

CHAPTER IV

ECONOMICS AS A MATHEMATICAL SCIENCE

Mathematical Character of the Science

Jevons believed that the present chaotic state of economics was due to the fusing together of too many branches of the science. He therefore suggested that there should be widest possible development of separate specialisms, as for instance, distinguishing the empirical element from the abstract theory or the applied theory, and so on. Thus, there would arise various sciences such as commercial statistics, the mathematical theory of economics, systematic and descriptive economics, economic sociology, and fiscal science.

Jevons complained that the whole subject was too extensive, intricate and diverse, so much so that it could not be treated in any single book or in any single manner. But at the same time a general theory was indispensable. "As all the physical sciences have their basis, more or less obviously, in the general principles of mechanics, so all branches and divisions of economic science must be pervaded by certain general principles the establishment of such a theory is a necessary preliminary to any definite drafting of

of the superstructure of the aggregate science."¹

Jevons was aware of the prejudice that existed against attempts to introduce mathematical methods and language of mathematics into any branch of the moral sciences. Nevertheless, he was still persistent in his stand that if economics was to be a science at all, it must be a mathematical one. "Many persons seem to think," Jevons wrote, "that the physical sciences form the proper sphere of mathematical method, and that the moral sciences demand some other method - I know not what. My theory of economics, however, is purely mathematical in character."² This type of approach to the moral sciences, economics being a branch, has undoubtedly met with opposition from the orthodox social scientists who are interested in methodology.

Professor Lionel Robbins notes that Jevons' contention of apparently an a-priori³ mathematical approach to economics had outraged even the feelings

¹ W.S. Jevons, op. cit., p. xvii.

² W.S. Jevons, op. cit., p. 3

³ For definition of a-priori, see footnote 10, p. 24.

of some of the supporters of the classical methods.⁴

For Jevons, economics must be a mathematical science simply because it deals with quantities, holding also that any science which deals with quantities is fundamentally mathematical in character; and if the term mathematical is used in a broad sense so as to include all enquiries that deal with quantitative relations, the propriety of thus describing the science admits of easy demonstration. For economics is not concerned simply with questions as to whether events will or will not happen. It deals with phenomena whose quantitative aspect is of fundamental importance, and one of its main objects is to determine the laws regulating the rise and fall of these phenomena. But in as much as the economists had not recognized clearly that they were dealing with quantities they had been very awkward in their method of procedure. We should be able to carry on these discussions far more effectively if, recognizing that we are dealing with quantities, we proceed to treat them by using that very powerful tool of mathematical symbolism; not that mathematics is going to give us any different results, but experience in every scientific work has abundantly shown that we

⁴ L. Robbins, "The Place of Jevons in the History of Economic Thought," in The Manchester School, Vol. VII No. 1, 1936, p.3.

can think with less danger of falling into error if we use mathematical symbols. By using mathematical symbols we also make it possible to treat successfully a variety of problems which are too intricate to be handled by the methods of ordinary algebra.

Mathematical Logic and Economics

Jevons' interests in economics and logic, it must be remembered, ripened together during his College days, so that there must be a close relationship between his views on modern Mathematical Logic (that is, Logic strengthened by the use of symbolic methods) and that of economics as a mathematical science.

In his formal studies Jevons was essentially a logician trying to base mathematics on logic. He was, of course, a follower of Boole - the boldness, originality, and beauty of Boole's system captivated him - and, quite apart from other influences, the personal influence of De Morgan⁵ a logician as well as a mathematician, was profound.

For Jevons, "Logic is the superior science, the general basis of mathematics as well as of all other sciences. Number is but logical discrimination, and

⁵ Jevons studied under De Morgan for at least four years, for three years when taking the B.A. degree and for one year when taking the M.A.

algebra a highly developed logic."⁶ Unfortunately, Jevons did not have the adequate logical tools to demonstrate this proposition effectively. It was left to Russell and Whitehead⁷ in their Principia Mathematica to show how arithmetic could be based on logic.

Mathematical Science and Exact Science

Jevons believed that many people had been prejudiced against the use of mathematical language and mathematical methods in economics because of the confusion between the ideas of a mathematical science and an exact science. For Jevons there is no such thing as an exact science, but merely in a comparative sense, as for instance, astronomy is more exact than other sciences, because the position of a planet or star admits of close measurement. Even the apparently simpler problems in statics or dynamics would only hypothetical approximation to the truth.

To those who questioned the availability of

⁶ W.S. Jevons, The Principles of Science, 5th. ed., p. 156.

⁷ Both B. Russell and A.N. Whitehead were British philosophers. In their work, Principia Mathematica, (a masterpiece written about 1910) they show that the mathematical concepts used by Peano can be defined in terms of logical constants and that all their properties can be demonstrated by pure logic.

sufficient statistical data to render economics capable of measurement mathematically, Jevons said that these are more abundant and precise than those possessed by any other science, but it is mainly because of a want of method and completeness in actuarial statistics that had prevented us from employing them in the scientific investigation of the natural laws of economics.

