SOME OBSERVATIONS ON SOVIET INDUSTRIAL GROWTH*

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I

Imagine an economy born in violence and grown up in turmoil, where the only two spurts of growth stand on either side of a destructive war; where the economy's character has been radically transformed within less than thirty years; where industrial structure and directions of growth have been dictated by the aim of maximizing state power; where prices have borne a haphazard relation to costs; and where a government with flexible standards of candor has exercised rigid control over the trickle of information it has allowed to the outside world. You are asked to determine how fast that economy has been growing and to compare it in performance with other powerful economies of the world.

Your problem is unique: not one of the major pitfalls of economic measurement is missing; any economic aggregate or index number that might be constructed is subject to virtually all the serious faults one can think of. The economy has undergone a metamorphosis that cannot be meaningfully summarized in a measure of over-all growth; the directions of growth have shifted swiftly and violently from time to time; no moderately long and undisturbed period of development has been experienced; and, finally, only a small biased sample of economic data, of doubtful meaning and validity, is available for study.

Under the best of conditions it is a mistake to rely too heavily on broad indexes of industrial production in making comparisons of growth between countries. In addition to revealing nothing about the structural side of growth, such indexes are by no means independent of it. That is to say, the numerical value of a production index may be greatly influenced by the course of expansion followed

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by an economy, even though growth in some significant meanings of economic capacity is neither greater nor smaller than it would have been had an alternative course been followed. In any event, what applies to the best of conditions applies with magnified force to the Soviet Union. If sound and relevant judgments are to be made on Soviet economic growth, the evidence must be summarized in a variety of ways, only one of which is the broad production index.

I want to suggest some of these ways, and to explore one in some detail. Despite the ambitious title originally assigned to this paper, my discussion will have to be limited to industrial growth, since that is the area I have been working in. The data that will be presented have been drawn from a study under way at the National Bureau of Economic Research; they are, of course, preliminary and subject to revision. In any event, a full explanation of what lies behind them will be published when the study is completed. It must be said here that all Soviet data are based ultimately on information published in the Soviet Union; and, though efforts have been made to remedy the most obvious deficiencies, no scholar can have a clear conscience in working with Soviet data as if they were fully reliable. A few additional remarks will be made on this crucial point at the conclusion of this paper.

II

Suppose we raise the following question: How successful has the Soviet Union been in matching the industrial achievements of the United States? One way to approach an answer is to make an industry-by-industry comparison of Soviet and American growth in physical output, in each case confining the comparison to periods in which American and Soviet industries were of equivalent size.[1] A comparison

[1] Any study of individual industries involves the many familiar problems of defining each industry in a relevant way and of finding comparable industrial categories for different economies. The problem of definition has been "solved" in part by the availability of Soviet data. In general, the industries—it is perhaps more accurate to say "commodities"—chosen for study are the most narrowly defined categories for which Soviet data on physical output can be found covering the entire Soviet period. Relying on narrow concepts of industries makes for obvious difficulties in interpreting differences in growth as between economies with differing endowments of resources. Thus the petroleum industry has shown a much more rapid development in the United States than in the Soviet Union over comparable periods, while the coal industry has not. The comparatively slower growth of coal in the United States is essentially the result of comparatively better opportunities in the petroleum industry, not of any relatively depressive factors applicable to the "fuel industry" as a whole. It would therefore be useful to examine comparative developments in the fuel industry as well as in its components and similarly in the case of other industrial groups. Analysis of this sort is planned for the study under way at the National Bureau.

It should also be pointed out that there are gross deficiencies in the definitions of industries as given in Soviet statistical materials. Often little is known about a Soviet industry beyond a broadly descriptive title—as "copper," "paper," "canned food," and so on. Under these circumstances, the choice of American counterparts is necessarily somewhat arbitrary, though we have done our best to choose what seemed to be the most similar industries.

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of this sort, while containing flaws of its own, makes allowance for the important fact that most individual industries tend to grow more slowly percentagewise as they get older and larger—a phenomenon characteristic of the Soviet Union as well as the United States. An industry-by-industry comparison of percentage growth rates for concurrent periods does not make such an allowance and may produce misleading conclusions to the extent that mature American industries are being compared in growth with youthful Soviet counterparts. A simple and direct method of making the desired kind of comparison is to examine the lag of Soviet output behind American output and what has happened to the lag over time.

