as altogether mistaken and useless.

There was once a doctrine in economic science which saw a fixed relationship between supply and price in one case. It was believed that the purchasing power of the monetary unit is inversely proportionate to the amount of money in circulation. Except for this notion, long since refuted and abandoned, no one has ever dared to declare that the relation between the supply and the price of any

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(1) We can also name an outstanding mathematician in this connection, Paul Painlevé. See his preface to the French edition of William Stanley Jevon's work, Theory of Political Economy, Paris, 1909.

(2) P. 105.

commodity is unchangeable. Everything that can be found out through statistical experience about the supply of commodities and their prices is a datum for economic history. Statistics is one of the methods which economic history can make use of.

Laymen often insist that one can prove anything with statistics. Actually, statistical experience in the field of human action can prove nothing in the sense in which the natural sciences colloquially speak of proof. Historical experience, which is always the experience of complex phenomena, cannot lead to a knowledge of theoretical laws. Historical experience must be interpreted and explained by the help of general laws gained independently of historical experience.

The subject matter of economics is not potatoes, shirts or razor blades, but human action, which is directed by value judgments. A judgment of value does not measure, it grades. It does not say A equals B. It says: I prefer A to B. Only out of such choices does action come into being. When the judgment of value deems A equal to B, no action takes place. Production and exchange do not result from equality of value, but from value difference.

Therefore, in the field of human action, there is no unit of measurement and no measuring. Prices are not measured in money; they are expressed in money.

As soon as we introduce a concrete datum in our deliberation on human action, such as the price of a commodity expressed in terms of money, we leave the field of economics and enter that of economic history, even if it be the history of this very last moment. Everything that can be said in figures about future prices is speculative anticipation. We can speculate correctly or incorrectly, but we can never be certain in advance that we will speculate correctly.

Positivism allows for no difference between the natural sciences and the sciences dealing with human action. Just as chemistry has progressed from the qualitative stage to the quantitative, so economics is to pass from the qualitative analysis of its problems to a quantitative analysis. The positivist does not see that there are no constants in human action and that his postulate is therefore unrealizable.

### On Choices

A daily increasing number of books and essays of the mathematical school deals with choices which individuals and companies make in the conduct of their daily business. A closer view shows that they deal with the algebrization and generalization of the lines of thought taught in schools of business under the name of business arithmetic and which has long been applied by businessmen who never attended such a school.

The authors of these writings declare that their inquiries are of great value in business practice both in a capitalist society and in a socialist state. They never raise the question why businessmen pay no attention to their inquiries.

The truth is that these scholarly treatises give the businessmen only one piece

of advice: to buy when he expects prices to rise and sell when he expects them to drop. Everything else they offer is insignificant. It is a waste of time to publish voluminous books on the best size of an inventory. Such a decision depends on the entrepreneur's plans which are based on his judgment of future conditions. All decisions in business life as well as in the life of the individual and in government affairs are guided by an expectation of a definite development of future conditions. They prove themselves false speculations if matters develop differently. This also applies to the management policies of the head of a socialist society. He, too, if he could calculate, would not calculate otherwise than does the businessman seeking profit. The fact that he cannot calculate belongs to another set of problems.

Like Marx and all socialists, the mathematical economists fail to realize that human action has to do with future conditions over which nothing certain is known. If we ignore the uncertainty of the future, we can, of course, build wonderful mathematical houses of cards. There is a silent agreement between all mathematical economists not to reveal the many contradictions in the assumptions upon which they base their inquiries. The concept of human action referring to a future that is in no way uncertain is logically inconceivable. The life of people for whom the future contains nothing unknown would be so different from the life we know that no imagination is adequate to form a picture of it. Would this be life at all in our sense?

The report of the highest authority in matters of mathematical economics, the Cowles Commission, for the period of January 1, 1948 to June 30, 1949, attempted a lame defense of the mathematical method. The report cannot deny that actually no "behavior constants" exist. But it clings to the assertion that the mathematical method merely assumes that the data presented "remain reasonably constant through a period of years."<sup>(3)</sup> Whether this hypothesis is true, however, can only be ascertained afterwards, i.e., by historical experience. Thus all the assumptions of the mathematical economists collapse. Their method proves to be a method dealing with the data of economic history. The highly praised equations are, insofar as they apply to the future, merely equations in which all quantities are unknown.

