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CHAPTER 7

Some Details of Growth

WE HAVE sketched the bolder outlines of Soviet industrial growth, and we must now take up the task of filling in the more important details. It is inevitable in a large study like this one that details will be slighted and perhaps even distorted, for they are subordinate to the primary objective. This chapter should therefore be looked upon as simply an introduction to the many highly special topics in Soviet industrial development that deserve careful study, much more careful than we can give.

The discussion will proceed chronologically, attention being directed in turn to the pre-Plan period, the prewar Plan period, and finally the postwar period. In each case, we shall try to present the basic characteristics of industrial development over the years in question. Definitive treatment must be left to others.

The Pre-Plan Period

It is difficult to trace out the year-to-year developments in Soviet industry from the revolution to the beginning of the Plan period because data on output are available for only a relatively small sample of industries and most of them refer solely to large-scale production. The latter factor means that production indexes (see Table 47 and Chart 18) probably overstate the rates of both declines and rises in output, though the degree of overstatement must remain unknown. Despite such qualifications, there is little doubt about the general nature of the movements of industrial production during this period.

The year 1913 is widely used, in both Soviet and Western analyses of economic developments in the Soviet Union, to represent prerevolutionary conditions. It is interesting to note, therefore, that industrial output had not reached its prerevolutionary peak in that year: it was significantly higher in each of the three succeeding years, if our indexes are to be believed. During 1917, the year of the revolution, industrial output dropped sharply, by something on the order of 17 per cent. This was, however, a moderate decline compared with what was to follow while the civil war was in progress: during 1918 the decline was on the order of 47 per cent and during 1919, 40 per cent. The bottom was reached in 1920, when industrial output was apparently less than a fifth of the level of 1916, and only a slight recovery was made in 1921. The decline in

output was general throughout all segments of industry: over the period 1913–1921, output declined in fifty-one out of fifty-four industries for which data are available.[1]

With the end of the civil war and the initiation of the New Economic Policy in 1921, there began a rapid recovery in industrial growth. The

TABLE 47
PRODUCTION INDEXES FOR INDUSTRIAL MATERIALS: SOVIET UNION, 1913–1928
(1913 = 100)

	1913 Weights	1928 Weights
1913	100	100
1914	110	113
1915	107	109
1916	111	112
1917	92	92
1918	40	43
1919	24	21
1920	22	19
1921	24	21
1922	35	34
1923	43	43
1924	53	52
1925	73	75
1926	91	91
1927	101	98
1928	103	100

SOURCE: Table D-1. Interwar Soviet territory

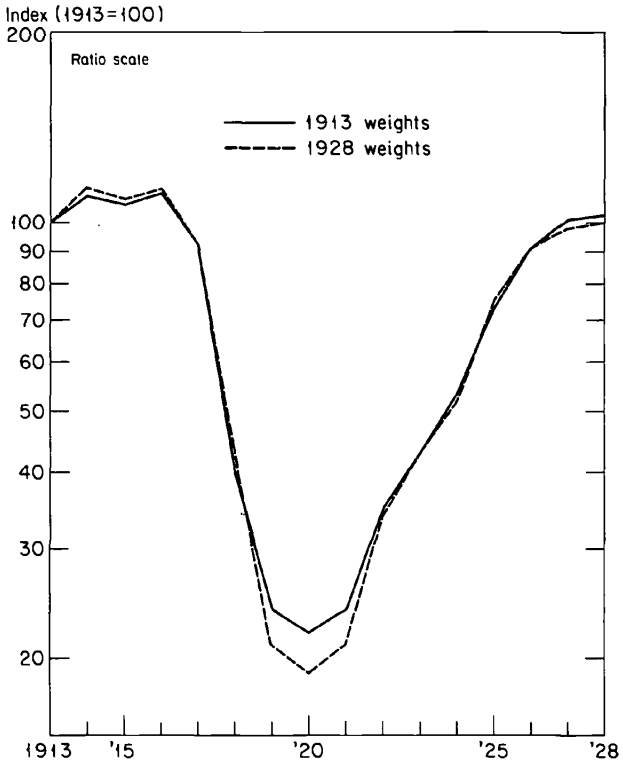
rise was on the order of 46 per cent during 1922, 23 per cent during 1923 and 1924, 38 per cent during 1925, 25 per cent during 1926, and 11 per cent during 1927. As in the case of the decline, the recovery was general: over the period 1921–1928, output rose in fifty-four out of fifty-five industries for which data are available.[2] Our production indexes indicate

[1] See output series in Table B-2. The three exceptions are corundum and emery, peat, and lignite.

The decline in output was less pronounced for small-scale industry than for the total, one source estimating that small-scale employment fell no lower than 40 per cent of its prerevolutionary level (V. A. Tikhomirov, "Promyslovaia kooperatsiia na sovremennom etape" [Producer Cooperatives at the Present Stage], *Vestnik promyslovoi kooperatsii* [Bulletin of Producer Cooperatives], 1931, No. 8, p. 3). See the detailed discussion in Adam Kaufman, "Small-Scale Industry in the Soviet Union," NBER (in press), Chapter 4.

[2] See output series in Table B-2. The exception is oil shale.

CHART 18
Production Indexes for Industrial Materials:
Soviet Union, 1913–1928



Source: Table 47.

that industrial output had about recovered to its 1913 level by 1927 and 1928, but the indexes do not fully reflect the deterioration in quality of many commodities, particularly consumer goods, discussed earlier in Chapter 3. It is therefore very doubtful that the 1913 level of industrial output had been reached on the eve of the First Five Year Plan; it is virtually certain that the prerevolutionary peak had not been reached.

As would be expected, output showed a net rise in some areas over the entire pre-Plan period and a net decline in others. The following increases were apparently registered (see Table 53): agricultural machinery, 151 per cent; consumer durables, 58 per cent; fuel and electricity, 50 per cent; chemicals, 46 per cent; and textiles and allied products, 13 per cent. On the other side, there were the following declines: food

and allied products, 16 per cent; construction materials, 12 per cent; ferrous metals, 12 per cent; transportation equipment, 10 per cent; and nonferrous metals, 3 per cent. Output increased by 43 per cent in the case of machinery and equipment and by 8 per cent in the case of intermediate industrial products, while it decreased by 3 per cent in the case of consumer goods.

Output per man-hour in all industry rose by 37 per cent over the pre-Plan years, and output per person engaged by 11 per cent, the latter reflecting a rise of varying magnitude in every industrial group (see Table 40). The increases in output per person engaged were, in order: ferrous and nonferrous metals, 33 per cent; construction materials, 19 per cent; fuel and electricity, 18 per cent; food and allied products, 12 per cent; machinery and allied products, 11 per cent; textiles and allied products, 9 per cent; and chemicals, 1 per cent. Moreover, the improvement in labor productivity applied to small- as well as large-scale industry (see Table 52). As we noted in the preceding chapter, improved productivity accompanied a substantial reduction in hours of work, at least in large-scale industry.[3]

The First and Second Five Year Plans

DISAPPEARANCE OF SMALL-SCALE INDUSTRY[4]

The boundaries of industry are seldom clear, particularly during the early stages of industrialization. Up to the beginning of the Plan period, a large fraction of Russian industrial output was produced in handicraft shops and similar small establishments, and much of what appears in official statistics to be an increase in output during the succeeding years was essentially a transformation of this small-scale production into factory production. Some of the transformation was, indeed, more statistical than real: the definition of factory, or large-scale, production was expanded to incorporate what was formerly treated as small-scale. The nature of developments during the early part of the Plan period cannot be understood without taking account of the changing role of small-scale industry.

There is no way of knowing exactly what happened to definitions of large-scale industry between 1928 and 1933. The general boundary line between large- and small-scale establishments had been set in the Tsarist period: if sixteen or more persons were employed along with mechanical

[3] See Tables A-21 through A-23 and the surrounding text in Appendix A.
[4] This section is based on the previously cited report by Adam Kaufman.

power, or thirty or more without it, the establishment was considered large-scale.[5] Over time, this general rule was supplanted in some industries by special qualifications adapted to the peculiar conditions of those industries.[6] These were, however, insignificant exceptions compared with those introduced during the early part of the Plan period.

The pressure to show rapid rates of growth led to statistical juggling of various sorts, some tailored to special industries (as flour milling, bread baking, and shoemaking) and others to industry in general. For instance, all state-owned bakeries, whether large or small, came to be counted as large-scale, and most of the village bakeries became state owned. Similarly, all flour mills with at least five grinding units came to be counted as large-scale. A general rule was laid down that all enterprises under the jurisdiction of a Union Republic ministry were to be counted as large-scale, whether they met any other requirements or not. Hence the picture of what actually happened to forms of industrial organization must remain somewhat hazy. Even so, there is little doubt of an appreciable decline in the relative importance of genuinely small-scale industry over this period.

Related to this shift from small- to large-scale production was a definitional expansion of "industry," to bring within its scope a number of activities that had previously been classified elsewhere. These activities included logging, fishing, and various types of food processing carried on in agricultural communities, such as meat slaughtering, processing of dairy products, milling and cracking of grain, and extracting of vegetable oils. These were for the most part small-scale activities that were to be incorporated statistically into "industry," in many cases without any essential change—at least initially—in the form of productive organization.

A brief summary of the statistical record of small-scale industry is presented in Tables 48 through 50. Considerable allowance should be made for possible error of unknown magnitude and direction, since the statistical foundations are weak. During the Tsarist period, virtually no statistics were collected by the central government for this segment of industry, and estimates of the role of small-scale industry are based ultimately on data collected by the local and provincial councils (*zemstva*). It should not be assumed that these data are less reliable than those collected by the Tsarist government; on the contrary, there was generally

[5] The Russian word for qualification is *tsenz*. Hence the large-scale establishments meeting the described qualifications have been often characterized, through loose translation, as belonging to the "census industry."

[6] For a summary of changes during the Soviet period before the plans, see A. Yezhov, *Soviet Statistics* (translated from the Russian), Moscow, 1957, pp. 12 ff.

TABLE 48

PERSONS ENGAGED IN LARGE-SCALE AND SMALL-SCALE INDUSTRY:[a] SOVIET UNION, SELECTED YEARS, 1913–1933
(full-time equivalents)

	Thousands		*Per Cent*	
	Large-Scale Industry	Small-Scale Industry	Large-Scale Industry	Small-Scale Industry
1913	2,864	2,942	49	51
1927	2,726	2,098	57	43
1928	2,971	2,408	55	45
1929	3,297	2,232	60	40
1933	8,062	591	93	7

SOURCE: Table C-1 and Kaufman, "Small-Scale Industry," Table A-2.
[a] Including fishing and logging but excluding repair shops.

TABLE 49

PERSONS ENGAGED IN LARGE-SCALE AND SMALL-SCALE SECTORS OF SELECTED INDUSTRIES: SOVIET UNION, 1927, 1929, AND 1933

	1927		*1929*		*1933*	
	Large-Scale Sector	Small-Scale Sector	Large-Scale Sector	Small-Scale Sector	Large-Scale Sector	Small-Scale Sector
			THOUSANDS			
Metal products	119	188	150	140	413	9
Wood products	23	162	34	160	249	105
Knitted goods	18	48	47	56	156	36
Garment industry	50	278	114	218	403	33
Fur processing	3	31	8	25	41	2
Boots and shoes	27	303	77	240	239	44
Flour and groats	49	118	41	79	59	115
Vegetable oil	12	17	16	18	20	7
Total	301	1,145	487	936	1,580	351
			PER CENT			
Metal products	39	61	52	48	98	2
Wood products	12	88	18	82	70	30
Knitted goods	27	73	46	54	81	19
Garment industry	15	85	34	66	92	8
Fur processing	9	91	24	76	95	5
Boots and shoes	8	92	24	76	84	16
Flour and groats	29	71	34	66	34	66
Vegetable oil	41	59	47	53	74	26
Total	21	79	34	66	82	18

SOURCE: Kaufman, "Small-Scale Industry," Table A-2.

TABLE 50

ESTIMATED PERCENTAGE OF VALUE OF OUTPUT, VALUE ADDED, AND EMPLOYMENT ACCOUNTED FOR BY SMALL-SCALE INDUSTRY:[a] SOVIET UNION, SELECTED YEARS, 1913–1933
(per cent)

	Value of Output	Value Added	Employment[b]
1913	34		50
1927	31	30	43
1929	26	26	40
1933	8		7

SOURCE: Table C-2 and Kaufman, "Small-Scale Industry," Table A-3.
[a] Including logging and fishing but excluding repair shops.
[b] Persons engaged in industry expressed in full-time equivalents.

a higher level of statistical competence in these local activities than in the central government.[7] Nevertheless, the statistical investigations raise many problems of comparability of data, uneven and incomplete coverage, and the like.