This is done in Tables 1 and 2, where the Soviet lag in both total and per capita output is listed for 37 industries as of three bench mark years: 1913, 1937, and 1955. Although the sample of industries has been dictated by availability of data on physical output, it does cover a fair number of so-called "basic" industrial materials and consumer "staples." Cyclical fluctuations have been smoothed out of the American output series—essentially through nine-year moving averages—so that comparisons would not be made with unusual temporary peaks in American output. On the other hand, Soviet series were not similarly smoothed because their fluctuations are fundamentally different in nature from our own cycles, and also because serious technical problems arise as a result of marked discontinuities in the series. Similarly, no adjustment has been made for gains in Soviet output resulting from territorial expansion after World War II; i.e., such gains are included in the data. Therefore, on these scores, the lags are computed favorably for the Soviet Union, at least as a general rule.

The meaning of these lags and of their changes over time is best shown through an example. In 1913, the Russian production of steel ingots within the interwar territory of the Soviet Union was roughly equal to production achieved in the United States around 1892, or 21 years earlier. Hence the lag in 1913 was 21 years. The lag had risen to 32 years in 1937, and fell somewhat from that point to a level of 29 years in 1955. Thus Soviet production of steel ingots was 8 years further behind American production in 1955 than it had been in 1913, which is to say that it has taken the Soviet Union 42 years (1913-55) to accomplish what the United States had done in 34 (1892-1926). On a per capita basis, the lag increased from 30 years in 1913 to 40 in 1937, and to 49 in 1955. Production per capita was 19 years further behind in 1955 than it had been in 1913; the same expansion in per capita output had taken place in the United States in 23 years (1883-1906), instead of in 42.

When we consider the entire group of industries, we note that in the

TABLE 1

LAG OF THE SOVIET UNION BEHIND THE UNITED STATES IN OUTPUT, BENCH MARK DATES, 37 INDUSTRIES*

	Lag (Number of years)			Increase or Decrease (−) in Lag		
	1913	1937	1955	1913–37	1937–55	1913–55
Iron ore	28	36	15	8	−21	−13
Pig iron	30	36	39	6	3	9
Steel ingots	21	32	29	11	−3	8
Rolled steel	27	35	29	8	−6	2
Primary blister copper	33	50	51	17	1	18
Lead	94	60	52	−34	−8	−42
Zinc	46	43	46	−3	3	0
Electric power	13	21	16	8	−5	3
Coal	45	49	47	4	−2	2
Coke	31	36	30	5	−6	−1
Crude petroleum	14	26	34	12	8	20
Natural gas	32	51	52	19	1	20
Soda ash	22	31	24	9	−7	2
Mineral fertilizer	43+	27	14	−16+	−13	−29+
Synthetic dyes	2	15	12	13	−3	10
Caustic soda	17	25	24	8	−1	7
Paper	44	46	54	2	8	10
Sawn wood	61	73	62	12	−11	1
Cement	19	33	32	14	−1	13
Window glass	13	0	‡	−13	§	−13+
Rails	42	57	54	15	−3	12
Railroad passenger cars	21	46	53	25	7	32
Railroad freight cars	33	51	69	18	18	36
Butter	21	38	35	17	−3	14
Vegetable oils	5	26	29	21	3	24
Sausages	24+	36	38	†	2	†
Fish catch	−11	4	‡	15	−4+	†
Soap	34+	52	52	†	0	†
Sugar	6	17	27	11	10	21
Canned food	43+	45	45	†	0	†
Beer	42	66	73	24	7	31
Cigarettes	−1	11	14	12	3	15
Boots and shoes	23+	44	44	†	0	†
Rubber footwear	14+	19	‡	†	−19+	−14+
Cotton fabrics	28	44	48	16	4	20
Silk and synthetic fabrics	23	44	25	21	−19	2
Woolen and worsted fabrics	43+	67+	69	†	†	†
Median**	28	36	35	11	−1	9

* U.S. output taken as centered nine-year moving average, with minor modifications. Soviet output covers interwar territory of the Soviet Union for 1913 and 1937, and postwar territory for 1955. A Soviet lead is indicated by a negative sign in columns 1–3. Where U.S. data do not go back far enough to give the full lag, the calculable lag is followed by a plus sign.

† Insufficient data to indicate whether the lag increased or decreased.

‡ Soviet output exceeds U.S. output up to the present.

