THE ROLE OF STATISTICS IN ECONOMIC RESEARCH

Sergiy Gerasymenko,
Professor,
National Academy of Management
Olena Chupryna,
PhD. (Economic), Associate Professor,
Karazin Kharkiv National University

The development of modern "economics of science" requires the high rates of science development. The science of all areas must have in equal extent the above mentioned rates. This requires from the society the understanding of the importance of the development of each of them. But the scientists are used to dividing the sciences into 2 groups – fundamental and applied.

In the result of such approach:

1). the scientists-fundamentalists usually interpret applied sciences in the direct understanding of the term "applied"; as the application to the fundamental sciences, but with their own specific object of research;

2). scientists-applicationists over saturate their works with the propositions of the fundamental sciences fearing that otherwise they will not be considered as scientific;

3). practitioners, who use for solving the problem the conclusions and recommendations just of the applied sciences, because of the conglomeration of fundamental terminology can't find the propositions of applied sciences proper, and that is why they take the position of the scientists-fundamentalists (see p.1).

And as a consequence:

1). the scientists-applicationists face with the problems of financing their research in the cases when the received results don't have the enough references on the fundamental sciences, though, as it is known, the suggestions, with can be introduced in practice are made inly according to the results of the applied researches;

2). with the development of the computers the solution of applied tasks is often substituted by making some calculations using a lot of mathematical methods and ways, but without explaining the practical benefit of the received results;

3). inability to determine the practical aim of the scientific research by the most of scientists- fundamentalists, reverts us to the contents of p.2.

In confirmation of the determined theses it is quite enough to look through the works of the best known scientists in the sphere of the so-called "applied" science –

economics. In the modern world the laureates of the Nobel prizes are considered to be such scientists. 65 prizes on economics were awarded, but it is no use going into details of all the works of the laureates. Some generalizations in respect of the biographies of the authors and the form of their scientific publications allow us to make grounded conclusions about the continued "priority of fundamental sciences" (that is – mathematics) while determining the aims and tasks of economics researches.

The first and the main consequence of such approach is the desire of the authors-laureates to substitute in their works the economic terms and concepts by the others. Very often these "new" terms are not understood even by their inventors. But the authority of the famous scientists causes the further occurring usage of such inventions, the sense of which nobody tries to explain. The example of this can be the statement of R.A.C.Frisch, who being the chief editor of the magazine "Econometrics", wrote in 1933 the following: "Econometrics is not the same as economic statistics. And it is not the same that is called economic theory, though the large part of this theory has quantitative character. It is not either the synonym of the usage of mathematics in economics. The experience shows, that each of these 3 points of view – the point of view of statistics, economic theory and mathematics – is the necessary condition for the right understanding of quantitative relations in the modern economic life, but taken each in isolation is not enough. Only the unification of these 3 points of view can form the strong method of research".

Such long citation is given here order to show that it is possible to speak much and long, but say nothing if it is nothing to say. R.A.C.Frisch, who is considered to be the author of the main propositions of econometrics, as we see, couldn't give definition of the science. And T.M.Haavelmo, who is called "the father of the modern econometrics", couldn't do it either. He only could write that in his researches he used the approach which he called "the main law of econometrics: the economic theory can be considered viable only after being checked by mathematical and statistical methods". He also writes about "statistical analysis of econometric models", and that he developed "the statistical theory for analyzing dynamic model".

As we can see, the above mentioned authors as many other Nobel laureates on economics, couldn't give the accurate definition and explanation of the aims, methods and results of their researches. In many cases for describing the same events and phenomena they used different notions. For example, for analyzing the economic processes they suggested using such methods of analysis as mathematical, statistical, economic-mathematical, quantitative economic, econometric. And on their basis to build the models with the same name. Without explaining the difference between them.

The reason of this mess in terminology of such famous scientists is quite simple: the most of Nobel laureates of economics were mathematicians by university education and their first scientific interests! But among the laureates on mathematics, physics and chemistry there were no economists!

Nobody doubts about the compliance of the contents of works of the Nobel laureates on economics with the highest scientific demands. But their form is the main argument of the continued antagonism between the fundamentalists and applicationists: if there are few formulas then this research can't be considered as scientific. It is important to say that the same laureates paid attention to the change of role of the science and its results in the modern society. So D.D.Stigler who avoided using mathematics in his works giving preference to simple literary style. That's why he gained general acceptance for accuracy and elegance of exposition and erudition. But he was an economist by education.

