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METODE STATISTICE DE CERCETĂRI A LEGITĂTILOR DE FORMARE ŞI MIŞCARE A PREŢURILOR

*(Statistical Methods for Studying the Laws of the Formation and Movement of Prices)*

Bucureşti, Editura Academiei R.S.R., 1973

This study is part of the works of a high scientific value on the price problems elaborated of late, a book in which the author proposed to tackle these problems in a new, modern outlook, underlining the *statistical* character of the laws on the formation and movement of the value of goods expressed in money.

The main instrument of investigation used by the author is that of strictly deterministic mathematical modelling in a first stage and, then, of stochastic modelling, remarkably harmonizing them, in our opinion, with the general methodological requirements of investigation and interpretation of the materialistic-dialectical philosophy in the field of sciences.

Now, it is unanimously admitted that the science of mathematical modelling — operating with exact quantitative estimates — has succeeded in solving also many problems of qualitative economic analysis, from this point of view, enriching the very content of the economic theory.

On the other hand, it is well known that in their direct contact with the economic processes, the mathematical disciplines themselves are witnessing a powerful development and modernization. În economy, mathematics is called, at present, not only to offer one computing method or another, but, to investigate a number of complex problems whose approach from the mathematical point of view, requires *new* theoretical elaborations, methods and solving algorithms unknown so far.

From this double point of view, the present work brings many new results and original contributions of special theoretical and applicative value, marking a new qualitative leap in the development of disciplines, belonging to mathematical economy, econometry and statistics. In essence, it represents a successful "product" of scientific research of a multidisciplinary type.

Further, we shall briefly dwell on only some of these results, considering that they are sufficient for defining the scientific value of the book.

In the introduction, the author develops an interesting theory on the statistical law, as a dialectical unity of two component elements: an element defining for the ensemble of the considered population expressed by the *mean value*, of the characteristic taken in the study — a relatively stable value — and an element of the *form of manifestation* of this mean value expressed by the law of big numbers.

In other words, what is necessary, in general, in a statistical ensemble may be manifested *if* and *only if* a *big number* — on suffi-

ciently big — of elementary units of this ensemble is considered and submitted to observation. In this lies the essence of the law of big numbers, being manifested — according to the inspired expression of the author — as a sort of a "satelite" law of any statistical law.

Many contradicting opinions and theories were expressed in connection with the problem on the role of the law of big numbers in general and especially in the interpretation of the social-economic phenomena and processes.

The special scientific merit of the author is to have made many theoretical clarifications on this fundamental problem of statistics, of immediate practical interest especially in the study of the laws on the formation and movement of prices. Thus, a number of theoretical conclusions, rigorously exact from the scientific point of view, on the necessary and sufficient conditions for the law of big numbers to be able to act, are formulated on pages 27—28.

In the just opinion of the author, the law of big numbers is an objective law of the real world and not a "mathematical law", as some researchers wrongly affirm when referring to those mathematical theorems with the aid of which various aspects of this law find a numerical expression.

The work rightly points out that this was understood, in the first place, by mathematicians who dealt with the mathematical formulation of the law of big numbers. Bernoulli and afterwards Poisson, Cebyshev, Markov, Hincin, Kolmogorov and many other scientists interpreted the law of big numbers as an objective law of the real world which, however, present also interesting mathematical aspects; that is why, none of them saw in the law of big numbers a sort of a shield or guarantee of the stability of the mean level of various phenomena and processes.

The problems clarified by the author on the particularities in which the law of big numbers is manifested enable its conscious use in the study, by statistical methods, of the economic phenomena and processes. This is what the author does when approaching in a new, statistical outlook the laws on the formation-movement of the value of goods expressed in money, of prices.

Setting out from a very interesting remark that there exists a powerful analogy between the objective economic process of the formation of the cost prices at the level of various socialist enterprises or branches of the national economy and the statistical-probabilistic methods for solving the matrical system of the Leontieff type, the author succeeds — in the second part of the work — in formulating an original theory of random iterations and consequently, he suggests a generalized method of the same type for finding the solution to the afore-mentioned matrical system.

Of course, the equation matrical system of production costs of the Leontieff type can be solved also through more convenient methods, among other things, also through the Monte Carlo method, but, the theoretical possibility — demonstrated by the author that the solution to the system may be obtained also with the aid of random

iterations makes obvious the statistical character of the real processes of the price formation-movement. From the mathematical point of view, each random iteration may be considered as being equal to a periodical readjustment of prices in economy.

