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The Limits of the Scientific Method in Economics and Business: A Critical View

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ABSTRACT – *The purpose of this paper is to discuss the limits of scientific method in economic research.In the paper is pointed out that despite the scientific method, which encounters a great applicability in economics and business, when forecasting future economic developments in question, its capabilities is very limited. Therefore, the modern scientific method should synthesize rationalism and empiricism In this context, the paper concludes with the assumption that knowledge of mathematical logic, including all its abilities, is in itself highly valuable and is an important supplement to the already existing scientific methodology that cannot be ruled out in economic research.*

KEY WORDS: *economic theory, scientific method, economic research*

Introduction

The social sciences deal with people or groups of people, companies, economies, and societies, i.e., with their individual and collective behavior. They are trying to determine objectively existing causal links between occurrences, as in certain areas of social life, and society itself as a totality of social relations. "These sciences can be classified in disciplines such as psychology as the science of human behavior, sociology as the science of social groups, and economy as the science of companies, markets, and economies." (Bhattacherjee, 2012, p. 1) But unlike the social sciences, the natural sciences have studied natural phenomena, such as matter, the earth, heavenly bodies, or the human body (examples of the natural sciences are physics, chemistry, medicine, and astronomy, etc.).

There is a significant difference between the natural and social sciences. While in the natural sciences there are certain patterns of relations among the phenomena that occur with such regularity that laws are derived, there are no such principles in the social sciences. In fact, unlike the natural sciences, which in their nature seek the universal laws of natural phenomena, the social sciences are of special importance in the practical application of theoretical models.

This is consistent with the opinion of the founder of economics Adam Smith who considered himself to be more a philosopher, who is constantly looking for opportunities to

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achieve the prosperity and well-being of people, than a scientist in search of universal economic laws (Jacobs, Nagan, Zucconi, 2014).

Each of the social sciences, with some minor exceptions, attempts to understand and explain certain aspects of social reality. Economy is sometimes celebrated as the queen of the social sciences, which acts as an injection into the engine of the other social sciences (Duhs, 2006). In the economic literature, one can often recognize that this is the ideal that economic science should strive for in its development to contribute the other scientific disciplines. This is the first thought on science and the principles of their development.

Scientific theory

A theory can be defined as a general and, more or less, comprehensive set of statements that describe different aspects of a phenomenon (Babbie, 1998; Hagan, 1993; Senese, 1997). A theory also may represent an attempt to provide an explanation about reality, or a way to classify and describe events and even predict the future of events (Hagan, 1993). Every theory consists of the following elements (Radovic, 1996):

- A series of definitions that precisely explains the variables used;
- A number of assumptions that provide a brief description of the conditions under which a theory is applied;
- One or more hypotheses which are derived from the assumptions on which a theory rests;
- The hypotheses that can be tested using different techniques.

"The main purpose of any theory consists in the fact that it should show how different things are associated with one another" (Radovic, 1996, p. 161). Namely, if one knows the kind of route two variables take, then one can easily find out if one of them changes with the change of the other one.

Assumptions also play an important role in the formation of a theory. They often involve a form of describing and presenting a theory. "They can also serve as an indirect test hypothesis, and sometimes they are used in order to define the conditions under which it is expected that a theory be valid" (Radovic, 1996, p. 162).

Economic theory

A theorist says that parameters are important and asks how they can be measured. For example, the Laffer curve shows the relationship between tax rates and tax revenues. The scientist, after whom the Laffer curve was named, considered that high tax rates are the main culprits for the existence of low national savings, low investment, and the recession. One axis is applied to the tax rate, and another axis to tax revenues that are realized through the application of appropriate tax rates. "The popularity of the Laffer curve is reflected in the fact that it can explain to everyone in six minutes what is discussed in six months" (Varian, 1989, p.4). Here, we have taken as an example, as Laffer analysis shows, the good and bad sides of the same economic theory. The downside of this theory can be seen in the fact that what the theory predicts could happen in real life, but not necessarily. Basically, actually practice has denied this theory. "After the reduction in tax rates, tax revenues did not increase, but have

also reduced, which contributed to an increase in the budget deficit." (Kulic, 2009, p.46) The good side of this theory is that it uses a simple analysis. In addition, it tells us which parameters are relevant for drawing conclusions, which one would not be able to know without a theory.

