

# PREDICTION IN SOCIAL SCIENCES

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Due to the change of demands in the fields of theory and practice towards forecasting, it is essential to rethink the theoretical and methodological aspects of future studies and forecasting at the beginning of the 21st century.

Tamas[26]

## ABSTRACT

Considerable interest has been shown over recent decades in the application of quantitative methods in social sciences. The purpose of this paper is to discuss the ability to make predictions in social sciences with a focus on economics. 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 paper concludes that, forecasts may be more desirable for many reasons. Namely, 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."

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## 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." [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 achieve the prosperity and well-being of people, than a scientist in search of universal economic laws [2]. So, prediction is a test of scientific understanding, and validation of the success of scientific research [3]. In other words, Prediction is a tool for testing the validity of a theory.

Each of the social sciences, with some minor exceptions, attempts to understand and explain certain aspects of social reality. In line with this, the aim of modern social sciences is to „develop theories that explain observed facts as the effects of their causes “[4].

Economy is sometimes celebrated as the queen of the social sciences, which acts as an injection into the engine of the other social sciences [5]. 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.

## 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" [6]. 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." [7]. 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 a hypothesis. "That is, if the practice confirms the hypothesis, then that hypothesis turns into a scientific theory." [8].

Samuelson [9] 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 [10].

## 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 [11]. Samuelson [9] and Arrow [12] 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 scientists [13]. Also, complementarity are the theoretical and empirical tests encountered in the works of Kuznet [14], Goldsmith [15], Friedman [16]. and others. In recent times, there are also many supporters of the mathematization of economics. For example, Edesess [17] 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 [11]. 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. Also, the famous scientist Walras [18] 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." 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 [17] 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." [17]. In other words, the economy cannot 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 a significance, but how important the benefits of mathematics in terms of improving the analysis and greater explicitness at each level of reasoning is." [8]. 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. [8].

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.

## ECONOMIC THEORY AND FORECASTING

Many social scientists consider the ability to make predictions to be the „real mark of a good theory“ [4]. Until the end of 1960s scientific theories were judged on the basis of their abilities to make predictions. In line with this, Friedman [16] is considered to have a good economic theory that provides accurate and useful predictions, whereas Simon, suggests that prediction is elusive even for some of our most well-accepted social science theories [19]. Popper [20] suggested that “the task of science is partly theoretical explanation and partly practical prediction- and technical application”.

Although much social science research is supported to develop predictions, such predictions may prove unsuccessful for all but the simplest (and therefore obvious), social situations [21].

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 [22]. 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 [23] [24][25].

In line with this, there are discussed in scientific circles the opportunities resulting from the anticipation of climate change to the economic crisis. Very often can be heard question among ordinary people and scholars: “Could the 2008 financial crisis have been predicted and avoided? The answer is simple if we know that the “ability of the social sciences to predict the future is not only currently and coincidentally, but also fundamentally limited “[4]. Namely, 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 cannot 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” [24]. Also, the predictions were made on the basis of mathematical models of three decades, which are not applicable in the changed circumstances. So, 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 [22].

“Scientific evidence on climate change can by no means be disputed, however, it is difficult to predict the way in which this change will affect certain regions and countries”[27] Namely, given the speed of climate change, the cumulative effect of harmful gas emission cannot be predicted, and it may be considerably more profound than expected. In the past, such floods were recorded once in every hundred years, and in the recent past the floods were seen once in fifty years. These changes occur on daily, season or annual bases, indicating climate differences and risks for both humans and the organizations (Fig.2).

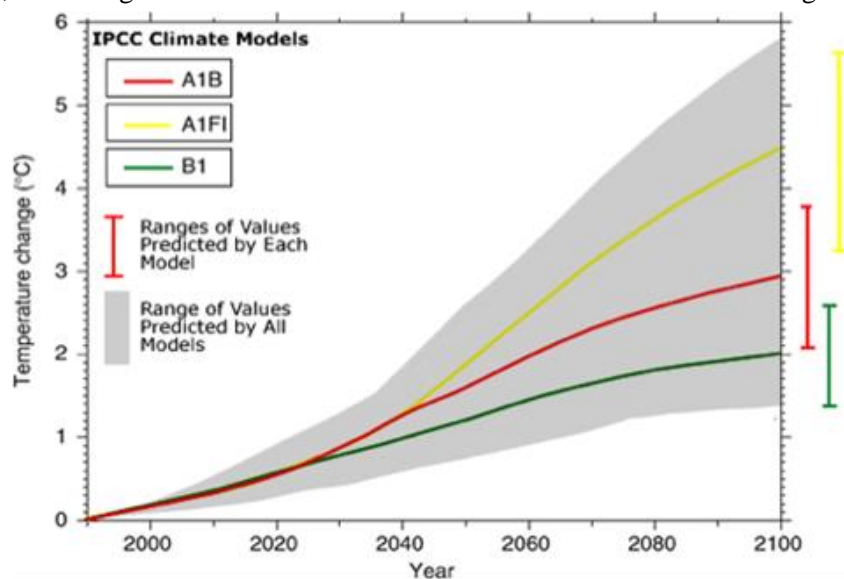


Fig.1 Climate change prediction- different models include energy use, economic development, and population growth

Source:[http://www.classzone.com/books/earth\\_science/terc/content/investigations/esu501/esu501page05.cfm](http://www.classzone.com/books/earth_science/terc/content/investigations/esu501/esu501page05.cfm)

In addition, various natural hazards can produce various types of business interruption in small and medium enterprises. There is growing evidence around the world that the sector of small, medium enterprises and entrepreneurs (SMEs) has a very important role in the economic development of any country, whether it is about countries with developed economies, developing countries or countries in transition [30]. Therefore, risk managers should develop a sense of probability of harmful events and predict the impact that they may have on the enterprise [29]. First of all, it is necessary to identify natural disasters that are likely to occur in the areas in which the company owns the property. In the case of natural disasters models, prediction of future damage depends on four factors: a) capital, b) labor, c) logistics and d) markets/buyers. All in all, prediction potential disasters are of extreme importance for the companies. Predictions determine the assumptions as the grounds on which appropriate decisions are made [31]. Predictions need to simulate a scenario of possible catastrophes (fire, earthquakes, landslides, floods, etc.). So, prediction aims are to avoid (or at least minimize) surprises during the crisis phase and to introduce improvements." Short-term predictions, especially those associated with extreme weather events such as floods and hurricanes, have proven useful in supporting emergency management strategies [28]. Attempts to provide longer predictive lead-times for discrete events such as earthquakes have generally been unsuccessful.

The better we are prepared for the most important scenarios of disasters, the less it will cost us if it comes to it. These considerations call for 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 [25], 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 chapter 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 discussion 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 characterized by high complexity of interrelations and inter conditionality.

It 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, we can conclude 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.

Finally, this chapter 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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