§ Decrease in lag of unknown magnitude.

** Medians in the last three columns are calculated from data in those columns; i.e., they are median increases in lag, not increases in the median lags given in the first three columns. The median increases in lag are derived from data for the following numbers of industries: 1913–37, 32; 1937–55, 36; 1913–55, 31.

case of total output the median lag—that lag exceeded by half the industries and fallen short of by the other half—was 28 years in 1913, 36 in 1937, and 35 in 1955. The median lag in per capita output was 56

TABLE 2

LAG OF THE SOVIET UNION BEHIND THE UNITED STATES IN PER CAPITA OUTPUT, BENCH MARK DATES, 37 INDUSTRIES*

	Lag (Number of years)			Increase or Decrease (−) in Lag		
	1913	1937	1955	1913–37	1937–55	1913–55
Iron ore	53+	52	54	†	2	†
Pig iron	48	52	56	4	4	8
Steel ingots	30	40	49	10	9	19
Rolled steel	24+	48+	52	†	†	†
Primary blister copper	53	58	66	5	8	13
Lead	105+	109	76	†	−33	−29+
Zinc	53	57	59	4	2	6
Electric power	14	26	25	12	−1	11
Coal	66	69	69	3	0	3
Coke	33+	49	56	†	7	†
Crude petroleum	27	34	41	7	7	14
Natural gas	32+	52	70	†	18	†
Soda ash	27	43	45	16	2	18
Mineral fertilizer	43+	40	30	−3+	−10	−13+
Synthetic dyes	14+	20	22	†	2	†
Caustic soda	19	40	35	21	−5	16
Paper	54+	67	71	†	4	†
Sawn wood	114+	102	111	−12+	9	−3+
Cement	30	38	47	8	9	17
Window glass	34+	−2	15	−36+	17	−19+
Rails	46+	70	85	†	15	†
Railroad passenger cars	27	57	69	30	12	42
Railroad freight cars	33+	57+	75+	†	†	†
Butter	30	50	58	20	8	28
Vegetable oils	16	40	44	24	4	28
Sausages	24+	48+	61	†	†	†
Fish catch	33+	57+	19	†	−38+	−14+
Soap	34+	58+	76+	†	†	†
Sugar	12	32	47	20	15	35
Canned food	43+	62	60	†	−2	†
Beer	43+	67+	85+	†	†	†
Cigarettes	0	15	19	15	4	19
Boots and shoes	23+	47+	65+	†	†	†
Rubber footwear	14+	38+	56+	†	†	†
Cotton fabrics	43+	67+	85+	†	†	†
Silk and synthetic fabrics	34	58	42	24	−16	8
Woolen and worsted fabrics	43+	67+	85+	†	†	†
Median‡	§	§	56	10	4	13

For notes * and †, see Table 1.

‡ See note ** in Table 1. The median increases in lag are derived from data for the following numbers of industries: 1913–37, 19; 1937–55, 28; 1913–55, 21.

§ Insufficient data to calculate median.

years in 1955; equally precise calculations cannot be made for other bench mark years in the case of per capita lags, because many lags are so long they cannot be measured—American statistics on output do not go back far enough to show output per capita as small as in the Soviet Union. Changes in per capita lags can, however, be measured for 21 industries over the Soviet era as a whole, and the median of these is an increase of 13 years. Moreover, 16 of the 21 industries show an increase

in lag. In the case of total output as distinct from per capita output, the median increase in lag is 9 years, and 24 of 31 industries show an increase. Per capita lags have generally increased over recent years (1937-55) as well as over the Soviet period as a whole, but this is not true for lags in total output: in that case more industries show a decrease in lag over recent years than show an increase, the count being 20 industries to 14.[2]

What may we then conclude? This is obviously not the place for an exhaustive analysis, but let me indicate, with appropriate qualifications, some inferences that might be drawn. In the first place, Soviet industry seems still to be roughly three and a half decades behind us in levels of output and about five and a half decades in levels of per capita output. This is, of course, a generalization about average performance rather crudely defined; in some areas the Soviet Union is much closer to us historically, in others much further behind. Second, and with the same qualification, the development of Soviet industry is roughly equivalent to what took place in this country in the four decades bracketing the turn of this century—in per capita terms, in an even earlier period ending around the turn of the century. Third, over the Soviet era as a whole, Soviet industries have generally lost historical ground to their American counterparts—the lags have generally increased—in terms of both total and per capita output. That is, growth from the same level of output, total or per capita, has been slower in Soviet than in American industries. This tendency is, incidentally, not unique to the Soviet era; the same thing was happening over the last four decades of the Czarist period. Fourth, while Soviet industries