Considering that the purpose of any theory is to explain a phenomenon, it is often a certain abstraction, simplification and generalization, and as such generally has characteristics of an hypothesis. "That is, if the practice confirms the hypothesis, then that hypothesis turns into a scientific theory." (Radovic, 1996, p. 163)

Friedman (1953) is considered to have a good economic theory that provides accurate and useful predictions, while Samuelson (1947) pointed out that economists should formulate theories based on a "practical concept". Thus, they are ideally logical equivalent to their characteristics described.

In recent years, economic theory has found itself more than ever being reconsidered under the influence of a major financial crisis, which was reflected in the numerous debates among economic experts who have questioned the new Keynesian theory and the views of its main successor Minsky, as well as modern monetary theory and the Austrian school of economics. This can be considered fully justified, given that when there is an economic crisis, there comes a crisis to the economic theory, as Joanne Robinson noted decades ago (Robinson, 1981).

The economic philosophy as the basis of economic theory

"From the beginning, the economy has sought to break free of the feelings and choices for itself, and to have the status of a science."(Robinson, 1962).

Chronologically speaking, the initial use of philosophy in economics can be attached to the names of John Stuart Mill and William Vevel, whose works in the 19th century, when they occurred, had been paving the way for a further development of economic philosophy. In the late 19th and early 20th centuries, logical positivism appeared that is associated with the "formalist revolution" in economics (Radovic, 1996, p. 151). Then, for the first time, it raised a question concerning the general problem of the relationship between scientific theories and scientific principles.

In particular, the role of economic philosophy was singled in the work of Heilbroner (1996), and is reflected in the importance he gave it for determining the contributions of social welfare.

Prominent economists, such as Robinson, Myrdal, Higgins, and Heilbroner, felt that economic philosophy is the essential basis for the establishment of economic theory. Therefore, the understanding of economic philosophy, underlying an economic theory, is a prerequisite for understanding the many controversies in the science of economics. In addition, there was also an increasing need for establishing relations between "pure theory" and "applied theory", as well as the separation of those theories that can be tested from those whose settings can not be tested and proven, with the help of different methodological instruments.

The objectivity of science is based on a constant checking of theory into practice. Therefore, research funding at any time consists for those theories that have not been disproved (Robinson, 1962). The success of a theory is measured by the ability it has to exact

the prediction of a phenomenon with the ability to control this phenomenon. However, the designing and testing of a theory is particularly difficult in economics and the other social sciences, due to both the insufficient accuracy of theoretical concepts and the inadequacy of instruments for their testing. Also, it is very difficult to refute those theories that "do not work". For example, Marx's theory has survived decades in the socialist bloc countries before being discredited as inefficient in terms of stimulating economic growth and social welfare.
The above mentioned example and other similar examples show that, unlike theories in the natural sciences, theories in the social sciences are rarely perfect; this fact provides many opportunities for further research.

Quantification of the economic theory

The quantification of the social sciences is not new. It was introduced in the 1920s, when sociology and economics were young sciences. Today, their quantification is needed to consolidate their status as a science (McCloskey, 2005). Paul Samuelson (1947) and Kenneth Arrow (1951) advocated it a few decades later, especially for the use of mathematics in economic research.