### The Equations

In modern economics, the notion of the evenly rotating economy (static economy or economy in a state of equilibrium) has a significant role. According to this notion, always identical processes of production are directed in such a way that goods of higher order go through these processes in a regularly repeated identity of kind and quantity, until finally the finished products reach the consumers and are used up. In this system, the market's state of rest is continually disturbed in the same way, and is continually restored in the same way. All data, including the disturbing factors, remain unchanged and thus the prices of all goods and services also remain unchanged. In the world of real human action, in the life of a living human being, there can never

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(3) P. 7.

be a state that corresponds to the mental construct of a static economy. However, in order to comprehend changes in the conditions and uneven movements of a real economy, we must contrast them with a state of affairs in which changes and their effects are absent. Although the full logical development of this construction leads to insoluble contradictions, we may and must resort to it unhesitatingly, as it is the only method of clarifying the problems of enterprise, entrepreneurial profit, and loss. We proceed from a hypothetical, unrealizable state of affairs in which changes in the price-conditioning factors are absent, and then assume that a change in one of these factors alone disturbs the state of affairs; and we examine the consequences of this one change up to the moment when a new state of rest and equilibrium emerges.

In the laboratory the natural scientist observes the consequences of a change in a single isolated element. In the sciences of human action such experimentation is not conceivable. Its place is taken by the method of imaginary constructions which, after all, is essentially an investigation of the effects which the change of a single factor brings about, other things being equal.

On the analogy with classical mechanics, the state of affairs in an evenly rotating economy has metaphorically been called a state of equilibrium. It is possible to describe this state in terms of a system of simultaneous differential equations. The formulation of such equations is the essence of what the mathematical economists are trying to do.

But the formulation of these equations in no way broadens our knowledge. What logical economics says in words, and what the mathematical economists must also say in words before they can set up equations, is presented in mathematical symbols. But these equations differ entirely in their practical applicability as well as in their cognitive reference from the equations of mechanics.

In the equations of mechanics we can introduce constants which have been determined with reasonable exactness through empirical experimentation. In this way we can ascertain unknown quantities from given data with an accuracy sufficient for technology. In the field of human action, however, there are no such constants. The equations of mathematical economics are therefore useless for all practical purposes.

But they are also valueless as knowledge. The equations of mechanics describe the movement up each point, the way their elements move, and their position at each moment. Economic equations describe only an imaginary condition that differs from the actual condition and that can never be realized. They say nothing about the actions of acting men, which, on the unrealizable assumption that no further change in the data occurs, would lead to such a state of equilibrium. Of course, one could show mathematically how a state of affairs that differs from the state of equilibrium would have to change in order to arrive at the state of equilibrium. But such a demonstration of a mathematical process is not a description of how an economy that is not in the state of equilibrium actually moves in the direction that ultimately, provided no further changes in the data appear, would lead to equilibrium. Such a demonstration says

nothing about the actions that constitute this process. Catallactics must show how market prices develop out of the action of individuals. The mathematical school of economic thought exhausts itself in the effort to describe a hypothetical state of affairs in which there would be no human action.

### The Vogue of Analogies

Carl Menger once said there is no better means of reducing a fallacious variety of thought to absurdity than to let it live itself out completely. The mathematical school of economics is already on this path. Considerable financial means are at its disposal. It controls large numbers of periodicals in many languages, organizes congresses and conferences and is taught in most universities as the only true method of economics. It also enjoys special favor with governments and UNESCO. But all the praise which the representatives of the school lavish upon one another will not suffice, in the long run, to conceal the fact that this activity leads into a blind alley. As soon as a critic writes a book raising the question of the results of the mathematical method, the illusions will disappear.

No representative of the mathematical school has thus far considered it worth his while to answer with arguments the devastating critique which the method has called for. They believe it sufficient to point to the example of the natural sciences. Whoever denies the positivistic dogma is branded as a metaphysician and a follower of the "idealistic philosophies of history, especially of the modern German variety."<sup>(4)</sup> To concern himself with such pre-scientific and unscientific stuff is naturally beneath the dignity of a positivist.

In the third quarter of the 19th century the biological analogy was very popular with positivistic economists and sociologists. Serious men then wrote treatises about such questions as, what is the intercellular substance of the "social body." Nobody any longer denies that these studies of Spencer, Schaeffle and Lilienfeld were a meaningless toying with words. The fashion has changed. Today men prefer the mechanical analogy. But this fashion too will pass without leaving any trace.

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(4) Compare Sigmar von Fersen, in the article "Philosophy of History" in Runes, Dictionary of Philosophy, New York, 1942.