During the 1920's, while the Soviet authorities were deliberating on methods of directing the economy, an effort was made to gather comprehensive statistics on small-scale production, and also to collate and interpret such statistics as were available for the late Tsarist period. Five censuses of small-scale industry were conducted during the 1920's, the two most comprehensive covering the years 1926/27 and 1928/29. These censuses contain data on value of output, value added, and employment. It is almost certain that these data are understated because it was in the political and economic interests of the small-scale producers to underreport, and the generally poor state of business records in this sector made it impossible to correct the underreporting. Moreover, coverage was incomplete in that many of the small-scale activities not then considered as within industry, but later incorporated, were not surveyed.

The downward bias in data is acknowledged in the following official comment on the census covering 1928/29:[8]

> It is necessary to note a certain understatement of the data for the capitalist sector [i.e., establishments hiring at least three employees]. The understatement arises from the tendency of the private entrepreneur to conceal the actual volume of his output, the extent of labor

[7] See, e.g., Bernard Pares, *A History of Russia*, rev. ed., New York, 1944, p. 402.
[8] *Narodnoe khoziaistvo SSSR* [The USSR National Economy], Moscow, 1932, p. 647, as quoted in Gregory Grossman, *Soviet Statistics of Physical Output of Industrial Commodities: Their Compilation and Quality*, Princeton for NBER, 1960, p. 43.

> employment, his receipts, etc., which has had a particular impact on the data due to the coincidence of the census period with intensive collectivization [of agriculture] in a number of regions. The under-recording in the private sector is partly compensated by the inclusion of data on home-workers, under the putting-out system, in the private capitalist sector.

While this statement is directed to a very small segment of small-scale industry, it would seem to apply to the entire private sector, which, despite understatement, accounted for 75 per cent of all employment in small-scale industry at this time.[9]

The most satisfactory way to picture the disappearance of small-scale industry is through trends in employment. We may look first at persons engaged in industry adjusted to a full-time basis and covering industry (except repair shops) as ultimately defined in the Plan period (see Table 48). We note that between 1913 and 1928, employment fell in the small-scale sector from 2.9 to 2.4 million, while it rose only slightly in the large-scale sector from 2.9 to 3.0 million. Over the next five years, employment declined precipitously in the small-scale sector (from 2.4 to 0.6 million) while rising even more sharply in the large-scale sector (from 3.0 to 8.1 million); hence total employment also rose substantially (from 5.4 to 8.7 million). During the span of five years, the share of employment accounted for by the small-scale sector fell from 43 to 7 per cent. In large part this was, as already mentioned, a statistical mirage: the same thing was merely being called by a different name. But the figures also reflect a radical shift in the structure of industry, as can be seen from the fact that the increase in employment in large-scale industry was 3.3 million greater than the decrease in small-scale industry.

The expanded employment in industry came, of course, from several sources, including additions to the labor force, displaced rural labor, and unemployed and underemployed labor.[10] There had been a considerable

[9] See Kaufman, "Small-Scale Industry," Table 9.

[10] According to one Russian source (I. Berlin and Ia. Mebel', "Strukturnye sdvigi v naselenii i proletariate" [Structural Changes in the Population and the Proletariat], *Voprosy truda* [Labor Questions], 1932, No. 11–12, p. 23), there was a net increase of 6.9 million in hired urban workers over 1927–1931, recruited as follows from the specified sources (millions):

Current urban labor force	
Self-employed	1.2
Unemployed and others	0.8
Urban entrants into labor force	2.1
Rural entrants into labor force	2.8

degree of underemployment in small-scale industry: the average number of weeks worked was roughly twenty-four in 1926/27, nineteen in 1927/28, and sixteen in 1928/29.[11] For large-scale industry, the average number of weeks worked was, by contrast, forty-four in 1927/28.[12] Hence, in 1928 the labor employed in small-scale industry (2.4 million full-time equivalents) represented a potential employment of roughly 5.6 million, or a potential addition to employment of 3.2 million, on the basis of the average work-year then prevalent in large-scale industry.

While the trends in employment give a general view of what happened to small-scale production, they are somewhat misleading in indicating changes in the share of real output accounted for by that sector. Labor was probably less productive in small-scale than in large-scale industry, and therefore the fraction of labor employed by small-scale industry, even when corrected to a full-time basis, probably overstates the fraction of output attributable to it.[13] At the same time, value of output and value added, the other two measures that are available, tend to understate the fraction, since sales of small enterprises were probably underreported and their costs of materials probably overreported for reasons already mentioned. There is also probably less double counting contained in value of output for small-scale than for large-scale enterprises, since the former tended to be more integrated than the latter.

Estimates of all three types are given in Table 50. From this evidence it seems reasonable to say that the share of industrial production accounted for by small-scale establishments declined from roughly a third in 1928 to roughly a twelfth in 1933.

Changes in output over 1928–1933 are given in Table 51 for twenty-seven products for which small-scale production can be estimated. Small-scale production declined in every case, while large-scale production declined in only eight cases (red lead, window glass, hard leather,

[11] Total weeks worked (Tikhomirov in *Vestnik promyslovoi kooperatsii*, 1931, No. 8, p. 3, and *Melkaia promyshlennost' SSSR po dannym vsesoiuznoi perepisi 1929 goda* [Small-Scale Industry in the USSR According to Data from the All-Union Census of 1929], Moscow, 1932–1933, Vol. I, p. 6) divided by persons engaged (*Statisticheskii spravochnik SSSR za 1928 god* [USSR Statistical Handbook for 1928], Moscow, 1929, p. 487; *Plan*, 1935, No. 8, p. 12; and *Melkaia promyshlennost'*, p. 6).

[12] Average number of days worked (266 according to *Statisticheskoe obozrenie* [Statistical Review], 1929, No. 12, pp. 88 f) divided by six.

[13] Small-scale production was most important in industries characterized by a relatively low net output (value added) per worker. In these industries, it is doubtful that the net output per worker was significantly higher in large-scale than in small-scale enterprises; such technological and organizational advantages as the former may have enjoyed were probably offset by longer hours of work in the latter. Net output per worker was probably lower for small-scale than for large-scale industry as a whole because employment was more concentrated in industries of low labor productivity in the former case than in the latter.

TABLE 51

OUTPUT OF TWENTY-SEVEN PRODUCTS IN SMALL-SCALE AND LARGE-SCALE INDUSTRY: SOVIET UNION, 1928 AND 1933

	Unit	*Small-Scale Output*			*Large-Scale Industry*			*Total Output*		
		1928	1933	Change, 1928–1933	1928	1933	Change, 1928–1933	1928	1933	Change, 1928–1933
Firewood consumed	mill. m^3	53	32	−21	26	75	+49	79	107	+28
Red lead	th. m. t.	0.8	0.2	−0.6	4.6	2.6	−2.0	5.4	2.8	−2.6
Red bricks	millions	768	404	−364	1,888	2,959	+1,071	2,656	3,363	+707
Construction gypsum	th. m. t.	108	—	−108	127	446	+319	235	446	+211
Construction lime	th. m. t.	242	—	−242	284	1,394	+1,110	526	1,394	+868
Industrial timber hauled	mill. m^3	60.1	—	−60.1	—	98.0	+98.0	60.1	98.0	+37.9
Lumber	mill. m^3	6.4	0.5	−5.9	7.6	26.8	+19.2	14.0	27.3	+13.3
Plywood	th. m^3	30.4	—	−30.4	164.6	424.3	+259.7	195.0	424.3	+229.3
Window glass	mill. m^2	0.7	—	−0.7	33.5	29.8	−3.7	34.2	29.8	−4.4
Hard leather	th. m t.	25.2	0.8	−24.4	63.8	38.9	−24.9	89.0	39.7	−49.3
Soft leather	mill. dcm^2	875	50	−825	2,175	2,436	+261	3,050	2,486	−564
Flour	mill. m. t.	16	13	−3	8	7	−1	24	20	−4
Butter	th. m. t.	82.1	34.8	−47.3	—	89.5	+89.5	82.1	124.3	+42.2
Vegetable oil	th. m. t.	338	21	−317	282	300	+18	620	321	−299
Meat	th. m. t.	424	7	−417	254	420	+166	678	427	−251
Fish catch	th. m. t.	840	13	−827	—	1,290	+1,290	840	1,303	+463
Soap (40% fatty acid)	th. m. t.	54	29	−25	306	233	−73	360	262	−98
Starch and syrup	th. m. t.	27	9	−18	69	142	+73	96	151	+55
Canned food	mill. cans	25	—	−25	100	619	+519	125	619	+494
Cigarettes	billions	2.4	—	−2.4	47.1	62.7	+15.6	49.5	62.7	+13.2
Low-grade tobacco	th. m. t.	22.9	—	−22.9	63.0	50.3	−12.7	85.9	50.3	−35.6
Boots and shoes	mill. pairs	79.4	10.8	−68.6	23.6	79.5	+55.9	103.0	90.3	−12.7
Cotton fabrics	mill. m	139	—	−139	2,539	2,732	+193	2,678	2,732	+54
Linen fabrics	mill. m	3.5	—	−3.5	170.9	140.5	−30.4	174.4	140.5	−33.9
Pure silk fabrics	mill. m	0.6	0.1	−0.5	1.3	12.1	+10.8	1.9	12.2	+10.3
Woolen and worsted fabrics	mill. m	34	12	−22	83	74	−9	117	86	−31
Felt footwear	mill. pairs	11.2	1.5	−9.7	4.4	6.1	+1.7	15.6	7.6	−8.0

SOURCE: Table B-2 and Kaufman, "Small-Scale Industry," Tables A-4 and A-5. For the meaning of symbols and abbreviations used, see the general note to Appendix B of this book.

—: Negligible.

flour, soap, low-grade tobacco, linen fabrics, and woolen and worsted fabrics). Declines in the small-scale sector were not fully matched by increases in the large-scale sector in six cases (soft leather, vegetable oil, meat, boots and shoes, cotton fabrics, and felt footwear). In the remaining twelve cases, the declines were more than matched by increases in the large-scale sector, but in all but two cases (canned food and pure silk fabrics) the decline amounted to at least 10 per cent of the increase. These data show that it can be very misleading to measure growth in output over this early part of the Plan period on the basis of large-scale production alone.

TABLE 52

INDEXES OF OUTPUT, EMPLOYMENT, AND OUTPUT PER PERSON ENGAGED IN LARGE-SCALE AND SMALL-SCALE INDUSTRY: SOVIET UNION, BENCHMARK YEARS, 1913–1933

	1913	1928	1933
		TOTAL INDUSTRY	
Output of industrial materials[a]	100	100	137
Persons engaged[b]	100	92	149
Output per person engaged	100	109	92
		LARGE-SCALE INDUSTRY	
Output of industrial materials[a]	100	107	183
Persons engaged[b]	100	104	281
Output per person engaged	100	103	65
		SMALL-SCALE INDUSTRY	
Output of industrial materials[a]	100	86	32
Persons engaged[b]	100	82	20
Output per person engaged	100	105	158

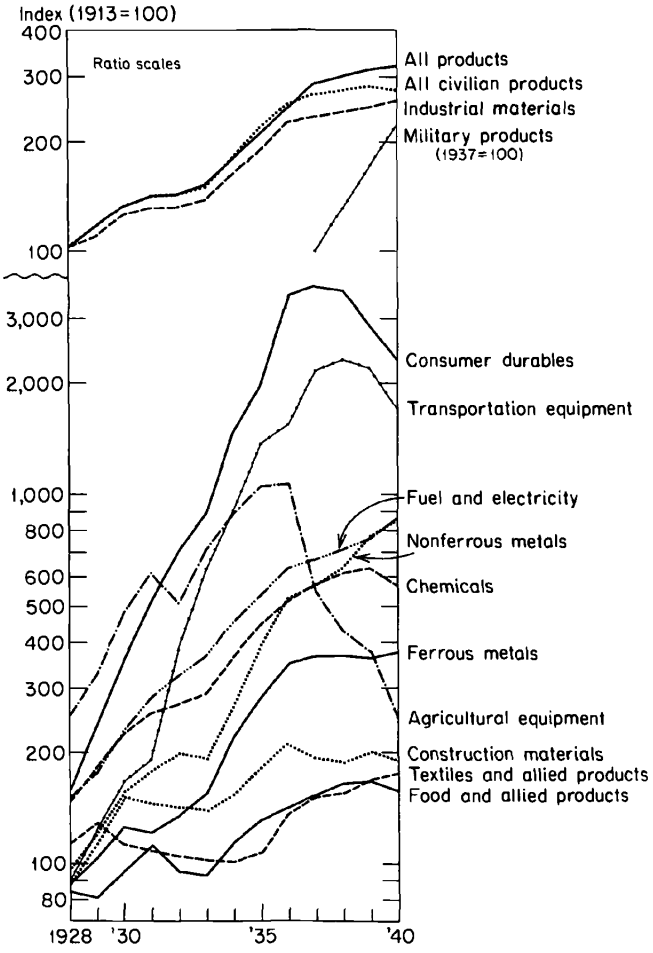
SOURCE: Tables 48 and D-1; Kaufman, "Small-Scale Industry," Table A-6.
[a] 1928 weights.
[b] Measured in full-time equivalents.