[2] The summary statistics given here reflect, of course, conditions in industries where growth has been deliberately retarded by Soviet authorities in order to promote growth in other industries. The difference in performance between the neglected and favored sectors may be indicated in part by computing summary statistics separately for industries producing consumer goods, on the one hand, and for all other industries, on the other hand. For instance, if the last 14 items in Tables 1 and 2 are taken as consumer goods, and the first 23 items as all other goods, the following results are obtained:

	Median Lag (Number of years)			Median Increase or Decrease (−) in Lags*		
	1913	1937	1955	1913–37	1937–55	1913–55
Total output						
Consumer goods.....	26	41	36	16	0	18
All other goods.....	30	36	34	8	−3	7
Per capita output						
Consumer goods.....	†	†	60	20	4	24
All other goods.....	†	52	56	6	4	11

* Derived from the following numbers of industries for 1913–37, 1937–55, and 1913–55 respectively: total output, consumer goods—8, 12, and 8; per capita output, consumer goods—5, 7, and 6; total output, all other goods—23 in each case; per capita output, all other goods—14, 21, and 15.

† Insufficient data to calculate median lag.

have tended in recent years to gain ground in terms of total output, they have continued to lose ground in terms of per capita output.

To anticipate questions that must have arisen in the minds of many, let me say right away that this has been a recital of the raw historical record for the Soviet era as a whole, which cannot serve in itself as an adequate guide to future performance. Bad years of growth—e.g., 1913-28—have been indiscriminately mixed with good, and the conditions producing those bad years may never recur with the same intensity. Such analysis has the same faults as focusing solely on the best years of growth; here, too, there were many peculiarities not likely to persist over the long term. A proper appraisal of underlying trends requires that attention be paid to both short and long periods. But we can attend to only one thing at a time, and the essential purpose of this brief paper is to bring the picture of growth trends into focus by looking at long-range performance. Needless to say, the study now under way at the National Bureau will give much more detailed attention to the problems mentioned here.

While digressing on qualifications, it is worth pointing out that Soviet products seem to be generally inferior in quality to their American counterparts, even to those produced many years earlier. Moreover, quality seems to have deteriorated in many industries over at least parts of the Soviet era. The inferiority and deterioration are most marked for consumer goods, but they also hold for many industrial materials. It has not been possible to make allowance for these factors, and hence the lags and their changes are biased in favor of the Soviet Union. This matter is apart from the question of how reliable Soviet data are on the quantitative side, quality ignored. On that score, it hardly seems likely that Soviet authorities have practiced the art of understatement in heralding their achievements.

III

Let us now return to the main theme and examine more closely the suggestion that industrial development in the Soviet era, unadjusted for population, is similar to, though slower than, our own during the period 1880-1920.[8] This inference has been drawn from an analysis that was not confined to a single period of growth in the United States. On the contrary, about half the comparisons between Soviet and American industries involved American periods ending earlier than 1920 and the other half involved periods ending later. Hence there has been some picking and choosing among different periods in American industrial

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history in order to obtain levels of American output equal to those of Soviet output, and the picture might not look the same if attention were confined to 1880-1920 alone.

Suppose we compute growth rates for that period for as many American industries as possible and compare them with Soviet rates for 1913-55 (see Table 3). We see that in 22 out of 31 industries growth was significantly more rapid in the United States than it has been in the Soviet Union. This does not on the face of it contradict the conclusion drawn from study of lags.

Of course, even if it were true that the growth rate for every industry were higher in the United States than in the Soviet Union, it would still be possible that an over-all weighted index of growth would be lower. This could come about if the Soviet rates for some industries were higher than the American rates for others, and if there were a sufficiently strong positive correlation between Soviet rates, on the one hand, and the ratios of Soviet to American weights, on the other. In fact, the Soviet rates are not even all lower industry by industry, and therefore the only relevant question is the correlation. The only way to find an answer is to make weighted indexes, and this should certainly be done. It is worth pointing out, however, that there is a very strong negative correlation between Soviet growth rates and the industry-by-industry ratios of Soviet to American output, the latter taken for the year 1913 (see Table 3). It would therefore seem unlikely that there would be a strong positive correlation between Soviet growth rates and any sensible relative weights one might choose.