The aim of investigation. Where did the excessive mathematisation of economic and statistical researches lead and continue to lead today? To the necessity, as it was and is with the laureates of the Nobel prizes, of double work: the first – scientific (that is – mathematical) formatting of the results, and then – explaining the kernel of the problem (the role and the significance for practice) and showing the stages of the realization of these results to the practitioners of all levels.

Basic material. Everything above mentioned concerns statistics, in particular – economic statistics. And the main reason why the most of practitioners interpret statistics not as a science but as a method of analysis is the creation of new "sciences" by way of taking from statistics some of its elements.

First of all the formulas were taken from of statistics and the methods which can be used for receiving these formulas. They were called "mathematical statistics". Having found out that the interpretation of the results of the calculation has probabilistic character, the methods of the probability theory were added and the new "science" was called "the probability theory and mathematical statistics".

The statisticians were upset and in order not to loose the integral part of their science, in their turn sorted out for separate consideration and study "the theory of statistics". The further – the more: "the theory of statistics" was divided into "descriptive" and "analytical". And proceeding from the fact that economic phenomena and processes can be considered both as functional and stochastic the "economic analysis" and "econometrics" were invented. But it was not the end: the economic, demographic, social and the statistics of every branch and type of economic activity, international statistics and so on appeared. Plus "simulation and forecasting" also separated from "Statistics".

As a result, "Economics" doesn't consider the branch statistics to be a science, but only mathematical methods for carrying out its economic calculations. And in the economic universities instead of "Statistics" in the wide scientific sense of this word the subject called "mathematical economics" is taught. Though all the propositions of this subject are built on the usage of statistical indices and statistical methods.

Oversaturation of economic publications with mathematics was inherited by the XXI century from the XIX and XX. In the former times universalism of knowledge and shills was welcomed at all levels not only at the scientific. In the

XXI century there is no necessity in this, as the specialization gives better effect then the attempt to know everything and learn everything. And the manager(of any business, territories, any type of economic activity or even country) for making efficient managerial decisions must be able not only to calculate himself, but to define the tasks for those who can analyze, simulate and forecast. But if these 3 "sciences" as in the universities so in scientific publications suggest considering the economic process from their own point of view then it is very difficult for them to by favorably received be the practitioners.

And it is impossible to change the established during 80 years situation of dividing statistics into parts. But it can be done and must be done. Otherwise in some time the term "statistics" will go out of use among practitioners and it will be transferred from the category of "applied sciences" to the category of "fundamental sciences". But once "The statistics" was created as exclusively "applied science".

In order to strengthen for statistics (and statisticians) the status of the main science for ensuring the efficient management of economics, from our point of view, the statisticians should define and rely in their researches on two basic for each science concepts – the aim and the tasks.

A single science which "branched off" the statistics never lay claim to the object to be researched. And the necessity of using just statistics while researching those "mass phenomena and processes" the system of which is presented by the modern economics of micro-, mezzo- and macro- level doesn't demand special proof. Changes, as compared with the previous by generally accepted, demand to apprehend the aims of the research of these phenomena and processes with the help of statistics. Simply speaking, "What is the benefit from using statistics in management?" "The benefit", in other words "the ultimate result" to the attaining of which the activity of economic subject is directed to, is the increase of profit which is reached by way of higher efficiency of this activity. That means, that the main task of the manager of economic subject in to ensure attaining the indicated aim.

For that it is necessary:
- to estimate the results of the work of the past,
- to compare the extent of the influence of the factors which caused the reached result,
- taking into account the investments, which the entity can use, to determine the level of these factors on the future,
- using the forecasted level of the factors to calculate the forecast level of the profit,
- to make this calculation in two version – pessimistic and optimistic,
- all the estimations and calculations should be don by the persons assigned as who are responsible for fulfillment of each solution.

It is impossible to make well-grounded decisions on each question without using statistics, which will:

- collect necessary data,
- prepare them for analysis,
- carry out the analysis,
- allow to draw conclusions about what happened in the past,
- make an information base for building and correcting the models of subject's activity,
- make forecasting calculation.

