

# AN INVESTIGATION INTO THE SCIENTIFIC STATUS OF ECONOMICS AND ECONOMETRIC METHODOLOGY

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*In the minds of many, to label any discipline as a 'science' affords it a certain level of legitimacy and authority. The question of whether economics can be classified as a science is a continuing source of contention within the field. In this paper, Adnan Velic discusses the criteria necessary for a subject to achieve scientific status, comparing the criticisms and counter arguments of conferring the standing of 'true science' on economics. Despite the contribution of econometrics, he acknowledges that critical shortcomings remain. The paper concludes by offering suggestions of how future practice might be improved upon.*

## **Introduction**

It is often stated that the Victorian historian, Thomas Carlyle, gave economics the derogatory nickname 'dismal science' in response to the late 18th century economic theory put forward by Thomas Robert Malthus. Malthus pessimistically forecasted that as population growth inevitably outstripped food supply, starvation would be the outcome (O'Hagan, 2000). Although he considered his principle of population as an economic theory of the past and present state of humanity, as well as a prognosis of the future, time did put it to the test. Irish experience, even during the Great Famine, refuted Malthus's theory as did the unexpected sensational advances in the efficiency of food production in the 20th century.

Since the time of Malthus, economics has made great progress in being recognised as a real science, yet it is still regarded by many critics as nothing more than a pseudo science. The economic analyst, Henry Phelps Brown, went as far as saying that what is wrong with modern economics is that its assumptions about human behaviour are randomly 'plucked from the air', thus rendering theories about real world economic phenomena non-scientific in nature (Brown,

1972).

This essay first seeks to examine the current scientific status of economics. It initially analyzes some of the properties that qualify a discipline to be labelled a science as well as reviewing some of the arguments of the critics who claim that economics does not deserve this title. We also scrutinise some of the counter arguments that seek to defend the field's standing as a true science. Afterwards, we look at the methodology of econometrics and how it has helped strengthen economics' claim to be a real science while assessing some of its weaknesses at the same time. Finally, we briefly consider some of the suggestions that have been made by those in the discipline on what could be done to help enhance the scientific status of economics.

## **The Scientific Status of Economics**

The primary objective of a positive science is the construction of a theory or hypothesis that yields valid and meaningful predictions about phenomena not yet observed by a person (Friedman, 1953). One of the key features of a hard science is the scientific method that is used to test the theory in question and its predictions via the data obtained. This data lends empirical support to the theory where the test and its results are repeatable and demonstrable to others when the same conditions are present. Furthermore, scientists and philosophers, most notably Karl Popper, have asserted that no hypothesis can be considered scientific unless it is falsifiable. Falsifiability refers to the logical potentiality that a theory can be shown to be erroneous by an observation or a physical experiment. This principle follows from the fact that you can never demonstrate that anything is materially true but you can prove that some things are materially false. Popper utilises this fundamental asymmetry in developing his demarcation criterion (i.e. the distinction between science and nonscience) which states: science is that core of synthetic hypotheses about the actual world that can, at least theoretically, be falsified by empirical observations (Blaug, 1992).

Given the pre-requisites above and also the fact that scientific theories must be objective, it is necessary to distinguish between positive and normative economics. The development of all economic theories should be based on positive economics in order to render them scientific. These are 'what is' statements about the real world. However, normative economics deals with 'what ought to be' assertions which are essentially value-laden judgements based on a particular ethical position (Friedman, 1953). Although economic theory does not aim to make such value claims based on normative propositions, it is generally one of the reasons why economics is not recognised as being founded on

empirical observation and the scientific testing of hypotheses. Critics often use the argument that economics cannot achieve Popperian falsifiability due to the very nature of its study. Even though this is true in certain instances, many analysts contend that the problem is over-emphasised and that, more often than not, it is the practitioners who create the problem rather than the problem being innate to the nature of the subject. Instead of endeavouring to refute testable predictions of economic theories, modern economists appear content in illustrating that the real world accords with their forecasts, thus replacing falsification, which is difficult, with verification, which is simple (Blaug, 1992). Mark Blaug precisely depicts the problem with mainstream neoclassical economists:

‘They preach the importance of submitting theories to empirical tests but they rarely live up to their declared methodological canons. Analytical elegance, economy of theoretical means, and the widest possible scope by ever more heroic simplification have been too often prized above predictability and significance for policy purposes. The working philosophy of science of modern economics may indeed be characterised as innocuous falsificationism’ (ibid: 243).