The movements of production and labor productivity in large- and small-scale industry are represented in Table 52. Output is measured by industrial materials because more comprehensive coverage is not possible on the basis of available data. Small-scale production declined by 14 per cent between 1913 and 1928 and by 73 per cent between 1928 and 1933, while large-scale production was growing over the same periods by 7 and 71 per cent. The movements in labor productivity were in the opposite direction, however: output per person engaged rose by 58 per cent in small-scale industry between 1913 and 1933, but fell by 35 per cent in large-scale industry. It is impossible to determine how much of this was due to shifting of industries from one category to the other and how much to other factors.

GENERAL ECONOMIC DEVELOPMENTS

According to our moving-weight index for all products (Table 53 and Chart 19), industrial output grew at an average of 12.1 per cent a year

CHART 19
Moving-Weight Indexes of Production, All Industry and Industrial Groups: Soviet Union, 1928–1940



Source: Table 53.

during the period 1928–1937. There was an acceleration in growth from the earlier to the later years: the average annual rate was 8.8 per cent

TABLE 53

MOVING-WEIGHT INDEXES OF PRODUCTION, ALL INDUSTRY AND INDUSTRIAL GROUPS: SOVIET UNION, 1928–1958
(1913 = 100)

			ALL CIVILIAN PRODUCTS						
				Intermediate Products					
	Industrial Materials	All Products	Total	Total	Ferrous Metals	Nonferrous Metals	Fuel and Electricity	Chemicals	Construction Materials
1928	102	102	102	108	88	97	150	146	88
1929	110	116	116	134	104	121	177	184	114
1930	126	134	134	174	126	156	229	226	154
1931	132	143	143	186	121	179	284	256	145
1932	133	144	144	199	134	197	323	270	142
1933	139	153	152	214	155	191	367	289	139
1934	165		182	262	223	266	454	367	154
1935	190		216	313	284	390	532	446	182
1936	226		252	371	350	522	630	513	211
1937	233	285	268	379	365	567	667	571	193
1938	240	298	275	385	368	635	706	616	187
1939	247	311	282	396	361	776	760	634	199
1940	257	318	274	417	375	847	849	565	189
1945	157	264	123	232	235	621	682	213	89
1946	178	180	160	287	262	683	766	326	116
1947	211	219	207	346	295	791	873	468	141
1948	252	276	271	442	371	910	998	619	192
1949	301	343	340	527	456	1,115	1,134	807	226
1950	331	393	397	612	534	1,290	1,263	981	264
1951	373	448	426	689	613	1,521	1,384	1,065	302
1952	397	488	439	734	687	1,779	1,490	1,116	317
1953	430	516	473	775	757	1,951	1,605	1,155	330
1954	466	563	528	859	824	2,118	1,759	1,278	370
1955	511	620	577	942	907	2,405	1,994	1,418	396
1956	547		625		974		2,202	1,561	415
1957	586		686		1,023		2,429	1,682	453
1958	628		715		1,094		2,660	1,804	488

TABLE 53 (concluded)

	ALL CIVILIAN PRODUCTS (CONCLUDED)								
	Machinery and Equipment			*Consumer Goods*				Civilian and Military Machinery and Equipment	Military Products (1937 = 100)
	Total	Transportation Equipment	Agricultural Machinery	Total	Food and Allied Products	Textiles and Allied Products	Consumer Durables		
1928	143	90	251	97	84	113	158	143	
1929	190	123	328	103	81	129	239		
1930	271	169	481	104	96	112	364		
1931	333	192	619	111	112	108	517		
1932	426	385	510	100	95	105	704		
1933	654	630	704	98	93	102	889	693	4
1934	897	904	887	110	115	101	1,472		
1935	1,274	1,384	1,050	123	131	107	1,950		
1936	1,383	1,546	1,055	144	141	136	3,445		
1937	1,624	2,155	546	157	153	151	3,652	2,597	100
1938	1,626	2,308	426	165	165	155	3,579	2,910	132
1939	1,517	2,190	373	170	166	168		3,209	174
1940	1,140	1,692	247	171	156	175	2,301	3,280	220
1945	265	430	36	73	82	69	274	6,363	627
1946	563	908	78	87	93	84		1,458	92
1947	883	1,350	165	115	115	111		1,564	70
1948	1,425	1,968	389	139	131	136	3,219	2,076	67
1949	2,069	2,700	659	168	164	159	4,512	2,721	67
1950	2,637	3,250	959	184	169	179	5,768	3,639	103
1951	2,248	2,435	1,014	220	197	214	7,420	3,950	175
1952	2,106	2,325	926	230	205	223	8,428	4,839	281
1953	2,312	2,775	900	251	222	240	10,191	4,811	257
1954	2,631	3,095	1,045	280	247	263	13,584	4,916	235
1955	2,994	3,447	1,231	297	258	275	16,350	5,795	288
1956	3,466	3,629	1,637	313	278	284	18,311		
1957	4,086	3,726	2,254	330	287	302	19,488		
1958	3,881	3,991	1,874	353	301	323	21,599		

SOURCE: Tables D-1, D-3, D-4, D-6, A-10, and A-11. Current territory except 1913, which covers interwar Soviet territory.

TABLE 54

AVERAGE ANNUAL GROWTH RATES OF OUTPUT, ALL INDUSTRY AND INDUSTRIAL GROUPS: SOVIET UNION, FIVE YEAR PLANS
(per cent)

	1928–1932	1932–1937	1937–1940	1940–1945	1945–1950	1950–1955
Industrial materials	6.8	11.8	3.2	−9.4	16.0	9.0
All products	8.8	14.6	3.7	−6.0	8.3	9.6
All civilian products	8.8	13.2	0.7	−14.8	26.4	7.7
Intermediate products	16.5	13.7	3.2	−11.2	21.3	9.0
Ferrous metals	11.0	22.2	1.0	−9.0	17.8	11.2
Nonferrous metals	19.4	23.5	14.2	−6.0	15.8	13.2
Fuel and electricity	21.1	15.7	8.6	−4.3	13.1	9.6
Chemicals	16.6	16.2	−0.4	−17.8	35.8	7.7
Construction materials	12.7	6.3	−0.7	−14.0	24.3	8.5
Machinery and equipment	31.5	30.7	−11.2	−25.5	58.3	2.6
Transportation equipment	44.0	41.1	−8.0	−24.2	49.9	1.2
Agricultural machinery	19.4	1.4	−23.4	−31.9	92.8	5.1
Consumer goods	0.7	9.4	2.9	−15.5	20.3	10.0
Food and allied products	3.1	10.0	0.7	−12.1	15.5	8.9
Textiles and allied products	−1.8	7.6	5.1	−17.0	21.0	9.0
Consumer durables	45.3	39.0	−14.3	−34.8	85.5	23.1
Civilian and military machinery and equipment	37.1[a]	39.1[a]	8.1	14.2	−10.6	9.7
Military products	[b]	123.6[a]	30.1	23.3	−30.3	22.8

SOURCE: Table 53. Average annual growth rates calculated from data in terminal years by the compound interest formula.

[a] 1933 instead of 1932.

[b] Output negligible in 1928.

for 1928–1932 and 14.6 per cent for 1932–1937.[14] At the same time, the growth rates for individual industries were much less widely dispersed for the later years than for the earlier ones (see Chart 20).

It should be recalled at this point that there was widespread deterioration in the quality of products during these years, most pronounced in the field of consumer goods and over the period 1928–1932. This means that production indexes tend to exaggerate rises and understate declines in output, and in some cases, as consumer goods, the bias is very substantial. Thus, although our index shows the output of food and allied products as increasing by 13 per cent from 1928 through 1932, it is probable that output, measured in terms of some standard quality, actually declined. Similarly, the decline in output of textiles and allied products was probably greater than the recorded 7 per cent.

[14] For all civilian products, the average annual growth rate was 11.2 per cent for 1928–1937, 8.8 per cent for 1928–1932, and 13.2 per cent for 1932–1937; for industrial materials, 9.6, 6.8, and 11.8 per cent; for finished civilian products, 10.3, 6.6, and 13.6 per cent.

TABLE 55

AVERAGE ANNUAL GROWTH RATES OF OUTPUT PER UNIT OF LABOR, ALL INDUSTRY AND INDUSTRIAL GROUPS: SOVIET UNION, FIVE YEAR PLANS
(per cent)

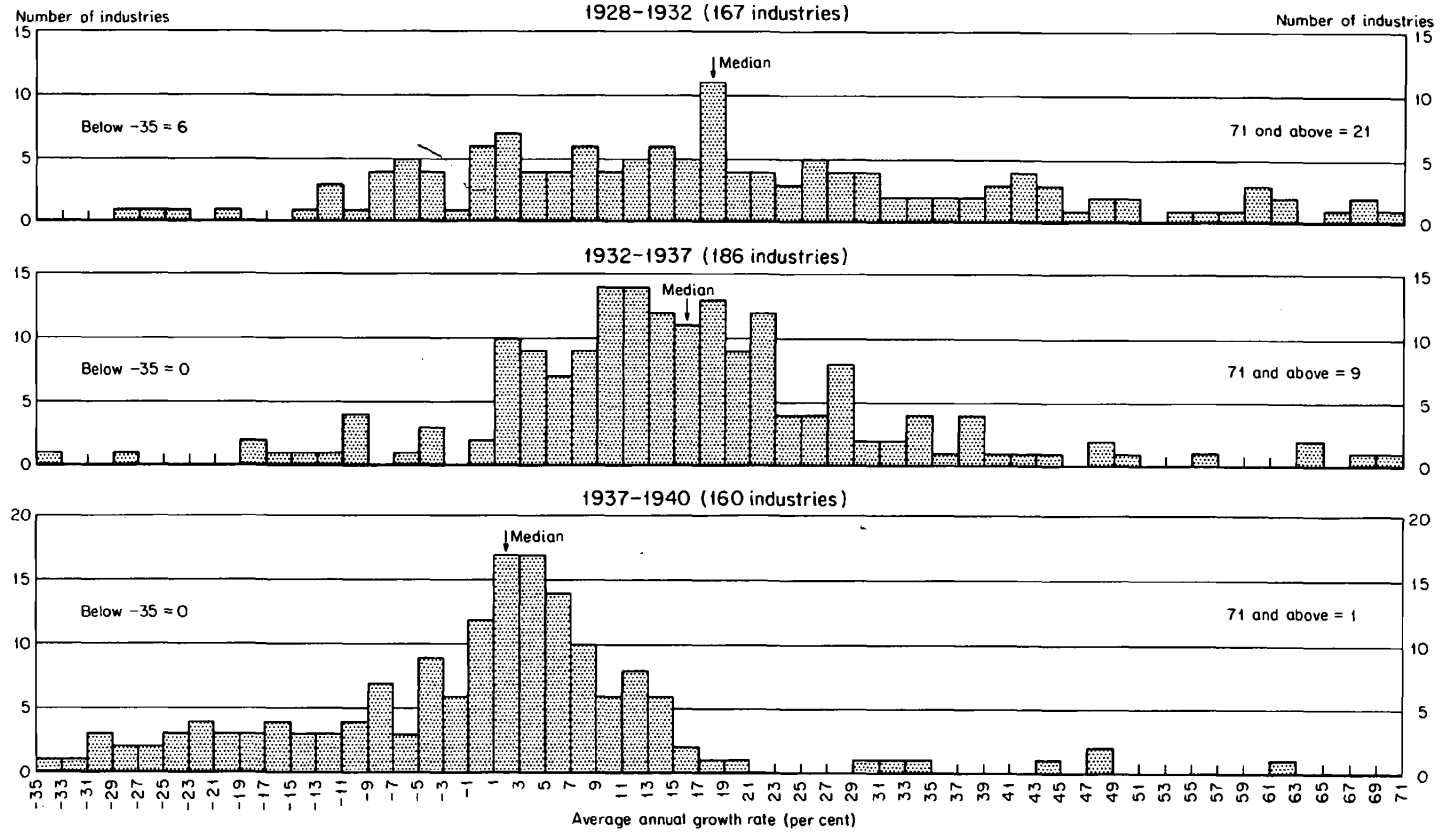
	1928–1933	1933–1937	1937–1940	1940–1950	1950–1955
		OUTPUT PER MAN-HOUR			
All products	1.3	6.7	−5.8	−0.1	7.1
		OUTPUT PER PERSON ENGAGED			
All products	−1.5	7.0	1.4	0.1	5.4
Ferrous and nonferrous metals	−2.7	21.8	3.2	−1.4	8.9
Fuel and electricity	5.1	14.7	3.5	−0.1	5.4
Fuel	2.8	11.2	2.3	−0.2	4.9
Electricity	−1.2	14.5	7.4	1.0	7.7
Chemicals	−5.5	14.4	−5.7	5.5	−0.5
Construction materials	−7.4	9.2	−5.8	0.4	4.1
Wood materials	−6.2	3.6	−3.8	0.9	1.5
Mineral materials	−12.0	35.8	−13.2	−1.4	5.5
Machinery and allied products	−2.1	28.7	4.6	−1.3	5.9
Civilian machinery and equipment	17.5	3.5	0.6	4.4	−2.0
Food and allied products	−4.1	5.1	−0.9	0.2	7.3
Textiles and allied products	−2.9	3.8	2.6	0.8	3.7