Proceeding from the aims and the tasks of the users of statistics – manager of economic subjects – the aim and the tasks of the statistics for the economics should be defined:

1) the aim – making constant renovation of the information base which ensures making efficient managerial decisions,

2) the tasks – ensuring the answers for the questions:

"What happened to the subject?"

"Why has it happened?"

"What is the extent of participation of certain employees of the subject in what has happened?"

"To what extend will financial resources be needed for changing the level of factors?"

"What change of the profit can be expected?"

The achievement of the aim and the solution of the above mentioned tasks are ensured by way of carrying out the well-known for statisticians stages of statistic research – statistic observation, data processing and analyzing, formulating the results, simulating and forecasting the process and phenomena. That's why, if in statistical publications along with the statistic terminology to use applied economic terminology then the most of the users – managers and analysts – will easily understand the advantages of the integrated use of one science "Statistics" instead of dozens of its derivations. These advantages will become apparent while formulating the tasks which demand for their solution making special statistic calculations the results of which ensure making efficient managerial decisions.

The complexity of bank system – multiplicity and diversity of bank institutions, and the functions which they perform – cause the creation of large flow of information. The users of this information are bank institutions themselves, their customers and partners in the country and abroad – that is the world financial-economic system.

The need in information is caused by the presence of risks in bank activities and the desire of the participants of the market of bank services to lessen this risk for themselves. A lot of scientists and practical workers dedicated thousands of their works to the estimation of the risks including the risks in bank activities. In all these works the statistical methods are used. But as it is impossible to describe the bank institution, bank operation and the customers of the bank using only 1-2

indices, the proposed by the majority of the authors methods of estimation of the risks are cumbrous and unreliable.

The results of the calculation of the ability of the bank to run across the risk is the determining of the limits as in whole for the portfolio so according to every position separately and the calculations of risk-chances are the premium for risk.

In the world bank practice the calculation of the risks is done from two positions:
- the calculation of the ability of the bank to run across the risk without breaking its financial stableness and reliability;
- the calculation of the risk-chances, which allows to obtain the information as to the expected income of the bank, proceeding from the conditions of taking the responsible risks.

The wave of bank failures in 90s in XX century caused the objective need from the part of the bodies of bank supervision to strengthen their control after the risks. As the main tool of such control Basel Committee for bank supervision in 1995 recommended the central banks of the world to use VaR-methodology for calculating the reserves necessary for covering the possible losses in the result of risk appearance.

The sphere of employment of VaR-methodology is very wide and various. It is used as a tool:
- of inherent monitoring for the risks within the bank;
- of supervision by the central bank for the capital adequacy, necessary to cover risks (outward monitoring);
- of making decision as to the expediency of hedging the risk operations (the comparison is done with the help of VaR before the hedge and after it is carried out. If the difference between VaR before and after the hedge is not considerable, then the expediency of the hedging casts doubt.)
- for determining the limits for the dealers of the bank and the control for observance of these limits;
- of the estimation of different bank projects;
- for determining the efficiency of the ways of using the bank capital taking into account the risks;
- for estimating the efficiency of the bank activity as in whole so of each of its branches;
- for motivating the bank dealers, as their reward is defined taking into account the size of the received income from the bank operations carried by them for one unit of VaR.

In comparison with other methods of risk calculation VaR methodology has some advantages:
- the width of use, that means that it is possible to calculate risks for different markets including those for which the high changeability is the characteristic of them, namely the markets of CIS.

- universality - that means that the risk is calculated not only for one position, but in whole for the portfolio of the bank.
- simplicity of the use of the methods that are based on VaR-methodology.
- convenience of giving the information. With the help of one number that has money expression it is possible to estimate the risk quantitatively in the form of the maximum possible potential losses of the bank capital.
- taking into consideration volatility of securities of the market, the value of risk position and the period of its supporting.

Alongside with the advantages VaR-methodology has some disadvantages, in particular:

- it doesn't secure the accuracy of the obtained result, that leads to the insufficiently correct estimation of the bank risks, as the calculations of VaR are based on the use of the law about the normal distribution of random variables. But in practice it is not always observed.
- it doesn't give information as to the concrete size of bank losses connected with the appearance of risk;
- it is accompanied by rather big financial expenses, as it requires from the staff rather high level of qualification and computerization of bank calculation procedures.