According to Blaug, the problem now, is to entice economists to take falsificationism seriously.

Tests of theories in the physical sciences require that all conditions remain constant except for the experimental variable. Unfortunately we can rarely, if ever test certain predictions of theories in the social sciences such as economics by experiments explicitly designed to eradicate the most significant disturbing effects. In other words, it is almost impossible to conduct perfectly ‘controlled experiments’ in economics where all the relevant exogenous variables are taken into account and are kept constant in order to ensure a *ceteris paribus* effect is analysed between the two variables of interest (Friedman, 1953). Frequently, some of the factors are unobservable and cannot be taken into account. Thus, the *ceteris paribus* assumption, it is argued, is an over-simplification of reality. Critics maintain that the inability to administer controlled experiments in economics renders it a non-science. Despite this contention, the counter-argument many put forward is that no experiment can be completely controlled and that every experience is partly controlled in the sense that only some disturbing effects are held relatively constant during its course e.g. experiments in astronomy in the physical sciences. The difference between controlled and uncontrolled experiments is thus one of degree (ibid). Therefore the inability to perform these so-called controlled experiments does not constitute

a major difference between economics and the physical sciences and does not render the theories any less scientific than those of the physical sciences.

In its attempt to be recognised as a real hard science, economics faces one major obstacle. As Lionel Robbins states, economics is ‘the science that studies human behaviour’ (Robbins, 1945). Human beings are not tadpoles that can be brought to a laboratory or cells that can be viewed under a microscope. It is impossible to get inside a human being or to perform repeatable experiments on human behaviour (Heywood, 2000). Thus the data that we can obtain about human conduct is limited and at times superficial. Such data is non-experimental and is often called observational data to elucidate the fact that the researcher is a passive collector of the information (Wooldridge, 2006). Given that many economic theories are based on, or somewhat related to human behaviour, we currently have no completely reliable means of testing economic theories in the absence of exact data (Heywood, 2000). Due to the fact that there is limited empirical evidence on human behaviour that can be used to refute or support economic theory, economics cannot just yet claim to be a real science.

## **An Appraisal of Econometric Methodology and its Interaction with Economics**

Econometrics can be defined as the application of statistical and mathematical techniques to the analysis of economic data, with the aim of lending empirical significance to economic theories and verifying or refuting them (Maddala, 2001). The principal task of an econometrician is the development of relationships between different economic variables in mathematical form. This essentially provides us with a simplified model of the complex real-world process. After an economic theory has been transformed into an econometric model, the model is then tested with observed data (via  $t$  and  $F$  tests - ‘inference’) and, if verified, is used for prediction and policy analysis. These are the two other main objectives of econometrics (Maddala, 2001).

For predicting the ramifications of changes, forecasting likely future outcomes and controlling variables to achieve targets, econometric models have a crucial function in modern economics and significantly improve the discipline’s claim to be a real science (Hendry 1980). Despite these claimed improvements in the discipline, several analysts have characterised the methodology of econometrics as:

‘an attempt to compensate for the glaring weakness of the data base available to us by the widest possible use of more and more

sophisticated statistical techniques' (Leontief, 1971: 2).

Although this view is perhaps a bit cynical and outdated, it is true that in certain areas of economics distinct econometric studies can reach opposing conclusions. In addition, there are no adequate methods for determining which conclusion is valid given the notoriously unreliable data available. Subsequently, conflicting economic theories may continue to coexist for long periods. Such results are far from scientific. As such, at this point, it may be beneficial to examine some of the limitations of econometrics in assisting economics on its route to becoming a science.

One reason why econometrics and therefore economics cannot be declared to be being scientific is because of the conditional nature of economic relations. In general these relationships appear to be time specific and hence fragile and unstable 'when exposed to the light of day' (Johnston, 1991). This renders economic theories supported by econometric results non-scientific when compared to the requirements that have to be satisfied by theories in the natural sciences. An example of this was the failure of the original Phillips curve after the oil shock of 1973. This point was impressively illustrated by Lord Robbins whilst scrutinising the disparities between economics and the natural sciences:

'The influence of the Reformation made no change in the forces of gravity. But it certainly must have changed the demand for fish on Fridays' (Johnston, 1991: 53).

