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Introduction

THE purpose of this brief study is to inquire into the reliability and general usability of Soviet statistics of the *physical* output of industrial commodities, with particular reference to the period beginning with the Five-Year Plans. Although I shall not be directly concerned here with the reliability of Soviet indexes of industrial production or of similar aggregative measures—a problem that has already received careful attention in the Western literature on Soviet statistics,[1] a major reason for this study is obviously to provide an additional basis for the interpretation of such aggregative series, whether the official Soviet ones or those computed by independent scholars on the basis of Soviet physical output data.

In virtually every case the physical output datum, whether an absolute figure or a relative (percentage), is revealed to us by a Soviet source, such as a statistical handbook, an official announcement, a speech, an article, or a radio broadcast. The revealed datum is what we have. Our problem is to find out whether it is a reliable representation of the actual event or situation that it purports to represent; and further, for any given time series of output figures, how the degree of reliability varies over time.

The revealed datum is not a first-hand representation of the actual event. Unless simply invented at publication, it is presumably taken, with greater or lesser fidelity, from statistics compiled for the official use of the authorities at some administrative level (all-union, republic, *oblast'*, etc.). But these statistics themselves are not a first-hand representation of the actual event. Rather, they are the end result of a complex, multistage flow of statistical data, which begins with the primary entry in immediate contact with some element of the actual event and passes through enterprises, the economic-administrative hierarchy (trusts, ministries), and a succession of statistical bureaus.[2] At various points in the course of this flow the data are recorded, re-recorded, reported, consolidated

[1] See, for example, A. Gerschenkron, "The Soviet Indices of Industrial Production," *The Review of Economic Statistics*, November 1947, pp. 217-226; N. Jasny, "Intricacies of Russian National Income Statistics," *Journal of Political Economy*, August 1947, pp. 299-322; D. Hodgman, *Soviet Industrial Production, 1928-1951*, Cambridge, Mass., 1954; and A. Nove, "'1926/27' and All That," *Soviet Studies*, October 1957, pp. 117-130. It may be noted at this point (the subject is treated in greater detail in Chapter 5 below) that the distinction between aggregative (value or index) series and series in physical units is not a sharp one.

[2] See Chapter 3.

with other data, and otherwise processed, and at any such point they may be accidentally or deliberately distorted. As we shall see, of all the stages in this flow, one of the most crucial ones is the reporting of output data by the producing enterprise to its administrative superiors, to statistical agencies, and to certain other entities.

If the purpose of this elaborate recording and reporting activity were merely to prepare statistical compilations for the use of scholars, or even for the exercise of indirect (e.g. monetary) controls in a market economy, and if the government that collected and published the data had no special stake in the image of its country that it presented to the world at large, the problem of reliability would hardly go beyond such considerations as the logic and rigor of industrial classification, the conscientiousness of the recording and reporting personnel, and the likelihood of innocent errors and omissions. But, for a variety of reasons, this is emphatically not the case with Soviet statistics. First, the Kremlin has a monopoly of publication within the Soviet Union and has compelling strategic, political, and ideological interests in the image of the Soviet economy that it presents both abroad and at home. Therefore we should not be surprised if it publishes statistics that are partial, selective, often deliberately ambiguous, perhaps falsified (in the strict sense of the word), and as likely as not misleading. (Of course the extent to which Soviet statistics are misleading depends on the sophistication of the reader.) Thus, the question of the intent (and, if one wishes, also of the moral responsibility) of the Soviet leaders enters into an appraisal of Soviet statistics. What are they trying to prove? How are they trying to mislead the world? What follows from this about the usability of a specific statistical datum? Questions such as these, dealing with the distortion of statistics at the time of publication, are discussed in Chapter 7.