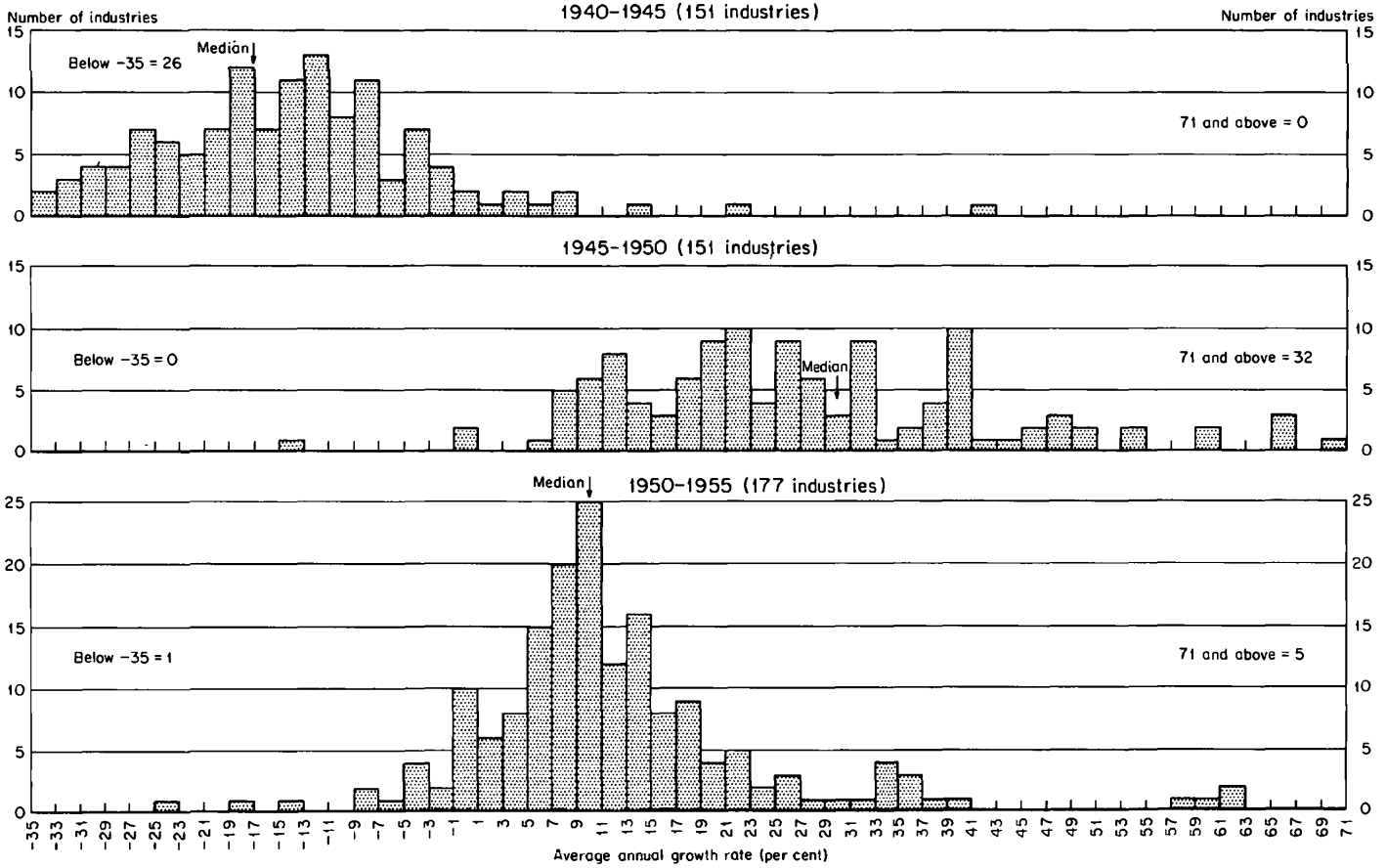
SOURCE: Table 40. Note that some industrial groups have a different coverage from that in Table 54. Average growth rates calculated from data for terminal years by the compound interest formula.

The broad structure of growth rates in the two periods 1928–1932 and 1932–1937 is presented in Table 54. Machinery and equipment showed the most rapid growth in both periods, followed by intermediate products and consumer goods. Growth retarded slightly for the first two categories but accelerated sharply for consumer goods between the two periods. Growth retarded in the case of six of the industrial groups listed (consumer durables, transportation equipment, fuel and electricity, agricultural equipment, chemicals, and construction materials) and accelerated in the case of four (ferrous metals, nonferrous metals, food and allied products, and textiles and allied products). The great disparity between growth rates for nondurable consumer goods, on the one side, and for all other goods, on the other, has been commented on many times before; at this stage we need only remark that the disparity was greatest during 1928–1932. Production of military end items began in earnest in the Second Five Year Plan, output expanding about twenty-five times between 1933 and 1937.

Growth in output in the First Five Year Plan was achieved primarily by expanding employment; in the Second, by improving output per person engaged (see Table 55). Roughly speaking, workers were first

CHART 20
Frequency Distributions of Growth Rates of Soviet Industries, Five Year Plans




Number of industries
1940–1945 (151 industries)
Number of industries
Median
Below −35 = 26
71 and above = 0
1945–1950 (151 industries)
Below −35 = 0
Median
71 and above = 32
Median
1950–1955 (177 industries)
Below −35 = 1
71 and above = 5
Average annual growth rate (per cent)

poured into existing facilities, with a general reduction in output per worker; simultaneously, new facilities were being built and equipped; and, in the succeeding period, new workers were combined with new facilities and equipment to raise both output and output per worker. We observe that output per person engaged fell in eight out of nine industrial groups during 1928–1933 (the exception being civilian machinery and equipment); it rose in all nine groups during 1933–1937.

OUTPUT OF MACHINERY

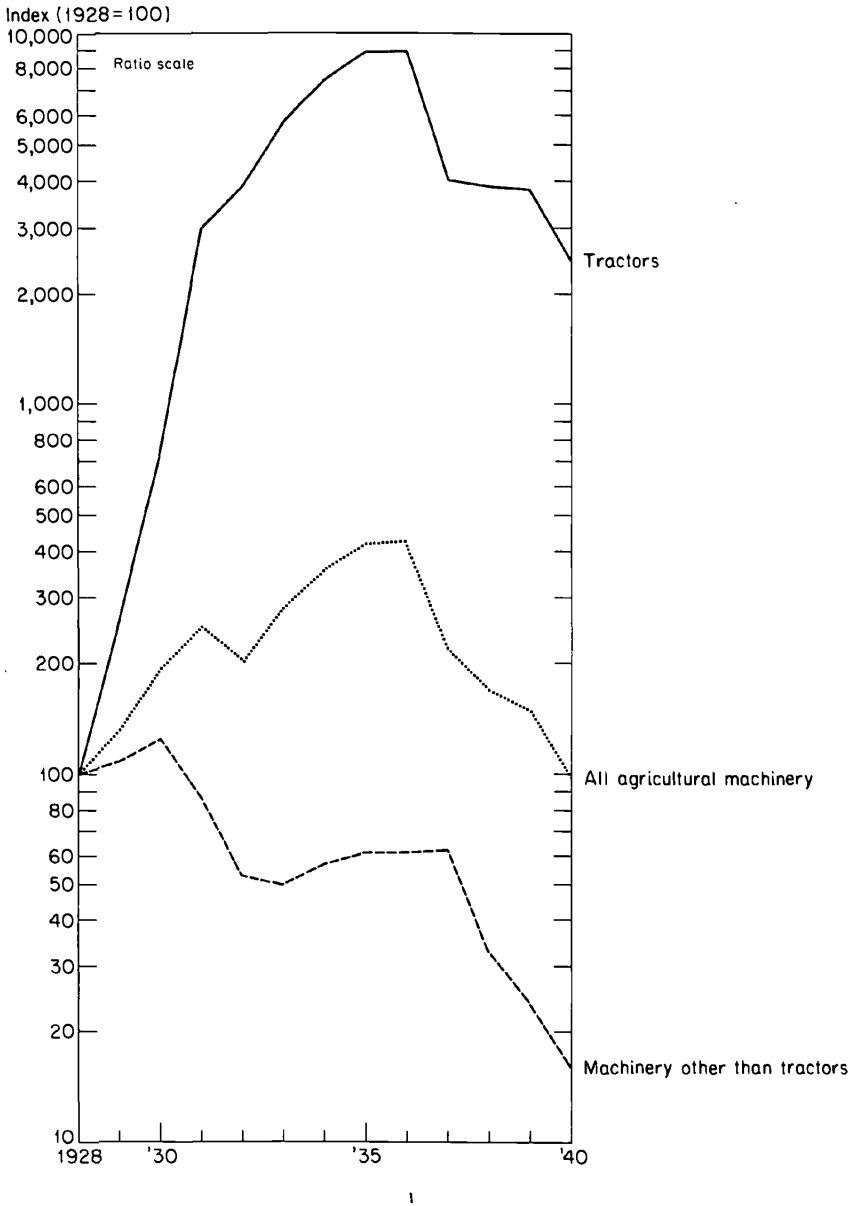
A few special remarks on the growth of machinery industries seem to be called for because of the great difficulties, already discussed, in devising satisfactory measures of production. In particular, it might be thought that the failure to include some of the more heterogeneous categories of machinery in our production indexes causes an understatement of over-all growth. Before facing that question, we should trace out the broad lines of growth in transportation equipment and agricultural equipment

The output of transportation equipment had fallen by about 10 per cent between 1913–1928. With the growth of the automobile industry, production rose rapidly thereafter and reached its interwar peak in 1938. The average annual rate of growth during 1928–1937 was 42.3 per cent.

By contrast, the output of agricultural equipment had risen by about 150 per cent between 1913 and 1928; and although production continued to rise, the growth rate—9.0 per cent a year during 1928–1937—was much slower than for transportation equipment. Moreover, growth in output was accounted for entirely by tractors: production of agricultural equipment other than tractors shows a cyclical pattern, with a peak in 1930, a trough in 1933, and a second much lower peak in 1937 (see Chart 21). Developments in this industry seem to be rather closely related to agricultural policy, in particular to forced collectivization.

There was a very substantial growth in other segments of the general machinery industry—electrical equipment, mining machinery, machine tools, and so on—but it is impossible to devise satisfactory measures of this growth. The illustrative production indexes we have constructed for this part of the machinery industry show a growth rate roughly the same as for transportation and agricultural equipment taken together. Put another way, inclusion of these heterogeneous machinery items in a general production index does not materially affect the movement of the index over 1928–1937 (see Table 28).

CHART 21
Production of Agricultural Machinery; Soviet Union, 1928–1940



Source: Table 53 and Appendix D.