Let us then accept tentatively the conclusion that industrial growth over the Soviet era has proceeded at a pace not any higher than that for the United States from 1880 through 1920. What else might this imply? The pertinent issue here is whether American industrial growth has tended to slow down over the long term. If there has in fact been such a retardation, it has not left an unambiguous imprint in the statistical record. To be sure, the Great Depression of the thirties brought about a sharp fall in the growth rate for the years bracketing it, but recent trends would suggest that this was a cyclical, not a secular, phenomenon. In any event, few economists who have studied American industrial growth find adequate evidence of a significant and steady retardation in the rate of industrial growth as conventionally measured. If such over-all retardation has not taken place and if Soviet industry has not grown faster than our own grew from 1880 through 1920, it would then seem reasonable to suppose that it has not grown faster than ours over a more recent period—say, the last forty years, or the Soviet era itself.

This conjecture is puzzling, indeed, in the light of what one observes

TABLE 3

GROWTH RATES COMPARED IN THE SOVIET UNION AND UNITED STATES, 31 INDUSTRIES
(Per cent)

	Average Annual Growth Rate*				Ratio of Soviet to U.S. Output	
	Soviet Union		United States			
	1880–1913†	1913–55	1880–1920	1913–55	1913	1955
Iron ore	7.1	5.0	5.8	1.4	16	71
Pig iron	7.3	5.0	5.9	1.9	14	52
Steel ingots	8.7	5.8	9.1	2.7	13	47
Rolled steel		5.5	6.6	2.7	15	48
Primary blister copper	7.3	6.0	7.6	0.8	5	42
Lead	0.9	13.7	4.9	1.2	0.3	38
Zinc	4.6	11.1	7.8	2.0	0.7	22
Electric power		11.2	34.1	7.6	7	30
Coal	7.5	6.4	5.1	−0.3	6	92
Coke		5.6	6.9	1.2	11	67
Crude petroleum	10.4	5.0	8.1	5.6	27	22
Natural gas		13.9	15.5	6.8	0.2	3
Soda ash	17.0	5.4	10.3	4.4	20	33
Mineral fertilizer		11.6	6.4	5.6	3	34
Paper		5.5	5.8	2.9	6	15
Sawn wood		3.9	1.5	−0.2	14	79
Cement		6.6	10.3	3.0	11	47
Window glass		3.5	3.8	2.0	60	106
Railroad passenger cars		1.2	3.8	−3.5	38	271
Railroad freight cars		3.1	5.3	−2.0	8	63
Butter		3.6	7.6	1.6	31	72
Vegetable oils		2.2	8.9	3.1	77	43
Fish catch		2.4	0.7	2.0	108	129
Soap		3.5	4.0	−0.8	15	73
Sugar	5.6	2.0	8.1	1.7	73	83
Canned food		8.8	6.2	4.5	2	16
Beer		2.0	1.6	0.9	11	17
Cigarettes		5.6	12.1	8.0	125	50
Cotton fabrics	4.7	2.0	3.6	1.4	35	46
Silk and synthetic fabrics		5.7	7.5	5.8	18	21
Woolen and worsted fabrics		2.1	1.3	−0.3	30	81

* Geometric mean of the ratio of output for terminal years, minus one. U.S. output taken wherever possible as centered nine-year moving average.

† For blank spaces, adequate data not found. Output covers Czarist territory excluding Finland.

when he compares concurrent Soviet and American growth rates for individual industries. The Soviet rates are almost all higher by considerable amount (see Table 3). The key to the puzzle may well lie in the fact that this is, as already mentioned, essentially a comparison of young Soviet industries with mature American ones; and, although there is no easily discernible retardation in over-all American industrial growth, there certainly is as a general rule—in the Soviet Union as well as the United States—unmistakable retardation in growth of individual industries as they get older and larger (see Table 3 for some evidence). If I may use an imperfect analogy, each son will ultimately catch up to his father in height, and brothers of different age will differ less and less in height as they get older. A whole population, on the

other hand, may maintain a quite stable average height or rate of increase in average height. As far as industrial growth is concerned, the point is that attention must be given to both new and old industries, to ones being born and ones dying, and in every case to the weights it seems proper to attach.