Also in the second part of the work, the author elaborates a new *dynamic* model of prices, defined by the integral equation (5.22), which permits to pose two very important minimum problems:

1° If in the (0, $T$) period, $S$ price readjustments take place, determine the moments $t_1$, $t_2$, ..., $t_s$ when these readjustments must be made, so that *the difference between the theoretical prices* $P(t)$ *and the real ones be minimum* (on the whole of economy).

2° How the supply with raw and related materials, etc. on the whole of economy should be made so that by observing the conditions imposed by the technology of production (the necessity of disposing of a certain quantity of raw and related materials, etc. in certain periods of the production process) *a minimum cost price* should be achieved.

The practical importance of these problems is obvious. Of course, in the future studies, modern solutions to these problems, posed only in a general form, will have to be found, since by applying the classical mathematical apparatus for their solution, an extremely big volume of calculations is necessary.

In the third part devoted to the essential problems of modelling the socially necessary labour costs, the author also comes to a number of original results, valuable from the theoretical and applicative points of view. In this context, the category of the *optimum price* is being outlined as part of an elementary production model and further, within a *dynamic model.* The unitary system of optimum estimations and the dynamics of real prices are defined as part of the model of optimum long term development of the national economy.

Extremely interesting are the results obtained by the author in studying the properties enjoyed by the optimum prices. Among them, the theorem of the *relative stability of optimum prices* is formulated and developed.

This theorem affirms that if all the components of the vector of resources $d$ — in a libeary production programme — suffer variations which do not exceed $\delta$ — the variation vector —, the basic matrix remains optimum and the prices remain optimum too.

Practically, in the working out of various technical-economic measures or production methods, we can operate with certain real prices proportional to the optimum prices. In this case, without affecting the highest efficiency of the production programme, we can vary — within certain limits — the vector of resources, a fact which is a great operational advantage.

In conclusion of the third part, the problems of the optimization of prices within production stochastic models are approached. As part of these models too, one starts from the idea that the optimization of the price system is an inseparable component part of the optimization of production processes; at the same time, certain new condi-

tions are also considered, the fact being outlined that the initial data and the main parameters of these processes are *random variables*. The author examines a concrete numerical model, in which the entire mechanism of the economy is presented monosectorially. To outline the statistical character of the real price systems, the numerical model is solved, first and foremost, in a deterministic outlook and then, in a stochastic one, giving the due interpretations — from the economic point of view — to the problem of duality as well as to the optimum prices. The conclusion is drawn that the strictly deterministic solutions can be considered neither *realistic* nor *satisfactory* from the economic point of view. The results presented show that the optimum prices offered by the solution to the dual of the stochastic problem are not some *certain* values, but, some values oscillating — with certain well determined probabilities — within variation intervals. Such eventualities — the author rightly points out — must be taken into consideration in the optimum planned management of the national economy, reflecting a scientific way of approaching, in the future, the problems of the production process as well as the problems of real laws, with a *statistical* character, on the formation of the value of goods and of adequate price systems.

The last part of the work is devoted to the problems raised by the study of the laws on the movement of prices. The price movement follows the movement of values within the large framework of social reproduction, where changes in the level of labour productivity, in the structure of production costs, etc. are continuously taking place. It results that the price institutional system must satisfy the exigencies of elasticity, mobility and efficiency in keeping with the requirements of the law of value and of the entire system of laws of the socialist economy, and according to the objective necessity of value deviations.

To see the laws of the price movement, the author uses the modern methods of mathematical statistics, consistently upholding and demonstrating that these methods are *unique* instruments of investigation for outlining the trends which are being manifested in the number of goods and prices.

Generalizing the experience gained so fer in the field of theoretical and applicative investigations on the dynamics of prices, the author presents some of his own results. To this purpose, he used: the stratified selection in the study of price indices; a general model-introduced by the author — of factorial analysis as well as a model of planning statistical experiments of the type $2^n$, with random variables.

The author makes an interesting contribution by introducing a statistical method of transposing the general model of analysis with random variables of the type $2^n$ to the study and elaboration of price indices. The method has also a special practical importance in the carrying out of concrete economic analyses.

The work concludes with an original interpretation given to the concept of *optimum index* — introduced by the statistician H. Theil — in the context of an experimental -applicative study. On this occasion, the classical texts are reconsidered in a new theoretical light, underli-

ning, the analytical-statistical efficiency of various types of price indices.

As can be seen, the presented work deserves high appreciation. It is a comprehensive work, thoroughly substantiated from the scientific point of view. The use with an authentic competence — by an economist — of the modern methods of mathematical statistics and of the theory of probabilities in the study of price problems makes it be included within the works of high value, inspired from the problems of the building of the manysidedly developed socialist society in our country.

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