Growth was also very rapid for consumer durables—bicycles, cameras, light bulbs, phonographs, radios, sewing machines, and motorcycles. The primary explanation here is the extremely low level of production at the beginning of the Plan period.

GROWTH CYCLES

The annual growth rate has a rather interesting cyclical pattern in each of the periods 1928–1932 and 1932–1937, though it is not so pronounced in the latter as in the former (see Table 56). In each period, the peak

TABLE 56

ANNUAL RELATIVES OF PRODUCTION, INDUSTRIAL MATERIALS AND ALL CIVILIAN PRODUCTS: SOVIET UNION, 1929–1940

	Production as Per Cent of Preceding Year	
	Industrial Materials	All Civilian Products
1929	108	114
1930	115	115
1931	105	107
1932	101	100
1933	104	106
1934	119	120
1935	115	118
1936	119	117
1937	103	106
1938	103	103
1939	103	102
1940	104	97

SOURCE: Table 53.

annual percentage increase in output seems to come in the second year. This finding is supported by behavior in individual industries. If we define a "growth cycle" as existing if the annual growth rate reached a peak in some year other than the terminal years of the period, and if we restrict our attention to industries with annual output data covering the entire period, fifty-seven out of eighty-six industries (or 66 per cent) had a "growth cycle" during 1928–1932, and eighty-six out of 106 industries (or 81 per cent) had one during 1932–1937. Moreover, the second year contained the peak annual growth rate for 69 per cent of the industries with a "growth cycle" during 1928–1932 and for 34 per cent of those with a "growth cycle" during 1932–1937. No other year claimed a larger percentage.[15]

[15] These statistics are calculated from output series in Table B-2.

It is not clear that any mechanical significance should be attached to these "growth cycles" since they are consistent with economic developments unique to each period. For example, the declines in annual growth rates during the period 1928–1932 coincide more or less with intensive collectivization of agriculture. Similarly, the declines in the period 1932–1937 seem to coincide with Stalin's political purges.[16] We shall discuss later whether there is similar evidence of "growth cycles" during the postwar years, for this would have an important bearing on the normalcy of such behavior.

SUCCESS IN MEETING GOALS OF FIVE YEAR PLANS[17]

The output targets set at the beginning of the First and Second Five Year Plans turned out to be rather poor forecasts of events (see Chart 22 and Table 57). For half the products whose targets were listed in physical terms, output reached less than 76 per cent of the target by the terminal year of each plan; the percentage fulfillment would be even lower for the First Plan if we used the maximum instead of the minimum targets. Those products accounting for half the value added (evaluated in 1928 or 1955 rubles) of all listed products in each terminal year had an output that was less than 85 per cent of the target. Finally, the total value added achieved by all listed products was no more than 77 per cent of the "planned" value, both values being expressed in 1928 or 1955 rubles.

Success in meeting planned targets varied from one sector of industry to another, being generally poorest in nonferrous metals, chemicals, construction materials, and consumer goods. Actual value added was within 10 per cent of "planned" value in the cases of fuel and electricity and agricultural machinery in 1932, and of miscellaneous machinery in 1937. It is interesting to note for agricultural machinery that actual value added fell from 98 per cent of "planned" value in 1932 down to 53 per cent in 1937.

[16] They may also be related to mobilization for war. At least one Western economist, Gregory Grossman, has argued that 1936 should be included with the following three years to form the period of intensive mobilization ("Steel, Planning, and War Preparedness in the USSR," *Explorations in Entrepreneurial History*, Vol. IX, No. 4, p. 231). This view may be doubted. Although military expenditures did rise substantially in 1936, this was largely due to rising prices following the discontinuance of widespread rationing. If this factor is discounted, expenditures in 1936 seem to fall in line with the rising trend of military expenditures begun in 1934 (see G. F. Grinko, "The Financial Program for 1935," in *Soviet Union 1935*, Moscow and Leningrad, 1935, and *idem*, "Financial Program of the USSR for 1936," in *Second Session of the Central Executive Committee of the USSR*, Moscow, 1936).

[17] Data underlying the discussion in this section are given in technical note 10 of Appendix A.

TABLE 57

FULFILLMENT OF FIVE YEAR PLANS, BY INDUSTRIAL GROUP: SOVIET UNION, 1932, 1937, 1950, AND 1955

	Percentage Fulfilled of Planned Value Added in 1928 Prices				*Percentage Fulfilled of Planned Value Added in 1955 Prices*			
	1932[a]	1937	1950	1955	1932[a]	1937	1950	1955
	VARIABLE PRODUCT COVERAGE[b]							
All covered products	74	76	94	99	78	76	94	98
Intermediate products	79	81	104	101	80	80	101	99
Ferrous metals	73	88	107	102	74	87	106	101
Nonferrous metals	60	59	105	81	62	58	103	82
Fuel and electricity	92	88	106	103	95	88	104	104
Chemicals	63	76	96	102	68	78	93	105
Construction materials	73	66	95	90	75	69	93	88
Machinery and equipment	102	77	72	107	110	72	72	110
Transportation equipment	118	79	69	[c]	119	63	63	[c]
Agricultural machinery	98	53	98	126	98	84	102	126
Miscellaneous machinery	[c]	99	77	76	[c]	111	82	74
Consumer goods	60	62	91	91	65	68	89	93
Food and allied products	57	72	95	86	65	74	90	93
Textiles and allied products	61	56	88	94	67	57	84	94
	STANDARD PRODUCT COVERAGE[d]							
All covered products	77	77	102	100	79	76	99	98
Intermediate products	82	83	104	101	83	80	100	99
Ferrous metals	73	89	106	102	73	88	106	101
Nonferrous metals	60	67	110	80	62	67	111	80
Fuel and electricity	92	86	108	104	95	85	105	104
Chemicals	72	83	89	107	72	83	89	107
Construction materials	78	69	87	88	79	68	87	87
Agricultural machinery	98	53	97	126	98	53	97	126
Consumer goods	61	61	88	90	62	63	90	89
Food and allied products	38	86	105	76	38	86	105	76
Textiles and allied products	65	57	85	94	70	57	86	94

SOURCE: Table A-46.

[a] Relates to minimum planned goals for 1932.

[b] Largest number of products for which required data are available in each case, as follows:

	Valued in 1928 Prices	*Valued in 1955 Prices*
1932	37	36
1937	61	64
1950	59	59
1955	34	33

[c] Planned output not published.

[d] Same sample of eighteen products in each case.

The Third Five Year Plan

GENERAL ECONOMIC DEVELOPMENTS

The course of industrial development changed abruptly during the period 1937–1940: our production indexes all show a sharp retardation in growth rate from the level of earlier periods. If we restrict our attention

CHART 22

Relative Frequency Distributions of Percentages of Planned Output (Five Year Plans) Fulfilled by Value Added: Soviet Union, 1932, 1937, 1950, and 1955

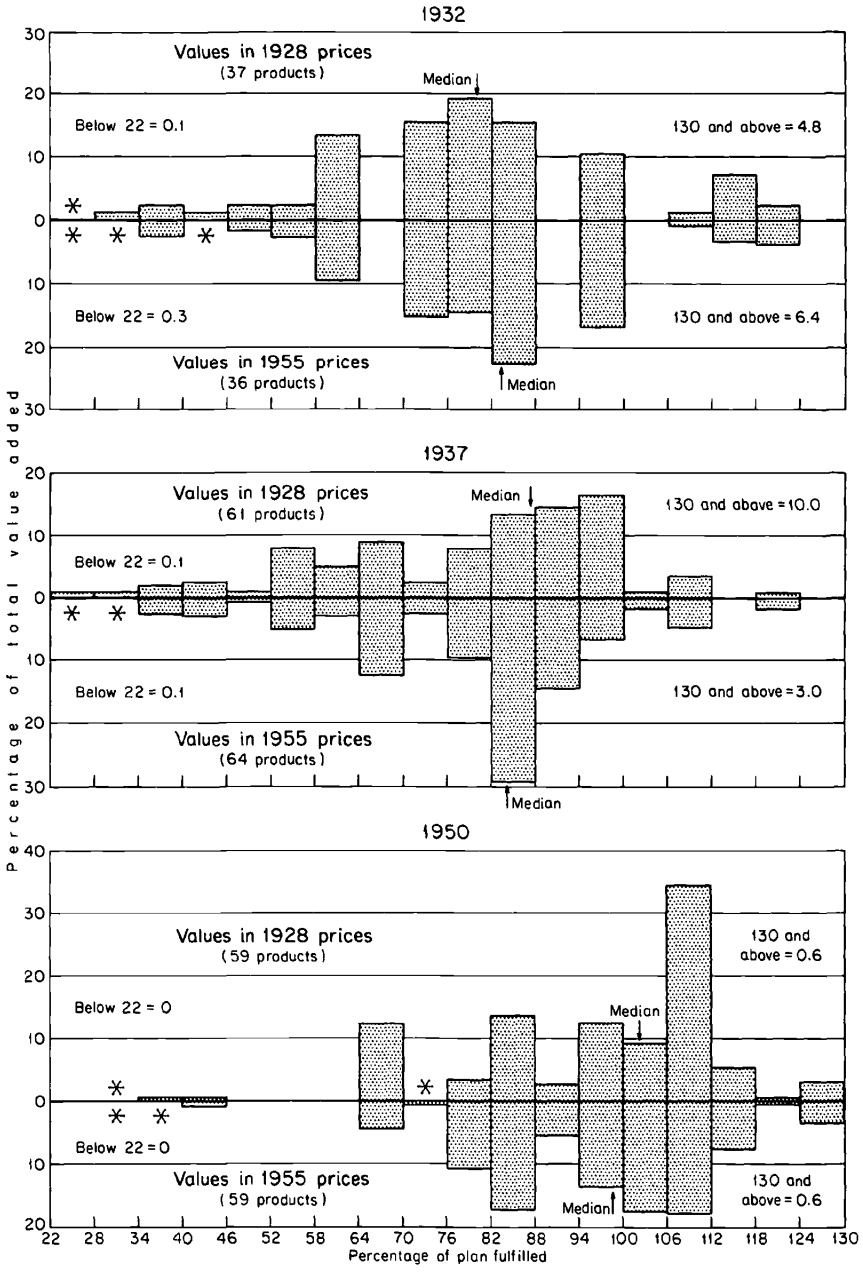
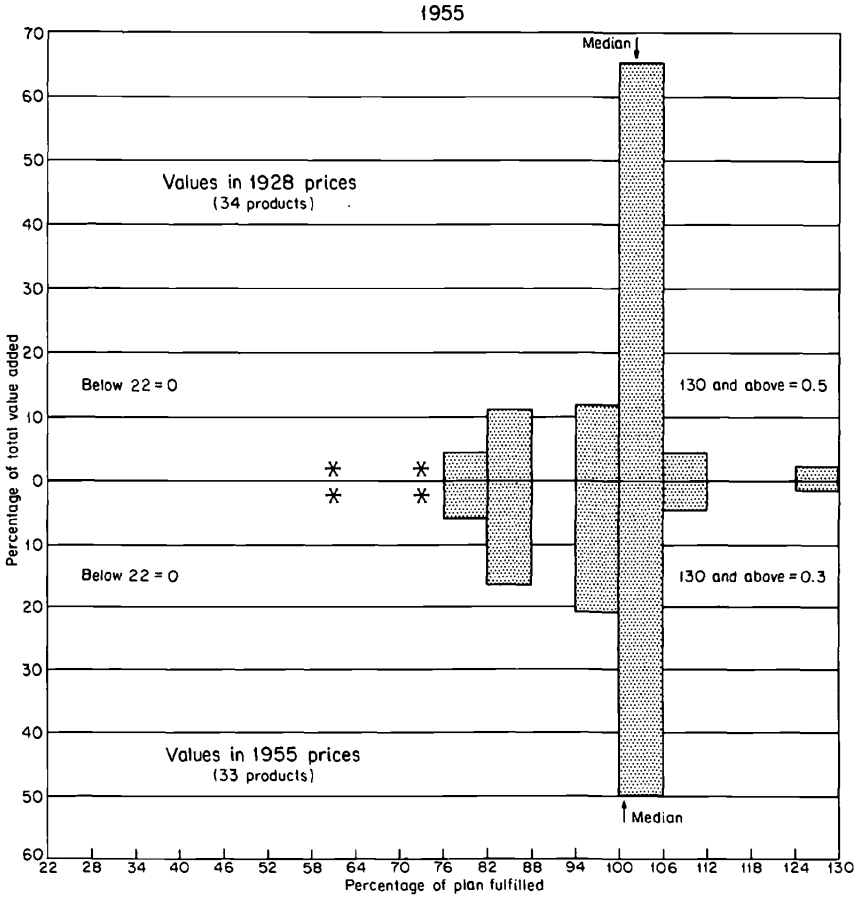


CHART 22 (concluded)



Source: Tables A-45 and D-8.
* Less than 0.5 per cent.

to the indexes based on moving weights, the average annual growth rate fell from 11.8 per cent for 1932–1937 to 3.2 per cent for 1937–1940 in the case of industrial materials, from 13.6 to −2.0 per cent in the case of finished civilian products, from 13.2 to 0.7 per cent in the case of all civilian products, and from 14.6 to 3.7 per cent in the case of all industrial products. These rates do not tell the full story because there was a substantial gain in industrial production attributable to territorial expansion.