But this is not all that affects, in a systematic and perhaps predictable way, the reliability of Soviet statistics. The second important consideration is that the Soviet economy is a "command economy"[3]—a fact that is no less significant for our purpose than

[3] As used here, the concept of "command economy" is akin to certain concepts to be found in the recent German literature on economic systems; such as *direkte Befehlswirtschaft* ("direct command economy"; see Adolf Weber, *Marktwirtschaft und Sowjetwirtschaft*, Munich, 1949, Part II), *zentralgeleitete Wirtschaft* ("centrally directed economy"; see Walter Eucken, *Die Grundlagen der Nationalökonomie*, 6th ed., Stuttgart, 1950; 5th ed. translated as *The Foundations of Economics*, London, 1950, see esp. pp. 119ff.), and *Zentralverwaltungswirtschaft* (K. Paul Hensel, *Einführung in die Theorie der Zentralverwaltungswirtschaft*, Stuttgart, 1954, *passim*). It is also similar to the

that it is a planned economy. In contrast to a market economy, a command economy allocates resources and attempts to attain balance (in the sense that the inputs required for the production program will themselves be produced or otherwise forthcoming) and perhaps a measure of allocative efficiency, not primarily through the market mechanism but largely by direct production orders (commands) from the central authorities to the enterprises. The commands for production are generally based on central planning of some sort and are often supplemented by allocation (rationing) orders for the more important or more scarce factors and commodities, as well as by financial controls.

The nature and role of information in a command economy are, therefore, quite different from what they are in a market economy. The difference pervades the whole economic fabric, and even reaches deeply into individual firms to affect their internal reporting and accounting.[4] In the case of a market economy, the information required for its operation consists primarily of offers, frequently not addressed to anyone in particular, to engage in certain transactions at certain prices. Output reports by enterprises are not necessary; if they are submitted at all to statistical agencies or government bureaus, it is not to ensure balanced (not to say efficient) production within the economy, but to supply information either "in general," or for fiscal purposes, or for the operation of certain controls or the pursuit of policies of economic stability—all of which are not essential to the market mechanism as a form of economy-wide organization, albeit perhaps quite necessary for the long-run survival of the particular economic system, or for other good reasons.

In a command economy, on the other hand, the centripetal flow of production (and other) information is absolutely essential for the functioning of the system, that is, for the issuance of production

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concept of "hierarchy" as a "process of organization," when the latter is viewed on an economy-wide scale (see R. A. Dahl and C. E. Lindblom, *Politics, Economics, and Welfare*, New York, 1953, pp. 227ff.). The earliest use of the term "command economy" in the English literature occurs to my knowledge in George N. Halm, *Economic Systems*, New York, 1951, pp. 310ff., where acknowledgment to Weber, *op.cit.*, is made.

[4] In this connection, see the illuminating article by R. W. Campbell, "Accounting for Cost Control in the Soviet Economy," *The Review of Economics and Statistics*, February 1958, pp. 59-67, which shows that Soviet cost accounting is geared primarily to supply information for control by superior authorities over management, rather than for control by management over costs. Price formation is similarly affected; see my article "Industrial Prices in the USSR," *American Economic Review*, May 1959, pp. 50-64.

and allocation orders, and (what is sometimes overlooked) for the appraisal of the performance of subordinates by the central authorities. The compilation of statistical abstracts is only a by-product of these functions. Moreover, just as the production commands must be, as the Russians say, "addressed" to particular economic agents in order to pinpoint the responsibility and accountability for their execution, so the reports flowing in the opposite direction cannot be anonymous.

The analogy between the Soviet economy and a military organization that is frequently drawn by outside observers, and which is underscored by the vocabulary of Soviet economic administration, can be extended to the intrasystem communication: subordinates submit periodic reports on the progress of the "campaign"; on the basis of these reports, the central command issues orders *and* promotes or disciplines subordinates; and in turn, completing the circle, the subordinates report on their execution of the orders. The principle of authority-and-subordination, with all it implies for information and communication, pervades the Soviet economic system from top to bottom. But authority breeds deception, and commands elicit simulation. These problems have, as we shall see, a profound bearing on the reliability of Soviet statistics.

The third characteristic of the Soviet economy that impinges on statistical reporting is the chronic sellers' market. Its relevance is twofold: it affects the quality and specification of the goods whose output is being reported, and it removes or weakens certain checks on the inaccuracy of reporting. These problems will be taken up at various points in the present essay.