Studies conducted in the natural sciences yield unconditional predictions and are beyond the domain of being effected by human actions while those in economics and econometrics are not. However, we cannot use this argument as concrete evidence of the non-scientific nature of econometrics; some predictions of theories in the natural sciences are conditional too. Hence we must make a further distinction between strong and weak conditional predictions. Typically, scientific predictions are strong which means that under specific conditions an event will occur with certainty. In contrast, economic forecasts are weak meaning that an event will follow if there is no disturbance i.e. some of the conditions for the event to follow have been detected (McGrath, 2002). The difference is due to the fact that human behaviour and the forces present in the field of economics are both unpredictable and erratic in nature across time. Consequently, we surely cannot expect econometricians to develop 'super equations' that take into account all the relevant factors and conditions (Johnston, 1991). Hence the nature of the study of economics renders the methodology of econometrics non-scientific and economics a non-science when

compared to the natural sciences.

The scientific method, when testing theories in the natural sciences, requires that the test be unbiased. However, complete objectivity is very difficult to achieve in econometrics because during the specification aspect of the econometric work, it is often up to the econometrician to select the functional form of the regression model. Hence, deception is easy as econometricians can exploit this opportunity and choose the functional form of the model that corroborates their own economic theory (Hendry, 1980). There is no doubt according to some critics that such regression analysis and testing of economic theories relies on cookbook econometrics where a hypothesis is expressed in terms of an equation, a variety of forms is estimated for that equation, the best fit is selected while the rest are rejected and then the theoretical argument is modified to rationalise the hypothesis that is being tested (Ward 1972).

Econometric methodology provides us with probabilistic results due to the need for a stochastic error term (to account for the variables that we cannot include in our model which influence the endogenous variable of interest). However, econometrics relies too much on experimentally unobservable human behaviour and on the assumption that unforeseen events or disturbances follow statistical distributions (Hendry, 1980). Hence, due to the greater uncertainty that is attached to econometric results, econometrics cannot be recognised as an authentic definite science.

## **Enhancing the Scientific Status of Economics**

Given some of the problems associated with econometrics, there have been those who have suggested that these are justifications for abandoning it altogether (Blaug, 1992). However such action would leave economics with practically no means of choosing, from an abundance of possible theories, the one theory that best explains the economic event in question. Although there do exist other techniques for testing economic theories, such as ethnographic methods etc, the requests of state economic policy makers will always bring us back to the methodology of econometrics (Blaug, 1992). Rather than dispose of something that has done more good than harm in advancing the scientific status of economics, numerous suggestions for strengthening the claim of economics and econometrics together as a hard science have been made by Thomas Mayer. Some of these recommendations are outlined below.

Mayer first suggests that we place greater emphasis on data collection. Second, he asserts that econometric results should not be considered as evidence from a 'crucial experiment' which is not to be repeated but rather that applied

econometrics should aim to replicate past results using different data sets (Blaug, 1992). As Hendry states, the three golden rules of econometrics are 'test, test and test' (Hendry, 1980). This would do much to resolve the problem of contradictory hypotheses coexisting by relying on many pieces of evidence being pulled together from many periodic tests rather than falling back on the results of a single crucial experiment. Third, we should try and eradicate data mining by requesting authors to present all the regressions they ran and not just the specific regression that happened to support their economic theory (Mayor, 1980). In addition to these suggestions, Johnston recommends that in order to improve the quality of econometric work in the short-run, a greater balance needs to be achieved between theoretical and applied work in econometrics (Johnston, 1991). According to him, more empirical work with the objective of verifying economic theories would go a long way to enhancing the scientific status of economics and econometrics as a measurement tool.

## **Conclusion**

As we have seen throughout the course of this essay economics cannot yet be regarded legitimately as a real science although econometrics has contributed vastly to this cause. Economics faces a variety of difficulties in achieving this objective due to the substandard practices of those in the discipline who often fail to exercise the methodology they preach and also as a consequence of the problems that arise in the field which are innate to the nature of the subject. The artificial obstacles constructed by the economists and econometricians themselves can indeed be eliminated by imposing more stringent measures in terms of methodology in order to augment the scientific status of the field. Too often our researchers who are protective of their own theories fail to ask the scientific questions such as; does there exist a different model that fits the data well and that is better at explaining the economic phenomena in question? Instead they pose the same question that a juggler's spectators would ask; have virtuosity and skill been exhibited? (Summers, 1991). However, the natural complications that arise in economics are more difficult to overcome even with the aid of econometrics but despite this, theory based on empirical evidence is surely the discipline's best defence against any criticisms seeking to diminish its scientific status.

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