In order to interpret the economic development, one must keep in mind the political disturbances of the period. The Great Purge of the Communist Party directed by Stalin reached its zenith in 1937 and 1938,

resulting in, among other things, a wholesale turnover of Soviet economic, military, and political leaders.[18] Though it may be impossible to assess the full impact of the purge, there is no doubt that it had an adverse effect on industrial production.

Coupled with the purge was a program of war preparedness, involving substantial diversion of resources from some segments of industry into armaments. Again, for reasons to be elaborated, there is no way to determine how much this mobilization effort had to do with the sharp retardation in growth. Our data on labor productivity (Table 55) do indicate that one apparent effect of disturbances was a significant decline in output per man-hour in industry as a whole. Average annual hours worked increased by about 25 per cent between 1937 and 1940 (see Table A-23), and if this increase applied generally—as seems likely—output per man-hour declined throughout all sectors of industry.

Growth in output retarded sharply in every industrial area, output actually declining in the case of chemicals, construction materials, machinery and equipment, and consumer durables (see Table 54 and Chart 19). The slow rate of growth of the ferrous metals industry was officially blamed for many of these troubles, and trouble in that area was in turn blamed on inadequate development of material inputs such as iron ore, manganese, refractory materials, and lime.[19] In any case, the retardation in growth was so pronounced that aggregate industrial production would have grown very little—if at all—between 1937 and 1940, had it not been for territorial acquisitions. This seems to hold true even after allowance is made for expanding military production, which we now turn to consider.

[18] See, e.g., A. F. Khavin, "Razvitie tiazheloi promyshlennosti v tretei piatiletke" [The Development of Heavy Industry in the Third Five Year Plan], *Istoriia SSSR* [History of the USSR], 1959, No. 1, pp. 25 ff. In introducing a detailed discussion of the effects of the purge on industrial personnel, Khavin says the following (p. 25): ". . . In 1936–1939, having wormed their way into J. V. Stalin's confidence, the sworn enemies of the Party and the people Ezhov and Beria—hiding under Stalin's incorrect belief that, as the Soviet Union moved closer to socialism, the class struggle would become more and more intense—started purges of Party and governmental personnel, slandering and annihilating many honest and devoted Party people. Among those purged were many industrial executives.

"The new people put into executive position in industry often did not yet have sufficient experience. In 1937–1938, more than 5,000 new executives were in charge of enterprises, trusts, and chief administrations of heavy industry. Of the 4,000 young specialists who finished technical colleges in the second quarter of 1938, 816 (or more than 20 per cent) were sent directly from college to executive positions in industry. Of the students who were graduated from mining colleges in 1939, fifty-four were appointed chief engineers of mines, and seventy, chief mechanical or electrical engineers. Many workers with no theoretical training were promoted to executive positions."

[19] Khavin in *Istoriia SSSR*, 1959, No. 1, pp. 26 f.

THE MOBILIZATION EFFORT

The Soviet armament program was seriously under way by 1933 and 1934, production of conventional weapons already being large by standards of that day.[20] Production rose sharply through 1937, multiplying twenty-five times according to our estimates. Direct employment in military industries had probably reached one million persons by 1937, or about 9 per cent of all persons engaged in industry.[21]

The expansion in military output continued at the pace of about 30 per cent a year over the Third Five Year Plan, output more than doubling and employment about doubling in the course of three years. The additional million persons employed represented about 8.5 per cent of persons engaged in other industries in 1940. We might therefore suppose that, had these resources not been diverted to military production, civilian production would have risen by about 10 or 11 per cent instead of the 2 per cent actually experienced. In that event, output of all products would have grown no more than it did in the face of the armament program. In other words, there is little evidence here that diversion of resources to military production materially affected the over-all rate of industrial growth.

There was, of course, a substantial growth in the size of the armed forces over this period, military personnel rising from something less than 1.5 million in 1937 to something over 4 million in the middle of 1941. This increase of 2.5 million was much larger than the increase of about 900 thousand that took place during the Second Five Year Plan.[22] The accelerated build-up of the armed forces helps to explain why the industrial labor force showed an increase of less than a million persons over 1937–1940 compared with more than 3.5 million over 1933–1937. Persons engaged in industry increased by over 40 per cent in the latter period but by only 7 per cent in the former (see Table A-20).

In any case, Soviet industry had by no means been put on a wartime footing by the end of 1940. The full list of reasons cannot be known, since the happenings of these years are cloaked in mystery, perhaps never to be dispelled. Fewer data on output are available for 1939 than for any other single year in the Plan period, except war years. The political developments of that year were, of course, world shaking. The Hitler-Stalin pact was concluded in August, followed in September by the

[20] See the speeches by Grinko and Tukhachevsky in *Soviet Union 1935.* See also Heinz Guderian, *Panzer Leader*, New York, 1952, p. 141, and John Scott, *Behind the Urals*, Cambridge, Mass., 1942, pp. 106 f.

[21] See note *d* to Table A-20.

[22] These data are taken from the annex to technical note 3 of Appendix A.

German invasion of Poland and the start of World War II. In the wake of German victory in Poland and in accord with the Hitler-Stalin pact, the Soviet Union took possession of the Baltic States and about half of Poland. The war against Finland was launched. From an economic point of view, the gains from territorial acquisitions were substantial, while the drain of the Finnish war was probably very slight. Yet there is every indication from our indexes that industrial output increased by only 4 per cent in 1939 and 2 per cent in 1940—altogether, by less than the gains from territorial expansion. What happened?

One former Soviet official, Victor Kravchenko, has argued that the mobilization effort faltered in 1939:[23]

> The theory that Stalin was merely "playing for time" while feverishly arming against the Nazis was invented much later, to cover up the Kremlin's tragic blunder in trusting Germany. It was such a transparent invention that little was said about it inside Russia during the Russo-German war; only after I emerged into the free world did I hear it seriously advanced and believed. It was a theory that ignored the most significant aspect of the Stalin-Hitler arrangement: the large-scale economic undertakings which drained the USSR of the very products and materials and productive capacity necessary for its own defense preparations.
>
> The simple fact is that the Soviet regime did not use the interval following the Hitler-Stalin pact to arm itself effectively. I was close enough to the defense industries to know that there was a slackening of military effort after the pact. The general feeling, reflecting the mood in the highest official circles, was that we could afford to feel safe thanks to the statesmanship of Stalin. Not until the fall of France did doubts arise on this score; only then was the tempo of military effort stepped up again.

This view seems to be substantiated in an article by A. F. Khavin, a Soviet historian, published in a professional journal in 1959:[24]

> Nevertheless, in the years just before the war, the possibilities of strengthening the defense capacities of the country were far from being fully utilized. This was partly the result of J. V. Stalin's incorrect assessment of the military and political scene on the eve of the war, of

[23] V. Kravchenko, *I Chose Freedom*, New York, 1952, p. 335. See also pp. 362 ff.
[24] Khavin, in *Istoriia SSSR*, 1959, No. 1, pp. 22 f.

his obvious overconfidence in the pact with Germany. Socialist industry had at its disposal productive forces and cadres that enabled it to supply the Red army with the newest equipment. But it was not fully mobilized in time. Old-style tanks and planes were no longer produced, but the mass production of new types of military equipment was slow to be mastered.

Therefore, at the beginning of the war, the Soviet air force had, for instance, as many planes as the enemy force, but they were outmoded and inferior to German planes.

While not addressing himself to the inadequacies of industrial preparation for war, the late Nikolai Voznesensky, former head of the *Gosplan*, commented much earlier on the fact that full mobilization took place only after war had started. He said:[25]

The Patriotic War found Soviet war industry in the process of introducing the production of new equipment, and the mass output of war equipment was not organized as yet. Prior to the Patriotic War, when the menace of Hitlerite Germany against the USSR was being felt more and more, the Soviet government adopted as a precautionary measure the "mobilization plan" with respect to ammunition for the second half of 1941 and 1942, aiming at wartime conversion of industry in the event of a war. The mobilization plan established a program of ammunition production, and defined a program of industrial conversion, especially for the machine-building industry, in the event of an attack by fascist aggressors on the USSR. . . .

In the very first days of the Patriotic War the mobilization plan was transformed into an operational assignment for the expansion of output in the most important—and the most capable of mass production—branch of war industry: the manufacture of ammunition. The machine-building, metallurgical, and chemical industries began an intensive conversion from peacetime to wartime production. The growth of war production was assured by the radical conversion of all industry of the USSR for meeting the needs of the Patriotic War. War industry, basing itself on all the productive capacity of the country, rapidly mastered the production of modern war equipment and changed the technological process of production to the mass continuous output of aircraft, tanks, weapons, and ammunition.

[25] N. A. Voznesensky, *The Economy of the USSR During World War II* (translated from the Russian), Washington, 1948, pp. 46 f, one intervening paragraph omitted.

The ambitious plans for expanding output in 1941, summarized earlier in Tables 1 and 2, also suggest that industrial mobilization was not preoccupying Soviet leaders even as late as 1940. Large increases in output were planned throughout industry, in the sector of consumer goods as well as elsewhere.

It would seem from these lines of evidence that the sharp retardation in growth evident for the period 1937–1940 is not explained by industrial mobilization. The years most needing explanation are 1939 and 1940, when industrial output adjusted to constant territorial coverage seems not to have increased at all despite the fact that the mobilization effort seems to have faltered and even diminished. The Great Purge undoubtedly had more to do with slowing down growth, and even that may not be a full explanation.

Postwar Industrial Developments

EXTENT OF WAR DAMAGE

The Soviet Union suffered very heavy losses during World War II, and this is shown nowhere more graphically than in what happened to population, which according to estimates derived from official data dropped roughly 24 million between 1940 and 1945, whereas in the absence of war it might well have risen by as much as 15 million. The losses in output were also large, industrial production (for example) declining precipitously to an unknown low point around 1943 while large areas of the Soviet Union were being occupied by German troops. In 1945 industrial output stood, according to our indexes, at 83 per cent of its 1940 level, and this is probably an understatement of the decline because of the tendency of indexes to exaggerate wartime production. In 1946, after the sudden and sharp demobilization, output stood at less than 60 per cent of the 1940 level. Industrial and residential property were damaged and destroyed on a large scale. Even with an abundance of statistical detail at our disposal, we could hardly expect to make an adequate and meaningful assessment of the full economic significance of these war losses; faced as we are with only shreds of evidence, we can make only crude guesses. Even then we would have touched on only one—in most respects, a minor—aspect of war losses, namely, "economic" damage.

It is, nevertheless, important that we form some notion of the magnitude of the net economic handicap placed on Soviet industry in resuming its development in the postwar years, so that we may have a better basis for interpreting recent economic performance. One important thing to

recognize is that economic aid received during the war and "reparations" collected afterward did mitigate losses significantly.

It has been estimated that Lend-Lease shipments to the Soviet Union averaged about $3 billion annually.[26] The significance of this aid is revealed by noting that Soviet production in 1940 of the fifty items included in our index of industrial materials amounted to only $3.6 billion when valued in U.S. 1939 prices (see Table D-7). The total production of Soviet industry apparently amounted in 1940 to about $8.8 billion.[27] Annual Lend-Lease aid would seem to have been roughly a third of prewar annual Soviet industrial output, about the internal decline in industrial output. To this extent, current losses were being offset.

It is much more difficult to assess the more permanent economic losses in the form of property and manpower. On property we must reason entirely by analogy with the United States, and then in only the crudest way. According to Raymond Goldsmith's estimates, all reproducible tangible assets of the United States as of the end of 1940 were worth about $331 billion when valued at current replacement cost.[28] As a very rough guess, we might suppose that the stock of such assets in the Soviet Union was about a fifth as large as in the United States, which would give an estimate of $65 billion as the replacement value of Soviet reproducible tangible assets in 1940, expressed in current American prices.[29]

[26] Harry Schwartz, *Russia's Soviet Economy*, 2nd ed., New York, 1954, p. 595.

