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of each part. On the basis of the data obtained, he calculates the average dimensions of the part after processing and writes these figures on his chart. As the average dimensions of the part from one test group to another gradually approach maximum tolerance and might soon go beyond it, i. e., a defective part might appear, the inspector stops the machine. On a signal from the inspector, the foreman and technologist check on why the dimensions of the part diverged from the norm: whether the machine went wrong, whether the adjustment was thrown off by vibration, or whether the cutting tool was worn. Steps are immediately taken to restore the precisely established technological process. Thus OTK does not repair a defect but anticipates it.

"The results speak for themselves," write A. Novikov and V. Semenov. "A defect on a particular part was completely eliminated or held to only a few instances. On the whole, defects were cut by twice throughout the plan, and now constitute no more than 0.4 percent of the entire output. Not only is there no need for additional inspectors in the shops, but in many sections, where formerly three OTK inspectors were necessary, two workers now handle the entire job."

During its rapid development, Soviet statistics met vigorous opposition from adherents to bourgeois viewpoints, and from anti-party, sabotaging elements who were trying to utilize statistics as their weapon. Anti-Marxists, and ultra-leftists who held to the "theory" of the withering away of statistics under socialism, dealt a heavy blow to the development of Soviet economic statistical theory. The essence of the theory boils down to the arguments that under planned economy, the area for application of statistical methods in the field of economics disappears, that economic statistics is an implement of the capitalist system, and that the basis of its application is an elementary law of capitalist economics.

The theory of the withering away of economic statistics under socialism is propagandized in statistics textbooks, by Professor A. Ya. Boyarskiy and others. These authors artificially sever the conception of accounting from that of statistics, maintaining that in contrast to a capitalist economy with its elementary character, a socialist economy as a planned economy is a matter not for statistics, but for accounting. They maintain this despite the exhaustively clear ~~statements~~ given by Lenin and Stalin on the significance of statistics for socialist construction.

Nevertheless, the most widely disseminated textbook on statistical theory for higher educational institutions at present remains A Course of Statistical Theory, by Professor B.S. Yastrenskiy, Professor A. Ya. Boyarskiy, V.S. Novikov, P.P. Shysherin and O.S. Davydova, published in 1938. This textbook was subjected to devastating criticism in an article entitled "The Latest Wrecking in Statistical Science" (Bol'shevik, No 23-24, 1938), and also in the Planovoye Khozyaystvo, No 1, 1939. The textbook is no way satisfies the needs of statistical instruction in higher educational institutions, although it came after the theory of the withering away of statistics under socialism was exposed. The authors of this textbook criticized the theory an anti-Marxist (modestly passing over the fact that they themselves preach it!). In addition, the basis for applying statistics to the planning process of the socialist national economy is presented in this textbook in an anti-Marxist manner.

"At the same time, it follows", they write, "that the law of large numbers is by no means related only to elementary phenomena. One may introduce many examples of conscious management by mass processes, the elements of which are accidental in the sense indicated above. It is sufficient to point to such a simple, everyday operation as the boiling of water, which can be calculated beforehand in minutes, but which represents a process of just such

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a kind. The action of the law of large numbers on this process is indisputable."

And so, the theory of the withering away of economic statistics under socialism is refuted, and only one glass of water is needed! It seems that the law of large numbers in a planned economy plays the very same role that it does in physics.

The place and role of the law of large numbers in Soviet economy undoubtedly need serious and detailed theoretical development. But the authors of this textbook, as well as other Soviet statisticians, did not properly concern themselves with the problem.

Many other questions of statistical theory are dealt with in this textbook in a complete break from political economy, from real economics. Particular attention must be paid to the method of calculating the average yearly rate-of-change of social production, the more so because the erroneous exposition of this question by Professor Boyarskiy is uncritically accepted by all authors of textbooks on statistics coming out before 1946. The author of this article must acknowledge that even he uncritically followed Professor Boyarskiy on this question. The example with calculations of the rate-of-change of production is instructive since it graphically indicates to what erroneous conclusions an oblivion to Marxist political economy and a misunderstanding of the task of true expression of real economic activities may lead.

