**New York, NOVA Science Publishers, 2016. 301 pp.**

**Some quantitative methods and**

**models in economic theory**

**Prasolov Alexander Vitalievich, doctor of science, Professor,**

**Saint Petersburg State University**

Currently the mathematical model of dynamic process embodies some dependence between quantitative characteristics of system which allows forecasting their behavior for the near or long-term periods. In economics as in science about production, distribution and consumption of goods the forecast and management of parameters of system leads to rational decision-making at all levels of society: government, region, firm, family or person. Therefore, the development of mathematical modeling is very actual. However, unlike in engineering sciences in economics the formal logic is still weak, there is no accurate system of assumptions (as, for example, axiomatic approach in mathematics), being accepted by the majority of experts or being meant by default. It leads to decreasing economic researches efficiency and narrowing applicability of results. Nevertheless, having assumed some idealization, having picked up the corresponding abstractions of economic system dynamics it can be approximately described by the mathematical equations reflecting cause-effect relationships.

In this book the following economic issues are anyway touched:

* forecast of exchange currency rate,
* forecast of product’s price at the goods exchange,
* management of investments (capital investment allocation),
* macro-economic dynamic models,
* models of rivalry and interaction of several firms on the common market or case of using common limited manufacturing resources
* oscillations of economic activity,
* models of international trade,
* management of level of customs import tariff,
* dynamic models of advertising activity and some others.

Some of the described above tasks have been completely carried out, that is the solution algorithm has been given (in some cases results of modeling have been also given), the other tasks have only been analyzed and ways of making models have been outlined. Here it is not the neglect of completed forms but the consequence of author’s another direction. It can be explained by striving for increasing instrumental possibilities of the theory of modeling dynamic processes. Conditionally one can split the theory into linear and non-linear parts. In the first part which is widely used at present there are some weak points. These weak points include uncertainty in choosing the length of identification interval, criteria diversity of model quality and as a result impossibility to consider one model better than another model.

Thus offering the model of dynamics to an economist a researcher says that this model is optimal for the given set of the observation of dynamics of an experimental parameter, for the linear model class and for the given (as a rule, a square criterion in one or another sense) criterion of model quality. An economist does not want to go into details, why say linear or square and which data are necessary for a researcher, he needs a reliable model with which he could make a decision properly, i.e. a criterion of optimality must be set by the ultimate applied purpose of modeling. These and other questions of the linear model theory are discussed in the book.

However, the main aim is connected with the author’s desire to include logistic equations with time delay in the system of instrumental means of the modeling theory. In biology such equations are known as Lotka-Volterra equations. They have been a focus of attention for a long time but without taking into account time lag and also without algorithms of coefficient identification their use one cannot consider worthwhile. It is shown in the book that the use of Lotka-Volterra equations is quite constructive and a dynamic diversity exceeds the behavior forms of trajectories of linear systems. This concerns more complicated structure of balanced identity, oscillation and asymptotic behavior.

In economics time lags (delays in system reaction on a situation change) have been used long ago in the description of dynamic problems but the complication of mathematical apparatus of the theory of equations with aftereffect does not allow using this theory widely. However, it would be a mistake to ignore time lags completely. So the author gives the analysis of dependence of economic conclusions on the results of mathematical modeling from taking into account time lags. Numerous examples of economic situations with estimation of time delay have been given, competitive activity of firms with delay in reaction has been considered and what is the most interesting, the algorithm of joint identification of system and delay parameters has been given. In the appendix many (but not all) facts of the theory of differential systems with aftereffect have been collected, but certainly they are mostly intended for mathematicians than economists. The most part of material has been published for the first time.