

## MODELING IN ECONOMICS LEADS TO A FRAGMENTATION OF SCIENCE.

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### ABSTRACT

In this article the main tendencies of the development of the modern economic methodology are pointed out. The increased role of mathematical modelling in economics results that students receive applied education, far away from fundamental. Nevertheless, modern education requires the development of applied skills on a par with fundamental knowledge in the field of study, as the main mission of the university is to create a general cultural level in the first place, and then - in the development of science and education methods.

**Keywords:** science fragmentation, mathematical modelling of economic processes, university education.

### INTRODUCTION

Quite a long time, economic science was deeply theorizing and purely descriptive. Over time it became necessary to use quantitative methods in order to objectively quality evaluation the theoretical propositions. The attention of economists to the application of mathematical models has recently increased and it became the main characteristic of modern economics. It is a wonder that the vast majority of Nobel Prizes in economics has been awarded for the work of the mathematical content. The current economic methodology is at a stage of development that the quantitative models allow to evaluate the majority of processes in economics. Models begin to modernize, develop, and become more formalized and eventually, allow evaluating the processes in economics, which in the present time purely theorizing.

**The literature review.** This emphasis leads to an increasing of economic science fragmentation, to a narrowing of the outlook of future economists, narrowing horizons of future economists, to a distortion of vision macroeconomic processes in general. To confirm our statement, we turn to the words of Robert Solow: "My own practice may not always confirm to my understanding of the right way (or at least a good way) to do economics".

To understand what Robert Solow meant in his phrase, we will turn to the works devoted to the methodology of economics, written by R. Solow, D. Colander, R. Goldarb, T. Leonard and M. Blaug.

Economic science is developing rapidly. Changes are influenced by the needs of the science and the need to formalize the most economic processes

Robert Solow has started his activity in 40th and he continues it up to nowadays, so he has a great experience from which he has the ability to objectively evaluate the quality

of the development methodology of economics and this statement is undoubtedly refers to the weight of theory and evidence is a central concern of the distinguished scholars.

In his mini-paper Solow [1] sums up his notion of “good practice” through three injunctions and adds that serious economic methodology much more deductive and normative in character, rather than it is empirical and descriptive. The majority of economics methodology is formed under the influence of practical and actual experience, rather than under the influence of logical deduction.

In addition, it is important to say, that Solow is a perfect practicing economist, but his investigations over the years has referred only to certain parts of economics, and not to economics in general.

No wonder the majority of economists refer the Solow model to the appropriate and relevant at whose time, taking into account the accumulated experience and knowledge, and the importance to explain the sustainable economic growth with the objective quantitative tools. At that time there was a great need to provide deeply theorized scientific studies with objective quantitative toolkit. Not without reason Solow and Swan offered almost identical models simultaneously in the late 50th.

At the same time they (economists) point out that model has a number of shortcomings, which are called Solow paradox (among them are paradox of thrift, paradox of output, etc.). Despite the shortcomings of the Solow model have served as a starting point for economists next 20 years.

His work has stimulated similar studies in other countries. In the 60 - 70s he took an active part in the discussion on the role of capital and labour as a factor of economic growth. In 1961-1962 he was a member of the Economic Council under the President of the United States.

Creating a neoclassical growth model influenced the development of other areas of modern economic theory. Model Solow was used in the study the problem of optimal savings, analysing the state of public finances. It was used to assess the potential impacts of changes in tax policy on the subsequent economic development. In the 70 - 80s Solow neoclassical model has been successfully used in the study of business cycle fluctuations in the framework of the theory of general equilibrium, as well as the analysis of the securities market.

Nevertheless Solow model greater importance has due to the use of mathematical modelling in economics. The application of mathematical methods in economic research possible to achieve a high level of formalization of processes, to be the impetus to the development of such sciences as macroeconomics, microeconomics.

However, such models are often disconnected from the economy because of the inability to foresee all factors in a mathematical or econometric model, that limits its' using.

That is why Solow singled in his short-paper those three injunctions ( keep it simple, get it right, make it plausible ) and shift up that his ideas may have some scientific interest because he has conveyed it to graduate students over the years either directly in conversations or probably most effectively - in comments on their works.

Thus his ideas cease to be so isolated and acquire a more generalized form and evolve under the influence of this interaction. At the same time, development will not apply to a particular study, but to the entire methodology of economics in general.

In his paper in *Daedalus* [2] he said that “modern mainstream economics consists of little else but examples of this” and that the model is “a deliberately simplified representation of a much more complicated situation..... The idea is to focus on one or two causal or conditioning variables, excluding everything else, and hope to understand how these aspects of reality work and interact.”