As it is known, for calculating VaR it is necessary to take into account three main components:

1) content and size of the portfolio of the bank (risk position);
2) time period for which it is calculated;
3) the function of the distribution of the parameters of risk (in the case when VaR-portfolio is determined – distribution of its current income)

The researches of the calculation procedures in some banks revealed a number of problems, in particular:

1) calculation of VaR for the investing portfolio of bank is impossible for lack of the market prices for the shares of the most companies;

2) existence of some technical difficulties in calculations, as the content of bank portfolio contains more then ten different financial tools, that leads to the necessity to use the big correlation matrix. And in the conditions of partial automation it is very difficult.

At present the banking system of Ukraine is in the stage of formation. The lack of knowledge and experience as well as corresponding normative demands from the part of the National Bank of Ukraine are the main reasons why the majority of banks don't make the estimation and calculation of risks.

The research of the practice of calculation of bank risks in Ukraine made by us proves that in the most cases the calculation of the ability of the bank to run across the risk is realized by the empiric way, and the calculation of risk-possibilities (chances) is not done at all.

It is caused by the following factors:

First – by the instability of macroeconomic situation in Ukraine, that doesn't allow to create the objective informational base, which would serve as the basis for estimating and calculating the risks, for the prognoses of their appearance and also for determining the limits of their influence on the bank activity.

Second, very low level of methodological and informational providing for calculating bank risks. From the point of view of the level of methodological providing and the gained practical experience as to the estimation and calculation of the risks, the banks of Ukraine can be divided into three groups:

1. The subsidiary institutions of the famous foreign banks. It is necessary to stress that these banks have definite experience as to the calculation of the risks, but their experience was not elucidated in the means of mass media.

2. Big banks. In these banks we can see only the process of formation of the system of risk management with the use of modern tools for calculating these risks. From the whole complex of modern methods of risk calculating (historical simulation, method of Monte-Carlo, test simulation, analytical method and so on) only analytical method is sometimes used.

3. Medium and small banks. The part of these banks constitutes approximately about 86% of their total amount. The specific feature of his group is the lack of methodological, informational and staff providing for carrying out the risk calculation. That's why in these banks the quantitative estimation of risks and their calculation on the basis of VaR-methodology practically is not done.

Third, insufficient level of the development of information technologies in banks, and first of all, software, doesn't allow to automatize completely the process of risk calculation. This keeps back the use of modern approach to risk calculation in Ukraine. The main reason for such situation, from our point of view, is very high cost of software for risk calculation as compared with the obtained profit by the banks of Ukraine, and also insufficient economic advantage from the introduction of calculation procedures as compared with the cost for their elaboration.

The multiregression analysis in some cases allows to determine the influence of factors on the generalized estimation of risk. And then the participants of the market of bank services get the possibility to compare the risk and profitableness of definite bank operations and to make the well-grounded choice in favour of the definite bank institution, to fix the grounded cost of the definite bank operation, to define the priority in making the decision concerning the definite bank branch and so on.

That's why the comparison analysis for estimation of the risks of bank operations or participants of the market of bank services, and for choosing the ways of their lessening was widely spread. For modern banking the need in such comparisons is great:

choosing by the investor the object for investment;

fixing the individual credit rates by the bank;

choosing the bank for cooperation by the client;

estimating the financial conditions of the branches of bank, and so on.

Comparison is being made, of course, simultaneously according to several indices. The main problem is to define the list of indices according to which such comparisons are made. But we don't consider this problem in this article.

Let's consider, that the list of the demanded indices is made, then the problem raises to determine the rank for definite elements of the totality on the basis of these indices. The difficulty is that more often the indices don't allow to draw a simple conclusion: the values of some indices demand to include the element in the "best" group, while the values of others – in the "worst" group.

The generally known solution in this case can be the calculation of multidimensional mean. The methods and peculiarities of its calculation are considered in many scientific publications. But one of the most important questions connected with the grounds of the accuracy of the conclusions received by this way, so far hasn't been described in the applied statistic investigations. We must stress, that just in the applied investigations, because the theory of statistics contains the description of the answer to this question. Unclaiming of the theory by the practice in the given case once more shows the distrust of the economists-analysts to statistics and their inability (and very often – unwillingness) to operate with the precise data.