[27] This estimate is reached as value added in dollars in 1928 ($3.6 billion, as given in Table 63) times the production index for all Soviet products (311 per cent of 1928), deflated by the U.S. BLS wholesale price index for other than farm products and foods (89.5 per cent of 1928).

[28] R. W. Goldsmith, D. S. Brady, and H. Mendershausen, *A Study of Saving in the United States*, Vol. III, Princeton, 1956, p. 14.

[29] The official Soviet statement of damages is 679 billion rubles or $128 billion (Voznesensky, *Economy of the USSR*, p. 97). This is said to represent two-thirds of all wealth in territories occupied by the Germans (*ibid.*), and that wealth is implied by other statistics to have been from a third to a half of all wealth in the Soviet Union (*ibid.*, p. 94). Thus the losses are implied to be from a fifth to a third of total wealth. The numerical estimate of losses cannot, therefore, be taken seriously; for even with the obviously high estimates of the fraction of wealth lost, it would imply a total wealth of from $384 to $640 billion. These figures bracket Goldsmith's estimate of $424 billion as the national wealth of the United States in 1940.

Soviet statistics on wealth have recently been officially condemned as inadequate and unreliable by V. Starovskii, present head of the Central Statistical Bureau, in his article, "Novye zadachi sovetskoi statistiki" [New Tasks of Soviet Statistics], *Kommunist* [The Communist], 1957, No. 14, p. 68. As to estimated war damage, Starovskii says: "At the end of World War II the fixed capital of all enterprises in formerly occupied territory was re-assessed. The results of this work, done at various times, did not make it possible to estimate fixed capital in comparable prices. Therefore, the government recognized the necessity of bringing order to this matter."

In recognition of these shortcomings, a comprehensive census of capital was undertaken in 1960, and the results have recently been published in *Narodnoe khoziaistvo SSSR v 1959 godu* [The USSR National Economy in 1959], Moscow, 1960.

We might further suppose, as a very rough guess, that a fifth to a quarter of these assets were destroyed in war.[30] The capital loss would then be, on the basis of these crude assumptions, somewhere between $13 and $16 billion. That is to say, new investment within that range would have been required to restore the stock of tangible reproducible assets to its prewar level. No account is, of course, taken of the retardation in growth of capital that may have occurred as a direct consequence of war.

With those general orders of magnitude in mind, let us now turn to the question of "reparations" and see how they compare with this crude measure of "loss." We have collected together scattered estimates of reparations and aid given by a number of countries to the Soviet Union over 1946–1953; details may be found in technical note 8 of Appendix A. These fragments sum to at least $9 billion in 1938 U.S. prices, or to about $21 billion in current U.S. prices. The latter may be compared with the $12 billion given by the United States to Western Europe under the Marshall Plan.

Our estimate of reparations to the Soviet Union does not include requisitions to support Soviet occupation forces in Europe, confiscations of industrial equipment dismantled before the end of the war, proceeds from the so-called "joint companies" established in the satellite countries of Eastern Europe, labor services of prisoners of war, or benefits from differential trading prices (except in the case of Polish coal). Professor Nicholas Spulber concludes in his authoritative study of postwar economic developments in Eastern Europe that "the over-all contribution of these areas to the Soviet Union of reparations, restitutions, etc., was much more substantial than the value totals would suggest,"[31] further stating[32] that:

> The cost of the war participation of Hungary, Romania, and Bulgaria on the Nazi side has placed on them a burden of debt to Russia for a period of not less than 12 years (1944–45–1956). First in the form of reparations, second in the form of joint companies, which grew mostly out of the German assets, and third in the form of the sale and transfer of those assets back to those countries, the Soviet Union has pressed its claims almost inflexibly. It is against this background that

[30] This is suggested by various data given in A. Bergson *et al.*, "Postwar Economic Reconstruction and Development in the U.S.S.R.," *Annals of the American Academy of Political and Social Science*, May 1949, p. 53.

[31] N. Spulber, *The Economics of Communist Eastern Europe*, Cambridge, Mass., 1957, p. 182.

[32] *Ibid.*, pp. 205 f.

we should judge what the Soviet Union claims to have "given" these countries.

In the nature of the case, we cannot make a precise and reliable estimate of the total value of materials and property received by the Soviet Union from other countries during the postwar period. It is quite possible that our estimates of reparations represent no more than half the total. Thus we can imagine a range of $9 to $18 billion in 1938 dollars, which may be compared with our estimate of $13 to $16 billion as the Soviet loss of capital during the war, also expressed in prewar dollars.

The Soviet Union has not, of course, been able to make up for its enormous loss of population—if, indeed, it makes sense to talk about "making up" for such things. Most of these losses occurred among males of working age and, because of lowered birth rates, among the younger age cohorts of both sexes. Economically the result was an immediate reduction in the labor force and a delayed retardation in its rate of growth that was to set in a decade or so after the end of the war—i.e., around 1955. The reduction in the labor force was offset in part by the increased participation of women and by the use of prisoners of war, who were retained and employed on a large scale up to at least 1953.[33] These have been essentially temporizing measures, however; the permanent loss of population has not been economically compensated for, if we assume—as we should—that the lost population would have produced more than enough to maintain itself.

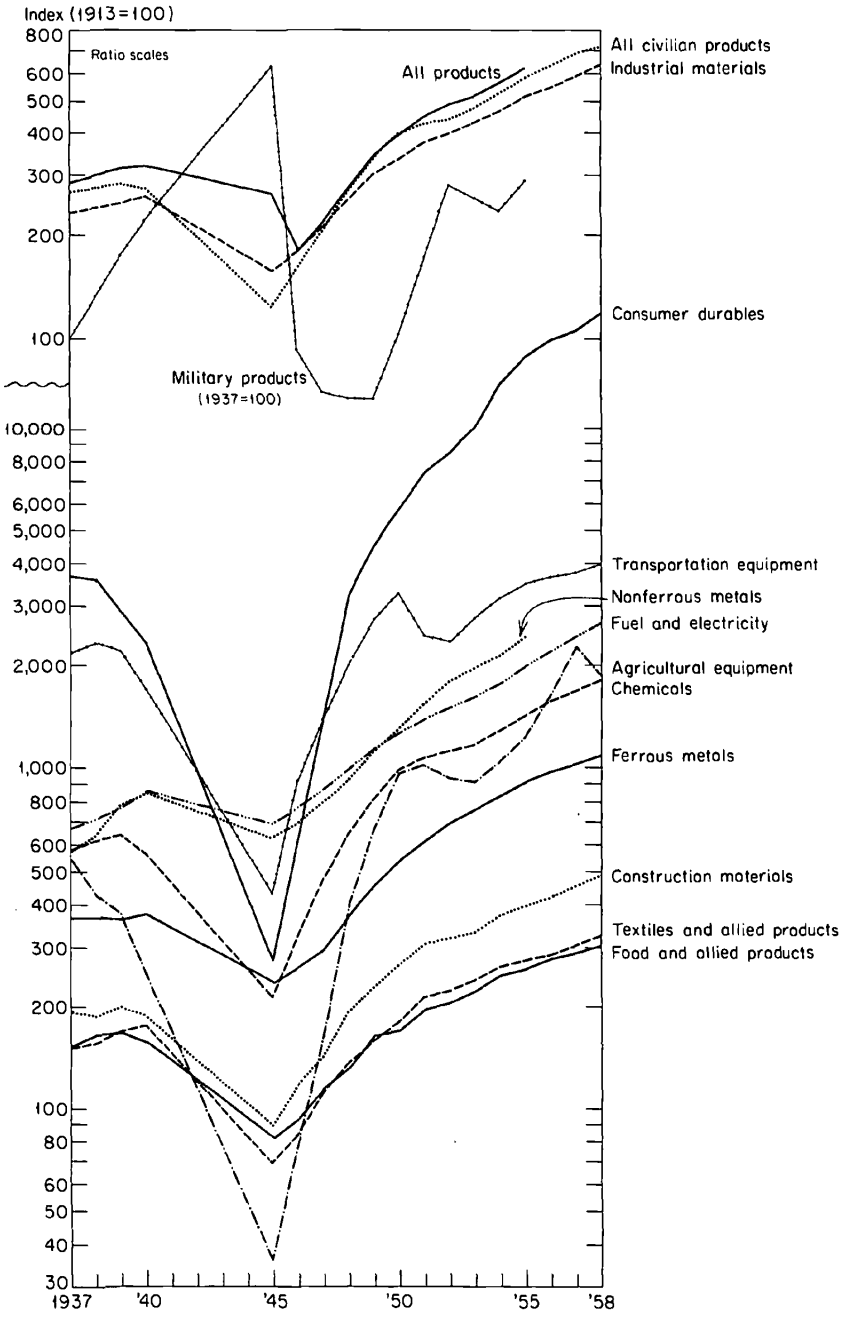
In summary, then, the Soviet Union suffered heavy economic losses in World War II. At the same time, various extraordinary measures resorted to, such as confiscations of foreign materials and property and employment of prisoners of war, considerably mitigated those losses and may very well have fully offset property damage.

RECOVERY OF INDUSTRIAL PRODUCTION, 1945–1950

Output recovered rapidly during the Fourth Five Year Plan (1946 through 1950), apparently reaching its peak prewar level by 1949. Reconversion also occurred rapidly: according to our imperfect measures, output of military products fell by 85 per cent in 1946 and total output by 32 per cent (see Chart 23). These declines are probably exaggerated, however, to the extent that our indexes for 1945 overstate production (see the concluding paragraph of the section on military products in

[33] Schwartz, *Russia's Soviet Economy*, pp. 569 ff.

CHART 23
Moving-Weight Indexes of Production, All Industry and Industrial Groups: Soviet Union, 1937–1958



Source: Table 53.

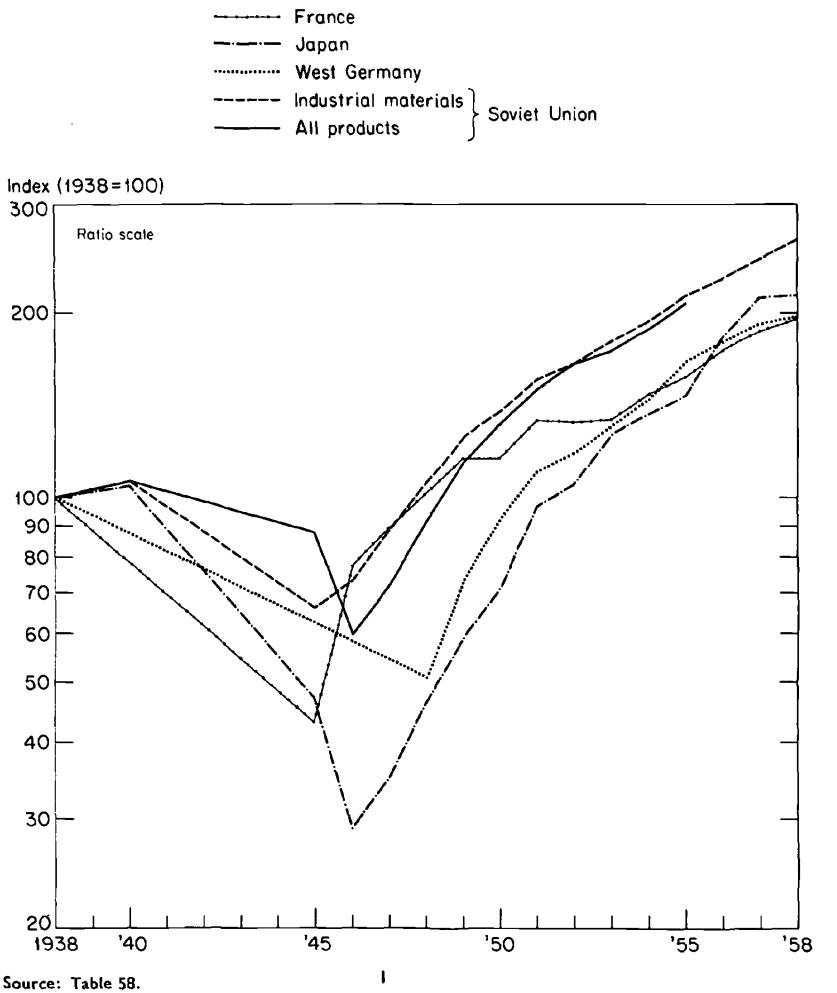
Chapter 5). The shifting of resources was apparently completed before 1948, when military output apparently reached its low point for this period—about 11 per cent of its 1945 level, according to our index—and total output registered a level equal to its previous (exaggerated) 1945 peak. Military output rose sharply again in 1950 with the outbreak of the Korean War, but it reached only about a sixth of its 1945 level. Hence, over 1945–1950, the measured increase in output was larger for civilian products (223 per cent) than for all products (49 per cent) or for industrial materials (111 per cent). By 1950, output was 24 per cent higher than the 1940 level for all products, 29 per cent higher for industrial materials, and 45 per cent higher for civilian products.