As Jacob Viner said “economics is what economists do” [3]. Economists today do many and diverse things. The hoariest methodological debate in economics concerns the weight that economics ought to give theory versus evidence. Theory by itself is empty, but empirical research uninformed by theory is not representative.

Thus, economists have always kept in mind that math only a tool in the hands of researchers and economists, and analysis of the phenomena must have substantial character and not to be formal.

Further progress of economic research is closely linked to the wider use of mathematical methods and models. If previously purely mathematical analysis dominated, now it is revealed quantitative relationships and mathematical models of many economic processes.

The result is a deeper insight into the processes studied.

**Research results.** Daring ideas, knowledge of macro- and microeconomics provide possibilities to obtain amazing results. For example, some patterns were found mathematically, by direct observation and not even allowed to establish their presence. Therefore, the path of mathematical modelling of economic processes and the establishment of a consistent causal relationship to enable monitoring, control and management is the most effective tool for solving various problems.

Thus economic science needs the application of mathematical models. Deep formalization part of the processes helps to evoke macro-models in general and to develop economics to new heights.

As noted by Solow economics of 40th as a science was descriptive and institutional subject. Books were represented as mixture of generalizations, examples and classifications, which made the economics as a sphere of intuitive knowledge.

Economics of 90th Solow's defined as a set of analytical tools that should be applied to the analysis of the observed situations. Economic science in 90th became formal, but rather superficial: a key component of science has been the use of mathematics. It was connected mostly with the need to provide objective quantitative results, as well as with the development of computers.

Economics of the New Millennium has not refused from the math models, but these models are different from the Solow model. As Colander says, modern model resembles the model of designing the forecasts of weather and confirm old results.

But while mathematics is obviously useful for economics modelling, it is not sufficient. Pure theorists do not bother with models, because models are meant to isolate and refer to observable empirical phenomena. Models are also routinely designed for the special

cases, involve fairly basic mathematics, and therefore neither general nor fancy enough for the pure theorist [4].

Because economic models are empirically oriented, and because they can be stated (if less compactly) in non-mathematical terms, Solow regards as misplaced the common criticism that economics is excessively formal. Model builders, says Solow, are “obsessed with data”.

We (Goldfarb, Leonard, 2002) might quarrel with Solow’s historical thesis that better data explains the ascendancy of model building technique, but there is no disputing his characterization of the discipline’s prevailing current method as “fact-driven model building.”

Thus does Alan Blinder wryly describe an economist as “someone who sees that something works in practice and wonders if it also works in theory” [5]. What most unifies economics is how economics is done. Colander concurs. “Modern economics” has become “enormously broad in its acceptance of various assumptions and content.” But it is “extremely narrow when it comes to method.... The modelling approach to problems is the central element of modern economics”.

**Summary.** In general, application of mathematical methods in contemporary economics now has three directions: mathematical economics, mathematical modelling of the economy and economic-mathematical methods.

In this mathematical economics is understood as a purely mathematical theory of economics. Discipline involves an extremely high level of abstraction, to prove theorems uses powerful mathematical methods (fixed-point theorem, selection of multivalued mappings, etc. Mathematical modelling of the economy - a description of the mathematical models of the economy, their creation and analysis.

Despite the long historical period of development of mathematical economic modelling problem of constructing econometric models is far from a final decision: there are different models of the same volume, there is no single methodological framework is not always reliable test for adequacy. More and more researchers are thinking about the need to inventory accumulated econometric models, creating properly digest on the model of the real economy. In addition, economic and mathematical modelling has the ability to create a formal macroeconomic model under any economic plan.

Despite the prevalence of empirical inquiry in economics modern science is represented by several types of scientists with different attitudes on theory versus evidence: pure theorists, applied theorist, theoretical econometricians, applied econometricians, applied economics.

The different species in these taxonomy proxy different attitudes toward the proper mix of theory and evidence in economics.

**To conclude** my short paper I want to say that as a result of changes in the structure and content of economic science and despite the differences in methodology among scientists, economics as the science is becoming more monolithic. In the opinion of Colander, improvements are due to structural changes in science itself. In the near future economic education will have become more personal and focused on the skills and knowledge needed in the future field of activity of students that means focused on the application of mathematical models, but not for their designing. These processes

will revival descriptive and institutional approach and freeing up time in the curriculum on the ability to generalize, classify, combine numerical examples. In other words – to provide an opportunity, knowledge, and skills to avoid fragmentation of economics and understanding of the right way to do economics.

Methodologist activity involves huge responsibility: they have to interpret the direction of economic knowledge, a good understanding of issues. They also have to be economists, but at the same time they shouldn't be afraid of generalizations, have philosophical intuition and enjoy the achievements related to humanities (at least, social theory and philosophy of science).

Result of methodological research in economics can become an apt description, and philosophical generalization, and interesting normative conclusion.

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