

## **ECONOMETRIC METHODOLOGY AND THE STATUS OF ECONOMICS**

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*The question of whether econometrics justifies conferring the epithet of ‘science’ on economics is a controversial one. Though the physical sciences are not free from imperfections, Cormac O’Dea contends that the problems with econometric methodology are too great to justify scientific status. He concludes by questioning the need felt by some economists to be referred to as scientists.*

### **Introduction**

In examining the nature of econometrics and evaluating its impact on the scientific status of economics, two approaches can be taken. We could consider a scientific realm of knowledge completely and definitively demarcated from all non-scientific knowledge. A second approach involves considering the very real flaws with econometric methodology and comparing them to similar, and again, real flaws in the physical sciences. Such an approach implicitly accepts science as a spectrum of knowledge and allows a ranking of disciplines in terms of their scientific nature. This essay will contend that econometric methodology has added a degree of testability to the economic theory, and by allying economics with mathematics and statistics, rendered the discipline ‘more scientific.’ However, if we are forced to make an absolute statement, then we must conclude that the inability of econometrics to conclusively and reliably falsify economic theories seriously undermines any claim to scientific status.

### **The Imperfection of the Physical Sciences**

Sceptics point to the inability (or severely restricted ability) of the social scientist to conduct controlled experiments. Friedman points to the inability of the astronomer to conduct same (1953). Assuming a particular distribution of the error term could be deemed to provide a fatal blow to the econometrician’s quest

for scientific status. However, Friedman notes the usefulness of the law of falling bodies in physics, which assumes that the body is falling in a vacuum (ibid). That this assumption is unrealistic and only provides an approximation to reality doesn't undermine the law's usefulness or its scientific status. With regard to the contention that there can be no scientific study of a subject matter of which the student is a part, Boulding reminds us that the Heisenberg Uncertainty Principle is by no means restricted to the social sciences (1969). Another frequent charge is that scientific study of the economic environment is impossible given the constant flux of the subject matter. Boulding notes that the subject matter of the physical sciences is not exactly static, in particular that evolutionary processes do not seem to render biology unscientific in the popular consciousness (ibid). It has been contended that the possibility of data mining undermines a claim on scientific status. Such a charge implies that abuses of data and deception are impossible in the physical sciences. Hendry predicts that the future status of econometrics will depend "on the spirit with which the subject is tackled" (1980: 403). It would seem grossly unfair to assume that the spirit of all physical scientists is beyond reproach while there exists apparently an army of economists and econometricians bent on deception!

The above paragraph documents some of the frequent arguments used to contend that economics is not scientific. It has not been an attempt to make a claim to the contrary. It simply points out that many of the flaws that exist with econometric methodology exist to a lesser degree in disciplines whose scientific status is not in question. Though it may be possible to find a counterpart in the physical sciences to each flaw in econometric methodology, those flaws should not be underestimated. Their total effect renders econometric tests inconsistent and non-reproducible, which undermines their claim to scientific status.

### **The Greater Imperfection of Econometric Methodology**

If econometric methodology is to give scientific rigour to economic theory, it must be capable of falsifying the hypotheses of economic theory. Such hypotheses normally contain a *ceteris paribus* assumption. The counterpart in econometrics to such an assumption is the disturbance term. All effects, other than those explicitly explained in the model, are included in this term. Assuming that this term follows a particular distribution, as econometric methodology does, it is an attempt to control statistically what we cannot control experimentally. The economic interactions of human beings are governed by an infinite number of forces. Schumpeter claimed that economics was the most quantitative of all sciences as "it was made numerical by life itself" (Hendry 1980: 389). However

many of these forces governing economic behavior are neither numerical nor measurable. They are not even what might be considered 'economic.' The inability of econometrics and the unwillingness of economists to consider such forces flies in the face of its claim to be scientific. In grouping all these forces into one term, the distribution of which is assumed to be known, econometricians take a massive leap of faith.

Econometric tests of economic theory are valid only under the exact conditions of the test. Such conditions can never be known exactly, let alone reproduced. This is problematic, given the role of hypothesis testing in econometrics. The interpretation of failing to reject a hypothesis at a 95% level of significance is that in repeated sampling, we would expect to be correct 19 out of each 20 times. However, given the complexity of the forces governing economic behaviour, and our inability to conduct controlled experiments, each experiment is unique, and to talk of 'repeated sampling' is flawed. It is not the probabilistic nature of econometric results which undermines scientific economics. Statistical inference plays a major role in modern quantum physics (Blaug 1980: 31).