Although in the following chapters I discuss a number of serious difficulties and grave problems that arise from the nature of the Soviet economic system, it is not my purpose to pass over-all judgment on the Soviet economy as compared with the American economy, on command economies in general as compared or contrasted with market economies, or on sellers' markets as against buyers' or "neutral" markets. But I do want to stress that one must not exaggerate the specifically Russian or communist elements in these problems. Rather, given the way human beings react in the face of authority and in their quest for material well-being, the problems discussed here arise by and large from the logic of a command economy and a sellers' market. To be sure, many of the details, aspects, and nuances are peculiar to the Soviet scene, and some perhaps even to the Russian "national character," if there be such

a thing. But the broader outlines of these problems can be easily recognized in other authoritarian organizations, especially in other command economies, and in sellers' markets in other countries and at other times. That the *Befehlswirtschaft* of the Nazis evinced many traits in common with those of the Soviet economy is by now well known. But some of these traits may manifest themselves even in what we would generally regard as a nontotalitarian environment, being brought out by the economic "logic of things." Thus, the British Ministry of Aircraft Production during the last war—a sort of command economy operating in a sellers' market—struggled with many operating problems, including that of obtaining reliable statistical information, strikingly similar to those that we often regard as characteristically Soviet.[5] And even such an "outlandish" Soviet practice as the classification of perfectly good products as "spoilage" by the producing enterprises themselves (see p. 82) had its counterpart in the early postwar years in Japan, where manufacturers receiving allotments of rationed materials for the ostensible purpose of production for export would declare the products "spoiled" in order to be able to dispose of them domestically at higher yen prices.[6]

I have already said enough to suggest that the approach in this study of the reliability of certain Soviet statistics is mainly one of economic-systemic analysis: namely, an analysis of the obstacles to an accurate and unbiased flow of information, given the structure of plans, orders, incentives, and sanctions that prevail in the Soviet command economy, and also given the sellers' market that is such an important feature of it. In doing so, I have the benefit of the considerable research on the operating principles and characteristics of the Soviet economy that has been accomplished in the United States and other Western countries since the war. Particularly heavy is my intellectual debt to Professor Joseph S. Berliner, whose careful research of considerable insight on the behavior of Soviet industrial managers has been of great value for this study.[7] In addition to research by Western scholars, the evidence employed in this study consists primarily of the public concern of Soviet statistical and political authorities over the reliability of the statistical data at

[5] See E. Devons, *Planning in Practice: Essays in Aircraft Planning in Wartime*, Cambridge, 1950, especially Chapter VII.

[6] I am indebted to Professor Leon Hollerman of Claremont Men's College for bringing this point to my attention.

[7] See especially his *Factory and Manager in the USSR*, Cambridge, Mass., 1957.

their disposal; reports in the Soviet literature of specific instances of data distortion and of related problems; and eyewitness accounts of former residents of the USSR, particularly as collected and analyzed by Berliner. The description of the statistical apparatus and system rests largely on Soviet textbooks and similar material.

The nature of the evidence, coupled with the understandable reluctance of Soviet authorities to share with the world at large such estimates as they may have of the exact extent of the inaccuracies in published Soviet statistics, means that our conclusions are of necessity qualitative rather than quantitative. It is hoped that they are no less valid or significant for this reason.

Moreover, the evidence is extremely fragmentary, and it might be felt that generalizations about Soviet industry as a whole and about the entire Plan era are difficult to make. However, it seems to me that a certain amount of cautious generalization is not unwarranted because the relevant institutional and organizational conditions are quite uniform in all branches of Soviet industry at any one time, and remained remarkably stable from the early thirties until at least the reform of industrial administration in 1957. The changes since 1957, as they affect the present study, should also not be overestimated. (At any rate, since the National Bureau is carrying its Study of Soviet Economic Growth only through 1955, relatively little attention is paid here to the effects of the 1957 reform.)

Lastly, this study consciously eschews any international comparisons of the quality of industrial production statistics. Thus, while this study necessarily focuses on certain shortcomings of the Soviet statistical system, and a few obiter dicta by way of international comparison may even be offered on the pages to follow, no judgment is passed here on the over-all quality of Soviet statistics of physical output of industrial commodities (not to say statistics in general) in relation to those of other countries. Such a comparative analysis would require a much more formidable inquiry than has been attempted here.