Output per unit of labor was roughly the same in 1950 as in 1940, according to our estimates (see Table 40). Such gains as occurred can probably be attributed primarily to technological advances—resulting from wartime experiences, including close contact with the Allies—since it is doubtful that there was a significant increase in industrial capital or improvement in worker's skills between 1940 and 1950. The largest rise in labor productivity came in the machinery and chemicals sectors, with smaller rises for electricity, wood construction materials, and textiles and allied products. Labor productivity apparently declined for metals, fuel, and mineral construction materials.

It would appear that Soviet industry was much more successful in meeting planned goals at the end of the Fourth—and Fifth—Five Year Plan than it had been in the First and Second (see Table 57). Whether this is the result of improved performance or a gradual process of selecting items easiest to plan—only eighteen products in the Fifth Plan appear in all the other plans—is not clear. The estimated 1955 value added of thirty-four planned industries—and value added fulfilled—amounted to less than a sixth of the total value added of industry (see Tables A-43 and A-46).

It is interesting to compare the postwar recovery of industrial output in the Soviet Union with recovery in other countries that suffered considerable war damage. This is done in Table 58 and Chart 24, where industrial growth over recent years is shown for France, Japan, West Germany, and the Soviet Union. Production is measured for the first three countries by their official indexes; for the Soviet Union, by our indexes for industrial materials and for all products. Postwar economic developments have not, of course, been the same in all these countries. In particular, the economic recovery of both Japan and West Germany was held in check by policies of the occupying powers until at least as late as 1948. In any

CHART 24
Indexes of Industrial Production in France, Japan, West Germany, and the Soviet Union, 1938–1958



Source: Table 58.

case, it is interesting to note that the over-all course of recovery (and subsequent development) was similar in all these countries, when due allowance is made for different circumstances. France showed a faster growth than the Soviet Union from 1945/46 through 1950, and both Japan and West Germany surpassed this record in a comparable five years of recovery (1948–1953). Growth in all three countries has continued to be rapid by the Soviet standard.

TABLE 58

INDUSTRIAL PRODUCTION IN FRANCE, JAPAN, WEST GERMANY, AND THE SOVIET UNION, 1938–1958
(1953 = 100)

				Soviet Union	
	France	Japan	West Germany	Industrial Materials	All Products
1938	75	79	77	56	58
1940	n.a.	83	n.a.	60	62
1945	32	37	n.a.	37	51
1946	58	23	n.a.	41	35
1947	67	28	n.a.	49	42
1948	76	36	39	59	53
1949	87	47	56	70	66
1950	87	56	71	77	76
1951	100	77	85	87	87
1952	99	83	91	92	95
1953	100	100	100	100	100
1954	110	108	112	108	109
1955	118	116	128	119	120
1956	130	144	138	127	n.a.
1957	140	167	147	136	n.a.
1958	146	168	151	146	n.a.

SOURCE: Table 53 and United Nations, *Statistical Yearbook, 1959*, New York, 1959. Data for years not given in the latter source have been interpolated by indexes in *Statistical Yearbook, 1956* or *1957*.

POSTWAR GROWTH, 1950–1955

During the Fifth Five Year Plan (1951 through 1955), industrial output apparently grew faster than during the First Five Year Plan and slower than during the Second—slower than during both the First and Second taken together (see Table 54). In the case of food and textiles, however, the growth was more rapid than during the First and Second Plans together. Consumer goods outpaced industry as a whole in growth, although, as we shall see, this was in part a result of the rearmament program. Military production continued the expansion begun in 1950—with a dip in 1953 and 1954, following the end of the Korean War and the death of Stalin—and multiplied almost twice as much as all other production.

In fact, industrial developments in the first two years seem to have been dominated by military preparations. Output of civilian machinery and

equipment fell by 15 per cent in 1951 and 6 per cent in 1952, while military production was rising very rapidly. In view of behavior in surrounding years, it seems likely that the sudden spurt in the growth of consumer goods in 1951—output increasing by 17 per cent for foods, 20 per cent for textiles, and 29 per cent for consumer durables—was also connected with the re-equipping of troops, whose strength more than doubled between 1948 and 1955.[34]

The end of the Korean hostilities and, particularly, the change of government with Stalin's death clearly left their mark on economic developments. Military production, by our measures, declined by 9 per cent in both 1953 and 1954, though it apparently recovered its 1952 level by 1955. As a counterpart, consumer goods and civilian machinery outpaced all industry in growth over this latter half of the Fifth Plan, the growth rate of consumer goods falling sharply, however, in 1955.

Though there is some evidence of a "growth cycle" during the period of postwar recovery (1945–1950), the picture is more confused for 1950–1955. Out of 170 industries for which the needed output data are available, only eighty-eight (slightly more than half) show a "growth cycle" in the latter period. That is, only about half the industries had a peak rate of growth in some year other than 1951 or 1955. The distribution of peak growth rates for all 170 industries is as follows: 1951, fifty-one; 1952, nineteen; 1953, thirty-four; 1954, thirty-six; and 1955, thirty.[35] These statistics cast further doubt on whether "growth cycles" might be a standard phenomenon of the five year plan.

Output per man-hour apparently grew more rapidly during the Fifth Five Year Plan than during either the Second or the Third (see Table 55). The average annual growth rate for the Fifth Five Year Plan (7.1 per cent) is considerably higher than the rates for both the entire Soviet period (1.9 per cent) and the Plan period (1.7 per cent). In the case of output per person engaged, the growth rate was faster than for the First and Second Plans combined but slower than for the Second Plan alone. For all industrial groups except food and allied products, output per person engaged also grew at a slower rate than for the Second Five Year Plan. For fuel, chemicals, mineral construction materials, and civilian machinery, the growth rate was also slower than for the First and Second Plans combined; for electricity, wood construction materials, food and allied products, and textiles and allied products, it was faster.

[34] See the annex to technical note 3 of Appendix A.
[35] All statistics are derived from the output series in Appendix B.

TABLE 59

ANNUAL RELATIVES OF PRODUCTION, ALL INDUSTRY AND INDUSTRIAL GROUPS: SOVIET UNION, 1950–1958

(per cent)

	Production as Percentage of Preceding Year								
	1950	1951	1952	1953	1954	1955	1956	1957	1958
Industrial materials	110	113	106	108	108	110	107[a]	107[a]	107[a]
All products	115	114	109	106	109	110			
All civilian products	117	107	103	108	112	109	108[a]	110[a]	104[a]
Intermediate products	116	113	107	106	111	110			
Ferrous metals	117	115	112	110	109	110	107	105	107
Nonferrous metals	116	118	117	110	109	114			
Fuel and electricity	111	110	108	108	110	113	110	110	110
Chemicals	122	109	105	103	111	111	110	108	107
Construction materials	117	114	105	104	112	107	105	109	108
Machinery and equipment	127	85	94	110	114	114	116	118	95
Transportation equipment	120	75	95	119	112	111	105	103	107
Agricultural machinery	146	106	91	97	116	118	133	138	83
Consumer goods	110	120	105	109	112	106	105	105	107
Food and allied products	103	117	104	108	111	104	108	103	105
Textiles and allied products	113	120	104	108	110	105	103	106	107
Consumer durables	128	129	114	121	133	120	112	106	111
Civilian and military machinery and equipment	134	109	122	99	102	118			
Military products	154	170	161	91	91	123			

SOURCE: Table 53.

[a] Does not cover nonferrous metals and several other products (see Table A-5).

THE YEARS SINCE 1955

The Sixth Five Year Plan began with 1956 and ended less than two years later in the fall of 1957, under circumstances suggesting that its goals were too ambitious.[36] After an interval of a year, a Seven Year Plan

[36] The following statement appeared in a resolution of the Central Committee of the Communist Party issued in December 1956 ("On Completion of Work on Drafting Sixth Five-Year Plan and on Policy of Drawing up Non-Specific Control Figures for 1956–1960 and Economic Plan for 1957," *Current Digest of the Soviet Press*, VIII, 52, 11, original text in *Pravda* and *Izvestia*, December 25, 1956): "In drafting national economic plans, the State Planning Commission, the State Economic Commission and the ministries are not taking sufficient account of practical possibilities for supplying materials and funds for plan assignments, are not providing for sufficient stocks of raw materials, fuel and supplies and are allowing an excessive volume of construction, which creates added strain in carrying out the plan." Abandonment of the Sixth Plan was announced in *Pravda*, September 26, 1957.

was inaugurated to cover 1959 through 1965. On the basis of data published since 1955, we have extended our production indexes for industrial materials and all civilian products through 1958 as given in Table 53.[37]

The output of industrial materials increased at an average annual rate of 7.1 per cent over 1955–1958, compared with 9.0 over 1950–1955; the output of all civilian products, at 7.4 per cent, compared with 7.7 per cent. Since the growth of industrial materials seems to have paralleled closely the growth of all products over 1950–1955 (see Table 59), it is

TABLE 60

AVERAGE ANNUAL GROWTH RATES IN PHYSICAL OUTPUT PLANNED FOR 1955–1965 COMPARED WITH THOSE FOR OTHER PERIODS: SOVIET UNION, TWENTY-FOUR INDUSTRIES
(per cent)

	1913–1955	1928–1955	1950–1955	Planned, 1955–1965
Iron ore	5.0	9.8	12.6	8.0
Pig iron	5.0	9.0	11.6	7.3
Steel ingots	5.8	9.2	10.6	6.9
Rolled steel	5.5	9.0	11.1	6.7
Electric power	11.2	13.9	13.3	11.6
Coal	6.4	9.3	8.4	4.1
Crude petroleum	5.0	7.0	13.4	12.7
Natural gas	14.6	13.4	9.3	32.5
Mineral fertilizer	12.5	17.1	11.7	11.2
Paper	5.5	7.2	9.3	6.3
Cement	6.6	9.7	17.1	13.2
Lumber	3.9	6.5	8.8	4.6
Window glass	3.5	4.1	5.4	8.2
Motor vehicles	n.a.	13.6[a]	4.2	6.1
Butter	3.6	6.6	6.6	8.4
Vegetable oil	2.2	2.5	7.4	7.2
Meat slaughtering	2.1	3.3	9.2	11.2
Fish catch	2.4	4.5	9.3	5.5
Raw sugar	2.0	3.7	6.3	10.5
Boots and shoes	3.7	3.7	6.2	6.5
Cotton fabrics	2.0	3.0	8.7	3.9
Silk and rayon fabrics	5.7	14.3	32.3	10.9
Woolen and worsted fabrics	2.1	2.9	10.3	7.1
Hosiery	n.a.	5.2[b]	10.4	4.9
Median	5.0	7.1	9.3	7.2

SOURCE: Table B-2; goals of the Seven Year Plan (taken as midpoints of announced ranges) as given in *Current Digest*, XI, 9, 3 ff. Average annual growth rates calculated from output in terminal years by the compound interest formula.

[a] 1932–1955.

[b] 1933–1955.

[37] Because the published record of production has not been complete, we have had to resort to some indirect procedures in extending the industrial materials indexes. They and their possible effects are described in the technical note 3 of Appendix A, in the text surrounding Table A-5.

reasonable to suppose that it has continued to do so in more recent years. Hence growth seems to have slowed down since the end of the Fifth Five Year Plan, more so in the case of all products than in the case of civilian products alone. It is, of course, too early to tell whether this marks a trend or merely a fluctuation.

The official production index shows the same slowing down: an average annual rate of 10.1 per cent for 1955–1958 compared with 13.1 per cent for 1950–1955 (see Table F-2). Moreover, the average annual rate planned for the Seven Year Plan is 8.6 per cent, compared with 11.3 per cent for the Fifth Five Year Plan and 10.5 per cent for the Sixth. The expected retardation holds generally for individual industries reported on (Table 60). By Soviet measures and expectations, the rate of growth in industrial production is retarding.