In this article we consider the kernel of the problem of raising the precision of the comparative analysis and its solution. The banker will say that the choice of the best (worst) branch must be done according to the *Profitableness of the assets,* which is generalising. But he must also take into consideration other indices, the meaning of which form *Profitableness of the assets.*

For example:

profits per one employee;

level of profitableness of the credits;

number of clients per one employee;

proportion of interest-bearing income in the total sum.

The accuracy of the result is defined first of all by the substantiation of the weights used while calculating $\overline{P_i}$. In practice it is a common thing to use the opinion of experts for this.

Insufficient accuracy in determining the weights by the method of expert estimation is caused by the following:

1). the concepts "opinion" and "expert" are not statistical, as there are no generally accepted definition of these concepts;

2). expert can determine the difference between the weights only in the form of conditional "unity", which has not got economic interpretation;

3). if conditions in which the event takes place change the new expert estimation is demanded.

At the same time the theory of statistics offers very simple and easily realised with the help of the computer method of precise determination of the contribution of the share of every factor in the variation of the result.

As it is known, the coefficient of multiple determination is determined by the following formula:

$$R^2_{y.12} = \frac{\sum (Y_i - \overline{y})^2}{\sum (y_i - \overline{y})^2} \tag{1}$$

where: Y_i theoretical meanings of the indices calculated according to the equation of regression.

It is also known, that while learning the correlation, for example, between three variables:

$$Y_i - \overline{y} = b_1(x_1 - \overline{x_1}) + b_2(x_2 - \overline{x_2}), \tag{2}$$

where: b_k - the coefficients of regression.

Taking into account the formulas of the calculation of the variances s_1^2 and s_2^2, and also s_{12}, and substitute (2) by (1) we will receive:

$$R^2_{y.12} = \frac{b_1^2 s_1^2 + 2 b_1 b_2 s_{12} + b_2^2 s_2^2}{s_y^2}. \tag{3}$$

If we build the equation of regression not according to the original data but according to the standardized:

$$y' = \frac{y - \overline{y}}{s_y},$$

$$x'_k = \frac{x_k - \overline{x_k}}{s_k},$$

(where: S_y and S_k – standardized deviations)
Then:

$$R^2_{y.12} = \left(b'_1\right)^2 + \left(b'_2\right)^2 + 2 b'_1 b'_2 r_{12}, \tag{4}$$

and summarizing

$$R^2_{y12\ldots k} = r_{y1} b'_1 + r_{y2} b'_2 + \ldots + r_{yk} b'_k \tag{5}$$

where r_{yk} – bivariate correlation coefficient.

So, by multiplying r_{yk} by b'_k influence of x_k on y is corrected ("is cleaned" from indirect influence of other factors). It means that $r_{yk} b'_k$ became similar to the partial coefficient of determination, but moreover has its own preferences: much easier to calculate; always positive; has the property of additivity.

With the help of correlation – regression analysis the degree of estimation of the results of the activities of branches using each index separately was defined. With the help of multidimensional mean their influence was taken into account in one multidimensional index. Ranking of branches, made with the help allowed of correlation – regression analysis to give the objective comparative estimation of the risks of the activities of the branches and expose those, which in the first turn require the interference of bank top authorities for not allowing the worsening of the situation in the bank in whole.

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Анотація

В статті автори розглядають напрямки використання статистики для досягнення цілей економіки. Більш детально розглянуто застосування статистичних методів в оцінюванні ризику банківської діяльності.

Ключові слова: статистика, економіка, статистичні методи, банківська діяльність.

Аннотация

В статье авторы рассматривают направления применения статистики для достижения целей экономики. Более подробно рассмотрено использование статистических методов в оценивании риска банковской деятельности.

Ключевые слова: статистика, экономика, статистические методы, банковская деятельность.

Summary

In the article the authors consider the role of statistics in economic research. The use of statistical methods in the estimation of the risks of bank activities is consider more detailed.

Keywords: the statistics, the economic, the statistical methods, the bank activities.

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