The genesis of the development and application of mathematical economics, based on logic and other methods, finds roots in the works of the French scientist Kurnoa (1960). Also complementarities are the theoretical and empirical tests encountered in the works of Kuznet (1966), Goldsmith (2000), Friedman (1953) and others. In recent times, there are also many supporters of the mathematization of economics. For example, Edesess (2012) offers a mathematical approach to some of the key problems facing an economic theory by launching a series of economic debates. On the side, one theorist who advocates the mathematization of economy is the scientist McCloskey (2005). He believes that common complaints are not acceptable concerning the application of mathematical and statistical methods in economics. In fact, in his own opinion, the advocates of this view are those scholars who emphasize the superiority of the natural sciences in relation to the social sciences (McCloskey, 2002). Also, the famous scientist L. Walras once pointed out that "many economists, who do not know mathematics, appear as the biggest critics of its application in the investigation of economic principles." (Walras, 2010) There is a view among economists that it is difficult to use mathematics in economics, and therefore they argue that it is better to use some other methods that are not based on mathematics. However, Edesess (2012) believes that the excessive use of mathematics in economics is not the source of all the problems and general confusion, but the fact that we should all use a mathematical model, when something in fact cannot be measured by the use of mathematical models, is senseless. In fact, according to his opinion, mathematics is used too much in economics, and too much of it is of a poor quality. "This arrogance is at the mathematical core of the critical state of economic theory that has exacerbated the financial crisis." (Edesess, 2012) In other words, the economy can not overly rely on accurate mathematical models, considering that economics and mathematics cannot be equated.

"Are we going to choose a mathematical or theoretical approach to economic analysis is not of such significance, but how important the benefits of mathematics in terms of improving the analysis and greater explicitness at each level of reasoning is." (Radovic, 1996, p.153) Also, mathematical economy should be seen as a specific approach to economic

analysis, which is no different from today's focus on non-mathematical economy. The main difference between "mathematical economics" and "theoretical economics" is the fact that the economy in mathematical assumptions and conclusions is expressed in mathematical symbols instead of in words. In addition, the "language" that uses mathematical economy is characterized by conciseness and greater precision, which in theoretical economics is not always the case. (Radovic, 1996, p. 154).

Although numerous mathematical methods proved to be useful in a large amount of economic research, mathematical logic has a high practical value given its rich set of tools used to explain verbal premises and statements in a very precise and clear form. Namely, the value of this method is in its ability to reduce the complexity of a problem down to its utmost simplification and explanation. Having this in mind, the exploration of applicative features of the logical method ends with a conclusion that this method is yet to become very important in the research of modern economic phenomena and issues characterised by high complexity of interrelations and interconditionality.

In the end, it can be concluded that although the quantification of social and economic phenomena from the start of application had a lot of supporters but even more opponents, mathematics and methodological knowledge have passed the test of time and have lost none of their importance to the present day.

The scientific method

For a clear perception of the concept of research, one must know the meaning of the scientific method. The two terms, research and scientific method, are closely related. They are the common feature of all scientific research methods and techniques, although they can vary greatly from one science to another science. "The scientific method is the search for truth through logical considerations, i.e., it is trying to achieve an ideal combination of experimentation, observation, and logical arguments" (Ostle and Mensing, 1975, p. 2). "The scientific method refers to a standardized set of techniques that are used to zoom in on scientific knowledge, such as how to conduct a valid observation, how to interpret the results, and how to generalize these results" (Bhattacherjee, 2012, p. 5). The scientific method should meet these four criteria:

Repeatability: Under this criterion, there is an opportunity for repeated scientific research and to provide similar, if not identical, results;

Accuracy: Theoretical concepts must be defined with such precision that they and others can be used as a definition for the measurement of these concepts and testing theories;

Probability: A theory must be provided in a way that it can be tested. Theories that can not be tested are not considered scientific theories;

Simplicity: When there is more than one explanation for a phenomenon, scientists have still to accept the simplest and most logical explanation.

The natural and social sciences are based on the same logic of the scientific method. Truthfulness is proved empirically, and the empirical method is based on its practical applicability in society. Using the scientific method is the most important tool in the study of

the social sciences since it allows us to not only learn lessons from certain social sciences, but also to understand their synthesis.

The limitations of the scientific method in economics and business: Do we need more precise and accurate predictions in economy?