In April 1929 at the Plenum of the TsK VCP (b), Comrade Stalin said in a speech on rightist deviations that "the method of averages, if not corrected by regional data, is not a scientific method." Explaining this, Comrade Stalin said: "If we are to survey the progress of acreage under cultivation according to regions, i.e., if we are to approach this matter scientifically, it appears that in some regions, acreage under cultivation increases regularly and that in others (they drop sometimes, mainly in connection with weather conditions) there is no data, even in one of the major grain regions, indicating a regular decrease of acreage under cultivation."

This instruction of Stalin must serve Soviet statisticians as a basic instruction on the theory of averages. However, Professor Boyarskiy, using as an example the sown acreage of hundreds of grains, states that the only correct average for calculating average yearly rate-of-change of national economy indexes is a particular kind of geometric mean. This conclusion, fundamentally contradicting the instructions of Comrade Stalin, leads to mistakes in calculating the average yearly rate-of-change.

Boyarskiy analyzed the following example:

| Year | Sown Acreage<br>(in 1,000 hectares) | Percent of Change over<br>Preceding Year |
|------|-------------------------------------|--|
| 1933 | 2,879                               | --                                       |
| 1934 | 2,858                               | -1                                       |
| 1935 | 2,862                               | 0  |
| 1936 | 4,532                               | 58                                       |
| 1937 | 5,561                               | 23                                       |

According to the formula recommended by Professor Boyarskiy, the average yearly rate-of-change for the 4-year period is equal to the fourth root of the product of the yearly rates, i.e.:

$$\sqrt[4]{\frac{2879}{2879} \times \frac{2862}{2858} \times \frac{4532}{2862} \times \frac{5561}{4532}} \text{ or, } \sqrt[4]{\frac{5561}{2879}}$$

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The perversity of this method of calculation is completely clear. The real economic process between terminal years can develop as you wish: the rates-of-change of sown acreage can increase or drop, the drop may alternate with the increase, etc. Averaging in the manner recommended by Professor Boyarskiy, the rate-of-change remains unchanged, as long as the terminal years are not changed. This averaging does not express the real process; the singularity of its development remains apart.

The general properties of the formula recommended by Professor Boyarskiy are:

1. If the rates-of-change of production from year to year are increasing, their geometric mean understates them, and the faster the rate-of-change, the greater the understatement.
2. If the rates-of-change of production are falling from year to year, the geometric mean shadows their fall, the more so, the faster the rate falls.

Thus, the application of the geometric mean recommended by Professor Boyarskiy is adequate only in that particular case when the rate-of-change of production remains almost constant.

Calculations of average yearly rate-of-change of the USSR national income can illustrate to what result similar unscientific methods of calculating averages may lead. The national income of the USSR changed in the following manner:

| <u>Years</u> | <u>Income</u><br><u>(in billion rubles)</u> |
|--------------|---|
| 1932         | 45.5  |
| 1933         | 48.5  |
| 1934         | 55.8  |
| 1935         | 65.7  |
| 1936         | 86.0  |
| 1937         | 96.3  |
| 1938         | 105.0                                       |

The average yearly rate-of-change, calculated according to the formula recommended by Professor Boyarskiy, is plus 15 percent. Calculation by summation of the amounts of national income and of their rates-of-change gives 16.7 percent. Thus, there is a difference of almost 2 percent. At first glance, this error is small. But in the interpretation of a few years, particularly the Five-Year Plans, it is very significant. Even at the end of the First Five-Year Plan, the error amounts to 18 percent; at the end of the Second Five-Year Plan it reaches 76 percent; and at the end of the Third, 240 percent (relative to the base year). Thus, an error of 2 percent of the rates-of-change calculated on a base period is by no means insignificant.