Terminology

The usability of any statistical datum for a given purpose depends on its *reliability* and its *precision*. Precision is both quantitative and descriptive. Quantitative precision is determined by the number of significant digits in the figure. Descriptive precision, or definitiveness, varies directly with the completeness of the revealed definition of the statistical category that the figure purports to measure. As

definitiveness decreases, ambiguity increases. It may be worth noting that beyond a certain point additional precision, whether quantitative or descriptive, may be of little value. Not only may it be spurious, but by imparting an unwarranted appearance of accuracy it may actually be a disservice to the user of the statistics.[8]

The reliability of a datum is essentially a matter of its accuracy. By accuracy I mean the degree to which the datum corresponds, within its own context, to the actual event or situation that it purports to represent. (It is, so to say, the truthfulness of the datum, using this term now apart from any moral connotations.) Inaccuracy results from the distortion of data, which in turn may be due to error, omission, or falsification. The last, of course, may go as far as sheer invention, "pulling out of thin air." As I use the terms in the present study, error and omission are unintentional (though not necessarily random or unbiased), whereas falsification is an intentional act, for whatever motive, by someone interposed between the actual event or situation and the user of the data.

I shall distinguish between two kinds of distortion. The first is *numerical distortion*, where the resulting inaccuracy is in the figure itself. The second kind of distortion refers not, or not only, to the figure itself, but to the description of the statistical category in question. I therefore call it *descriptive distortion*, under which I subsume *contextual distortion*, that is to say, distortion arising because although the datum may not be inaccurately described, it nonetheless is placed in a context that tends to mislead the reader as to its exact meaning. Of course, both numerical and descriptive distortion may be deliberate, in which case the term "falsification" applies. While the distinction between the two kinds of distortion, numerical and descriptive, should not be overstressed, it has some usefulness, at least in discussion of the process whereby the datum is distorted. Moreover, while numerically the distinction between accuracy and precision is quite clear, descriptively the distinction between distortion and ambiguity is not a sharp one; certainly a

[8] Some problems and perils of undue precision are discussed in the pioneering work of Oskar Morgenstern, *On the Accuracy of Economic Observation*, Princeton, 1950, p. 25 and elsewhere. Quantitatively, the published Soviet statistics are often precise enough for most of our purposes, being expressed in two, three, and sometimes more significant digits. Only one consideration might be added: arithmetic manipulation of the figures, such as concatenation of the ubiquitous percentages, should take into account the possible extent of their rounding, and the result should be expressed, where practicable, as a range rather than as a single figure.

lack of due definitional precision may give rise to descriptive distortion.

The quantitative effect of distortion may be in either direction; that is, it may either exaggerate or understate the actual event or situation. When the distortion is numerical and deliberate (i.e. a falsification), I shall use the terms *write-up* and *write-down*.[9]

Since I am concerned here only with the individual datum, and not with a collection of statistical data, selection with the purpose of misleading may be disregarded as a form of distortion.

Finally, by *bias* I mean a persistent and significant inaccuracy in one direction. (No moral connotation is implied.)

As might be expected in a rigidly planned and extremely centralized economy, Soviet statistical terminology is at any one time highly standardized, and it will be convenient to abide by it insofar as practicable.

Industry. By Soviet definition, the term "industry" (*promyshlennost'*) comprises the activities of mining, manufacturing (including the production of electricity and gas), fishing, logging, and "work of an industrial nature" (such as repairs).[10] There are several standard breakdowns of this aggregate. For instance, in the breakdown by ownership, Soviet sources distinguish between socialist (state and *kolkhoz*-cooperative) and, for the earlier period, private industry. Until the middle of 1957 state industry was further divided administratively into that under the jurisdiction of industrial or of nonindustrial ministries, and, by level of significance, into industry under union, republic, or local subordination; since the middle of 1957 state-owned industrial enterprises have been subordinated either to the regional "councils of economy" (*sovnarkhozy*) or to local government agencies ("local soviets"). Another classification of industry is by branches (power generation, machine-building, etc.) and subbranches.[11] A specific Soviet breakdown is into Groups "A" and "B," i.e. branches of industry producing means of production and articles of "people's consumption," respectively—a classification that roughly parallels Marx's division of the whole economy into Departments I and II. Lastly, there is the important breakdown into large- and small-scale industry according to the size of the

[9] The standard Soviet word for "write-up" (noun) is *pripiska*, its near-literal equivalent. There seems to be no standard Soviet term for "write-down."