Let me illustrate these issues by returning to the specific example of steel ingots. For the period 1913-55, Soviet output grew at an annual rate of 5.8 per cent (based on data for terminal years), while American output grew at only 2.7 per cent. As a result, Soviet output rose from about an eighth of American output at the beginning of the period to almost a half at the end. The significance of this development from the point of view of industrial growth is, however, not as clear as it might seem; for, as we noted earlier, it was about 30 years ago when American output reached half its present level, but it was only about 20 years before 1913 when it reached an eighth of its level at that time. That is to say, it took only 20 years for American output to multiply eight times up to its level of 1913, but it took almost 30 years for it to double up to its level of 1955. In terms of annual rates, American output grew at 9.1 per cent from 1880 through 1920, but at only 2.7 per cent from 1913 through 1955. It is quite possible, in view of the great efforts being put into steel production in the Soviet Union, that retardation in growth will not be as marked there as it has been in the United States. But the history of the Soviet steel industry certainly implies that there will be some retardation. The following comparisons of Soviet annual growth rates for the output of steel ingots are informative: 1880-1913, 8.7 per cent, compared with 1913-55, 5.8 per cent; 1928-37, 17.2 per cent, compared with 1948-55, 13.6 per cent.

I do not wish to argue that there is no significance in the tendency for certain Soviet industries to approach their American counterparts more and more closely in size. Quite to the contrary, it is easy to think of several important problems for which this is a very important consideration, and any study of Soviet industrial growth would be seriously incomplete without explicitly revealing this widespread phenomenon. The only point being made is that this type of analysis is not adequate for assessing "general" industrial development. The concept of industrial growth must somehow take account of expansion in breadth as well as length. Paying attention solely to a fixed list of industrial products—especially to a list supplied by Soviet authorities —is a deficient approach, even if some method is used to weight products by importance.[4] This point may be underscored by observing

[4] The essential point to keep in mind here is the austere nature of Soviet industry in contrast to American industry. American growth has taken place in large part through proliferation of commodities designed for similar functions, through improvements in quality, and through addition of new services, both directly and as embodied in improved commodities. Soviet growth has taken place mainly through expanded output of standard

that the decline of some industries in the United States—as coal, soap, and railway equipment—is in a real sense a sign of progress: the supplanting of worse by better means of doing the job. Are, then, gains by the Soviet Union on the United States in output of coal, for instance, to be viewed as indicating more rapid industrial advance?

IV

Even in a discussion as incomplete as this one admittedly has been, it would be improper to conclude without emphasizing once again that we have been looking, from a few restricted points of view, at the record of industrial achievement posted by the Soviet Union over the entire period of its existence. The years under review include the two world wars, a violent revolution, and a severe civil war—altogether some eleven years of turbulence, a fourth of the period. They also cover experience under both a planned and an "unplanned" economy, and these in turn have had disturbances of a severity that may not be encountered again. There are obviously questions raised about how trends are to be interpreted over times such as these.

At a minimum, account must be taken of the best years of growth, which come down essentially to the periods 1928-37 and 1948-55. These short spurts of growth have, of course, been much more rapid than growth over the Soviet period as a whole. As already mentioned, there are good reasons for doubting that the performance in these short periods can be sustained over the long haul. A number of unique circumstances that favored rapid expansion are not likely to be encountered again—including, for instance, the absorption of a vast idle labor force and the sudden inheritance of Western technology. However this might be, any judgment of Soviet industrial development should give all due weight to performance under the best of conditions.[5]

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products. This is, of course, an oversimplification, but it serves well enough here to point up a significant difference. As a few specific examples of the austere path of Soviet development, one might note the persistently limited varieties of textiles, the retention of basic tractor models for two to three decades, and the slow progress made in packaging consumer products. When one leaves the realm of "industry," the contrast is sharpened. Nothing remotely similar to the expansion of service trades in this country has taken place in the Soviet Union. It is perhaps well to stress that these remarks are directed to the question of "general" industrial development, not to performance in special areas. In particular, nothing that has been said is inconsistent with Soviet successes in developing new and increasingly deadly weapons of war, and in producing them in large quantity.