The effect of a break from Marxist economic science in the field of statistics is indicated by the following example. Lampert's work, "A Demographic Analysis of the Consequences of the Soviet Occupation of the Latvian SSR, 1941-1945", with a foreword by Professor Boyarskiy, appeared in Riga in 1946. In the role of official opponent, Boyarskiy gave a positive testimonial to this work, and Lampert received the scientific degree of Candidate of

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Medical Sciences. Meanwhile, Lempert's book is found to be unscientific.

It is sufficient to point out that the author, alluding to a "sane mind," "logicality," and correctness," refers to the mass annihilation of the population by the Germans as "mechanical movement of population." This pro-fascist slanderous concoction of Lempert's was exposed in the Soviet press. However, even after this, the Council of Scientific Workers of the Health Statistics Section, Institute of Public Health, and the Medical History Section of the Academy of Medical Sciences, as a result of the explanation given by the "opponents," Professor Boyarskiy and Professor Markoviy, presumed to point out, possibly with some reservations, that Lempert "conducted a significant statistical investigation." This fact shows that bourgeois methods of approach are still very widespread among statistical scientific workers, with whom the significance of an investigation is evaluated not according to its political, social-economic sense, but according to pseudoscientific phraseology.

In this respect, the recent speech of Academician V.S. Nemchinov at the session of the All-Union Academy of Agricultural Sciences in honor of V.I. Lenin is also characteristic. Academician Nemchinov, ignoring the essence of the reactionary, idealistic biological theories of Weissman, Morgan, and Mendel, and scorning the progressive, materialistic essence of the teaching of Michurin, Williams, and Lysenko, tried to argue in favor of a pseudoscientific chromosomal theory of heredity -- a statistical one.

These facts once more emphasize the necessity for statistical scientific workers to grasp profoundly Marxist-Leninist theory and to apply it undeviatingly in their work. It is primarily necessary to generalize the instructions of the great leaders of the Party, the creators of the Soviet state, Lenin and Stalin, the instructions of the Party and of the government on questions of statistics.

The creation of a high-quality textbook on economic statistics, which would deal with questions of calculating the accounted balance of the national economy, is a task for scientific workers in the field of economic statistics. In May 1938, at the First All-Union Council of Upper School Workers, Comrade V. M. Molotov noted that there was an insufficient number of good textbooks for higher education, particularly textbooks on accounting and statistics. Such a textbook must be created by Soviet statisticians in as short a time as possible. This work is made easier by the fact that in N. A. Voznesenskiy's book The War Economy of the USSR During the Patriotic War, basic models of the balance of the national economy are given. Voznesenskiy's book serves as an excellent example of scientific utilization of the facts of social-economic statistics for analyzing problems of socialist economy.

The preparation and publishing of a series of monographs on statistics is also an urgent task, and is entirely realizable. No other country has so many qualified statisticians as the USSR.

A profound study of the bases of statistics as a science can prevent the recurrence of nihilistic theories which have caused serious damage to Soviet statistical science. It is necessary to attract philosophers, economists, statisticians, and mathematicians to work out this question.

The working out of scientific statistical methodology, particularly utilizing the experience of sampling technique, and the study of questions relating to sampling theory are quite necessary. The role of sampling technique is a most responsible one (sampling research on crop productivity, on qualitative indexes of livestock raising, and others). They are ever more widely applied in the practice of Soviet statistics.

The utilization of experience in applying statistical methods to the tech-

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nique of controlling the quality of production, of fighting defective production, and of organising precise machine and instrument construction, is particularly important. Answers to our questions on the statistics of material and technical economic norms, of new techniques, and of natural resources are still entirely inadequate. Theoretical work in these fields lags far behind the inquiries of socialist construction.

• Finally, the challenging party criticism and its unmasking of bourgeois statistics -- the bankruptcy of its "scientific" principles, its rottenness, weakness, and apologetic role -- and also, the eradication of all traces of obsequiousness to bourgeois science are an affair of honor with Soviet statisticians.

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