However a reliance on statistical inference, combined with an inability to reproduce supposedly critical experiments, is a major problem.

Random effects are possible in the physical sciences but are all the more present in the social science. It would be tempting to attribute this to an intrinsic randomness in human behaviour. However, such an assertion would be unsafe. An effect that today is attributed to erratic human behaviour could be explained in the future by a variable not yet understood. Popper defines a scientifically significant physical effect "as that which can be regularly reproduced by anyone who carries out the appropriate experiment in the way prescribed" (Popper 2002: 23-24). Using this criterion, which seems eminently reasonable if theories are to be discredited on the basis of empirical results, econometric results cannot be described as 'scientifically significant.'

The Duhem-Quine problem with hypothesis testing has a particular relevance to econometrics, given the infinite number of ancillary hypotheses buried in the assumption about the error term and the specification of the functional form of the model. A rejection (or an incorrect decision not to reject) of a hypothesis concerning an estimated parameter could well be due to any number of flaws with the buried assumptions rather than the falsity of the hypothesis actually under examination. This results from an attempt to control statistically what ideally would be controlled experimentally and undermines the power of econometrics to test economic theory.

## A Question of Mindset

An ability to use the laws of statistics and mathematics to test and potentially reject hypotheses from theory is a necessary but insufficient condition to justify economics as a science. Economists have to be willing to reject hypotheses should they fail to stand up to econometric testing. Consider Koutsoyiannis:

“It should be noted that the statistical criteria are secondary only to the *a priori* theoretical criteria. The estimation of the parameters should be rejected in general if they happen to have the ‘wrong’ sign (or size) even though the correlation coefficient is high, or the standard errors suggest that the estimates are statistically significant” (1977: 26).

Such an approach seems to imply that econometrics can’t and won’t be used to put economic theory to the test. Koutsoyiannis sees economic theory as the falsifier of econometric results. The role of econometrics in this regard is simply to provide estimates of parameters in economic models. These models, according to Koutsoyiannis, are clearly beyond reproach, at least from econometric testing. The same author exhibits a cavalier attitude to statistical procedure when ignoring the problem of a loss of degrees of freedom every time a regression is run on the same data set using a different functional form. He states:

“Some ‘loose’ interpretation of statistical rules is at times essential if econometrics is to be helpful in testing economic theory and in measuring economic relationships” (ibid: 25).

Once again we cannot dismiss the notion of econometrics testing theory on the basis of one practitioner, but it would seem that Koutsoyiannis is not alone. Spanos admits that “no economic theory was ever abandoned because it was rejected by some econometric test nor was a clear-cut decision between competing theories made in lieu of such a test” (Keuzenkamp 2000: 247).

## Conclusion

Karl Popper is very clear in making a distinction between ‘scientific’ and ‘meaningful’ (2002: 18). To state that econometrics does not give scientific status to economic theory is not to say that it is meaningless or useless to policy. The constitution of the econometric society defines the aims of the discipline as “the

advancement of economic theory in its relation to statistics and mathematics” (Frisch 1933). It goes on to describe itself as a “scientific organization” (ibid). The former definition of econometrics is valid and achievable without the epithet of science.

This essay has pointed out that many of the faults with econometric methodology exist in the physical sciences, albeit to a lesser degree. If we are allowed to view science as a spectrum, we can argue that econometrics does grant a certain degree of scientific rigour to economic theory. If we are forced to come up with a ‘yes or no’ answer, which requires us to draw a definite line between the sciences and the non-sciences, I would argue that econometric methodology does not do enough to justify using ‘economic science’ to describe what used to be known as the ‘political economy’.

The debate about the scientific status of econometrics is largely irrelevant and represents a certain professional insecurity in those who desperately seek it. Roy F. Harrod points out that “speculation upon methodology...offer the greatest opportunity for internecine strife...and a victory even if it could be established, is thought to yield no manifest cause to the cause itself” (Blaug 1980). Conferring the word science on the discipline would not contribute anything to the development of either economic theory or econometric methodology.

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ECONOMETRIC METHODOLOGY AND THE STATUS OF ECONOMICS

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