[5] It is difficult to understand the argument that only the recent years of growth are of any interest; i.e., that long-range performance is irrelevant for assessing growth trends. However, in view of comments on this paper by Professor Grossman, it may be well to indicate the general behavior of lags with 1928 as a bench mark year. For total output, the median lag was 28 years in 1913, 45 years in 1928, and 34 years in 1955; the median change in lags was an increase of 15 years for 1913-28 (based on data for 31 industries) and a decrease of 9 years for 1928-55 (based on data for 32 industries). For per capita output, the median change in lags was an increase of 15 years for 1913-28 (based on data for 17 industries) and an increase of 0 years for 1928-55 (based on data for 24 industries). That is to say, of the 24 industries for which changes in per capita lags can be computed over the period 1928-55, half showed an increase and half a decrease.

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Some hint of what may come—and how it may differ from what has been—is contained in Table 4, which gives the Soviet lags that will exist in 1960 if the current Five-Year Plan is fulfilled. A quick comparison with Tables 1 and 2 will show that the Russians expect to gain ground generally over these five years, but the ground-gaining would not be sufficient in some industries to prevent their still being further behind us than in 1913. It remains to be seen to what extent the plans will be

TABLE 4
LAG OF THE SOVIET UNION BEHIND THE UNITED STATES IN TOTAL AND PER CAPITA OUTPUT AS IMPLIED BY THE SOVIET PLAN FOR 1960, 24 INDUSTRIES*

	"PLANNED" LAG FOR 1960 (Number of years)	
	Total Output	Per Capita Output
Iron ore	†	51
Pig iron	13	55
Steel ingots	17	47
Rolled steel	16	47
Electric power	13	20
Coal	†	63
Crude petroleum	26	39
Soda ash	22	33
Caustic soda	22	30
Paper	52	69
Sawn wood	62	115
Cement	†	10
Window glass	†	†
Railroad passenger cars	54	66
Railroad freight cars	72	80+
Butter	31	49
Vegetable oils	15	37
Fish catch	†	†
Sugar	†	31
Canned food	40	56
Boots and shoes	18	70+
Cotton fabrics	46	87
Silk and synthetic fabrics	23	28
Woolen and worsted fabrics	23	90+
Median	20	48

* See same note, Table 1, Soviet population in 1960 taken as 218 million.
† Soviet output, if achieved, will exceed U.S. output through 1955.

met. Experience suggests the most likely failures will be in the realm of consumer goods, particularly those based on agriculture. There is no reason to suppose goals will not be reached in areas of high priority; for, unless we have been massively deceived, they apparently have been reached in the past. If the goal for steel ingots is reached, the lag in total output will have fallen from 29 years in 1955 to 17 years in 1960, which is 4 years less than the lag in 1913; in something of a contrast, the lag in per capita output—as based on the population projected ahead by Soviet authorities—will have fallen only from 49 years to 47 years, which still exceeds the lag in 1913 by 17 years.

If I may now end up where I started, I should like to call attention once again to the heavy cloud of doubt and suspicion that must hang over any study involving Soviet data. The recent de-Stalinizing period has brought with it hopeful signs that Russian statistics may some day move toward the standards of completeness and frankness met by Western statistics, but it has also brought blistering internal indictments of wholesale deception practiced in the past. Thus we may read the following about industrial development in Poland, which may have some application to developments in the Soviet Union:

> It is necessary to stop the race for purely quantitative indices which are attained thanks to low quality and to high own costs. This brings about purely fictitious results, the usage of raw materials and of human labour for production of goods which do not produce the intended economic, and often even the intended technical effects (e.g., agricultural machinery improper to any use after a few weeks).[6]

These words come from an economist who four years ago was outdone by no one in the tribute he paid to Stalin and the Soviet system.[7] If the ebb and flow of political fortune can bring such a complete reversal in the position taken by Oskar Lange, we may only speculate on what the truth really is in the Soviet world.

[6] Oskar Lange, "For a New Economic Program," translated from the Polish by J. Vanek and reproduced for private circulation by the Center for International Studies, Massachusetts Institute of Technology, October, 1956. The article originally appeared in *Zycie Gospodarcze* (Warsaw) for July 16, 1956. The quotation is taken from p. 5 of the translation.

[7] See, e.g., Oskar Lange, "The Economic Laws of Socialist Society in the Light of Joseph Stalin's Last Work," *International Economic Papers,* No. 4 (London and New York: Macmillan, 1954), pp. 145-180, a translation of an article appearing originally in Polish in *Nauka Polska,* No. 1 (Warsaw, 1953).