Despite the scientific method, which encounters a great applicability in economics and business, when forecasting future economic developments in question, its capabilities are very limited. This opinion is confirmed by the American philosopher Peirce, who concluded that there are no new ideas derived from the analysis of the past with the help of inductive and deductive logic; the two forms of logic used by modern scientific methods (Martin, 2011). The predictions in the recent past have proved to be completely wrong. Yet, on the fact that a kind of prediction was better than nothing, governments of modern states and large corporations insist on projections of conjectural developments. They deal with forecasts of employment rates, inflation rates, and an increase or decrease in the gross domestic product; almost every aspect of strategic enterprise management refers to the future, from planning to the production of goods and sales for business expansion or the opening of a new organization. Nevertheless, these predictions of the future by economists in certain segments have been very limited, given that some aspects that are related to the other social sciences are not taken into account. However, in recent years, things are beginning to change, thanks to those scientists who bring down the barriers among the scientific disciplines (Ioannides & Nielsen, 2007; Beckert, 2013; Poli, 2014).

In line with this, there are discussed in scientific circles the opportunities resulting from the anticipation of climate change to the economic crisis. Predictions are particularly associated with a high degree of risk due to their failure to meet the conditions of the economic crisis. The problem is that "in terms of fundamental uncertainty, expectations can not be understood as a result of the calculated optimal choice, taking into account all available information, but on the potential interpretation of the situation in the context of the prevailing institutional structures, cultural patterns and social networks" (Beckert, 2013, p. 325).In addition, extrapolating the future to be a straight-line projection of the past is neither accurate, nor is it helpful in creating better understanding and newer ideas (Martin, 2011).

These considerations are gathering researchers from different scientific disciplines in order to have an interdisciplinary dialogue, which should serve as a basis for both understanding and policy making for future decisions. A better and more complete understanding of future trends and their effects will improve theories and models in economics and other social sciences. These improvements will greatly benefit those who explicitly seek to create a "ready society." In this way, there will be a more efficient use of modern technology not only for exploring the boundaries of human endeavor (Poli, 2014), but also for improving a response to the challenges of a global society.

Conclusion

Quantification of social and economic phenomena has since its early days of implementation attracted numerous followers but even more opponents .The paper does not dwell on whether mathematical or theoretical approaches should be implemented in

economic research; it rather discusses the possibilities of implementation of the mathematical and logical method for the purpose of enhancing economic analysis. Besides, the paper goes on, although numerous mathematical methods proved to be useful in a large amount of economic research, mathematical logic has a high practical value given its rich set of tools used to explain verbal premises and statements in a very precise and clear form. Having this in mind, the exploration of applicative features of the mathematical and logical methods ends with a conclusion that these methods are yet to become very important in the research of modern economic phenomena and issues characterised by high complexity of interrelations and interconditionality.

Finaly, the paper is meant to draw attention of the scientific society and provoke discussion on the limitations of implementation of the scientific method in economics. Hence a larger number of new papers is expected to be published on this topic which has so far been approached from the theoretical aspect rather than from the practical one.

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Ograničenja primene naučnog metoda u ekonomiji i biznisu: kritički osvrt

***REZIME** – Svrha ovog rada je diskusija na temu ograničenja naučnog metoda u ekonomskim istraživanjima. U radu smo istakli da uprkos velikoj primeni u ekonomiji i poslovanju, naučni metod ima ograničene mogućnosti posebno kada su u pitanju buduća ekonomska kretanja. Dakle, savremeni naučni metod treba da osigura sintezu racionalizma i empirizma. U tom kontekstu, kao zaključak istraživanja dajemo pretpostavku da je poznavanje matematičke logike, uključujući sve njene mogućnosti, samo po sebi vredan i važan dodatak već postojećoj naučnoj metodologiji koja se ne može isključiti iz ekonomskih istraživanja.*

***KLJUČNE REČI:** ekonomska teorija, naučni metod, ekonomsko istraživanje*

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