[10] Prerevolutionary statistics omit the last three categories from "industry."

[11] For example, see A. I. Ezhov, *Statistika promyshlennosti* [Statistics of Industry], Moscow, 1957, pp. 43-50.

enterprise (see section on small-scale industry censuses in Chapter 3).

Basic (*osnovnye*) enterprises are those which possess financial and administrative integrity, i.e. which have their own balance sheets. Those that do not meet this test are known as *subsidiary* (*podsobnye*) enterprises. Subsidiary industrial enterprises are frequently attached to basic nonindustrial ones, e.g. the repair shops of railroads, or the mills of collective farms.

Uchet. The important Russian term *uchet* is incapable of exact English translation, and has therefore been frequently rendered by such related notions as "accounting" and "statistics." The closest equivalents are perhaps "recording," "record-keeping," and "keeping account of (something)"; I shall use these expressions alternatively, depending on the context.

As to the content of this record-keeping, Soviet sources distinguish three major types of *uchet* on the enterprise level:

1. The first comprises the keeping of both engineering records (*tekhnicheskii uchet*), usually in physical units, e.g. temperature, pressure, weight, etc., and records of operations (*operativnyi uchet*), which cover all day-to-day activities of an enterprise. These overlap to a considerable extent and are therefore designated jointly as *operativno-tekhnicheskii uchet.* Its purpose is to aid managerial decisions at the enterprise and higher levels.

2. The second major category, *bukhgalterskii uchet,* deals primarily with value magnitudes and corresponds closely to what is known as accounting in the United States. (However, as befits a command economy in contrast to a market economy, there is no independent public accounting or auditing in the USSR as we know them in the United States. These functions are performed for the enterprise by superior administrative entities and various agencies of state control.)

3. Third, the sources speak of the keeping of statistical records (*statisticheskii uchet*), which bring together the accounting data and operational records, as well as some other information. These records are set up in such a way as to be able to gauge the extent of plan fulfillment, and they constitute the basic source of data for Soviet economic statistics.[12]

[12] On these categories of *uchet,* see Ia. S. Bebchuk, *Uchet, kal'kuliatsiia i tekhnicheskaia otchetnost' mashinostroitel'nogo predpriiatiia* [Record-Keeping, Calculation, and Engineering Reporting in the Machine-Building Enterprise], 2nd ed., Moscow, 1954, pp. 6-7; and V. Makarov and M. Belousov, *Teoriia bukhgalterskogo ucheta* [Theory of Accounting], Moscow, 1955, pp. 18-23.

As to the organizational level on which records are kept, the Soviet literature distinguishes among:

1. Primary record-keeping (*pervichnyi uchet*) at the earliest point at which data are generated (tally sheet, voucher, etc.).

2. Low-level record-keeping (*nizovoi uchet*), which covers all such activities on the enterprise level.

3. Economy-wide record-keeping (*narodnokhoziaistvennyi uchet*), which is that part of record-keeping and statistical work which culminates in a set of economy-wide statistics.

Reporting. Another important Russian term is *otchetnost'*, which can be translated as "reporting," or sometimes as "accountability." It has the specific connotation of rendering account to a superior, and generally denotes an upward flow. Soviet sources distinguish between reports of operations (*operativnaia otchetnost'*) of a day-to-day kind, the submission of accounting reports (*bukhgalterskaia otchetnost'*), and statistical reporting (*statisticheskaia otchetnost'*), the last dealing chiefly with plan fulfillment. As to the direction and purpose of the flow of reports, distinction is made between centralized reporting (*obshchegosudarstvennaia otchetnost'*) and departmental reporting (*vedomstvennaia otchetnost'*); the latter flows upward only directly within the same administrative hierarchy, while the former is also submitted to outside entities (such as the statistical authorities) for incorporation into regional or all-union statistics.

Statistics. By statistics I shall mean numerical data in organized and processed form. (In a few places, however, as will be evident from the context, I shall use the word in its other sense—that of a scientific discipline.) By *statistical apparatus* I shall mean the administrative and institutional structure whose primary purpose is the collection, processing, and compilation of statistics. The statistical apparatus, together with the ways in which it functions, will be referred to as the *statistical system.*