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REVIEW OF FOREIGN DEVELOPMENTS

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Anglo-Argentine Agreement on Sterling Balances

Robert A. Rennie

On September 17, 1946, an agreement was signed by the United Kingdom and Argentina which covers the terms of the release of the sterling balances and gold accumulated in London during the war. Apart from unpublished negotiations with Portugal, this settlement is the first of a series to be undertaken by the United Kingdom with holders of sterling balances as provided for under Section 10 of the Financial Agreement with the United States. The settlement of the blocked sterling debt was only one part of the agreement, which also considered the supply of Argentine meat to Britain, the status of the British railroads in Argentina, and the modification of the Anglo-Argentine trade treaty. All these questions, however, will require further implementation.

The net banking liabilities of the United Kingdom to the principal holders of sterling balances is approximately £3,500 million. The total Argentine blocked sterling account is roughly £131 million, or 3.7 per cent of the balances outstanding. However, both because its terms may set a precedent for later agreements and because Argentina was in a stronger bargaining position than other holders of sterling, the Anglo-Argentine agreement is more significant than the absolute amount involved would indicate.

Under its provisions, the British have agreed that all sterling derived from current and future transactions shall be freely convertible into other currencies in line with the terms of the United States Financial Agreement. This conversion also applies to any sterling which may be acquired by the Argentine Central Bank from the Bank of

Paraguay. In view of the present difficulties in converting pounds to certain other currencies, all transfers will temporarily be made to dollars, or, at the option of the Bank of England, to gold. In addition to the sterling settlement, the Argentine gold in London, amounting to £4.4 million, has also been released.

Completion of the agreement had been held up for several weeks because Argentina demanded an interest payment of two and one-half per cent on the sterling balance not immediately released. The final settlement required the payment of only one-half of one per cent. Britain had feared that the settlement of the Argentine blocked sterling would serve as the basis for demands of the other holders. If the higher rate of interest were granted generally, annual interest charges on the total blocked sterling liability might have reached £87.5 million, whereas at the lower rate the service could not exceed £17.5 million.

Argentina may utilize its existing balances in the following manner:

- a) to redeem its foreign sterling debt of £25.3 million;
- b) to transfer up to £10 million to Brazil in order to liquidate the blocked account which that country holds in Buenos Aires; and
- c) to liquidate British investments in Argentina, which amounted to £361 million on December 31, 1945.

In addition, provisions were made for the release of some of the balances for current payments. Argentina will be permitted to withdraw £5 million each year for four years from its blocked sterling account for payments in any currency. At the end of this period, a new agreement will be negotiated concerning the disposition of the balances. Moreover, if Argentina has an unfavorable balance of payments in any year with the sterling area, it may withdraw an amount equal to the deficit to meet payments in that area.

This last clause apparently contravenes the Financial Agreement which the United Kingdom signed with the United States on December 6, 1945. Section 10, part 2, of that agreement provides that any sterling balances released for current payments can be freely available in any currency area. The exact phrasing is as follows:

".....the Government of the United Kingdom agrees that any sterling balances released or otherwise available for current payments will, not later than one year after the effective date of this Agreement unless in special cases a later date is agreed upon after consultation, be freely available for current transactions in any currency area without discrimination."

It is understood that the clause was included at the insistence of the Argentines, who wished to avoid the criticism that might be leveled against them if, in the event of an unfavorable balance of payments, they were compelled to buy sterling with gold or dollars at a time when the blocked balances still existed. Such a clause could have far-reaching effects if adopted for all sterling settlements, for it would mean an extensive diversion of Britain's export capacity from current purchases to those financed by the use of the balances.

An unfavorable balance of payments for Argentina, in relation to the sterling area, is unlikely in the light of any foreseeable circumstances. Argentina has consistently had a favorable balance of payments with this area. In 1934, the favorable balance was £5.2 million, and by 1944 and 1945, it had increased to £38.8 and £31.3 million respectively.

During the next year, it is estimated that the passive trade balance of the United Kingdom vis a vis Argentina will be between £55 and £60 million. Although imports from the United Kingdom rose almost to the 1938 level during the first six months of 1946, exports increased to a figure 71.6 per cent above the exports during the same period in 1938. There is nothing in the near future which will materially reverse this trend. The new 7-1/2 per cent price rise granted by the new meat agreement brings prices to a level 45 per cent higher than those set in 1939. Meat represented 48.6 per cent of the value of all United Kingdom imports from Argentina during the first half of 1946. The new price levels will net Argentina an additional £2.5 million annually at the current rate of export.

Any attempt to estimate the period necessary to liquidate the Argentine sterling debt must consider the conditions of the agreement in the light of the economic relations of the two countries. After eliminating the immediate possible reductions of £35.3 million for the liquidation of the sterling public debts and the Brazilian blocked account, and £20 million which will be convertible to other currencies in the next four years, there remains a balance of £75.7 million.

It is expected in London that the Argentines will use part of this balance to purchase shares of the British-owned railroads. Under the terms of the new agreement, an Argentine company will be formed to operate the system--its stock to be distributed to the present British companies. This stock may be sold by the companies in the Buenos Aires market, or it may be acquired directly by the Argentine government. Should either of these two options be exercised on any scale, the problem of the sterling balances would disappear, since the railroads, under any system of valuation, are worth more than the sterling balances.

The Argentine government also committed itself to spend £31.5 million on development of the railroads over the next five years. Since much of the backlog is for rolling stock and equipment available only in England or the United States, whatever purchases are made in sterling will tend to reduce Argentina's favorable balance with that area.

Previously, the Argentine government had not been particularly anxious to acquire ownership of the railroads since they were considered a poor investment. However, the British were able to obtain a guaranteed service payment of approximately £5 million annually on the British-held capital of the new company. Furthermore, if during two consecutive years the return on the capital of the company is less than four per cent, the passenger and freight rates are to be increased

sufficiently to insure this minimum. Much of the significance of this guarantee will depend upon the valuation which is established, but whatever the capitalization may be, the Argentines are likely to compare the minimum payment of 4 per cent with the return of 0.5 per cent on their sterling balances and decide that the balances could best be utilized in the purchase of the British stock. President Peron's speech in connection with the signing of the agreement reinforces this position, for he left little doubt that both the sterling balances and the gold holdings will be used, if necessary, to complete the administration's plan to nationalize the foreign-held communications, transportation, and meat-packing industries.

In conclusion, it may be stated that the terms of the settlement are generally favorable to Britain, and although it did concede the point on the payment of interest, the rate is very low. In London, apart from the Beaverbrook Daily Express, which maintained that the provisions of the American loan agreement blocked better terms for the British, the agreement is regarded as a good precedent for the settlement of other balances with such countries as India and Egypt.

Reconstruction Finance in the Netherlands

J.H.F.

War damage suffered by the Netherlands reached such tremendous sums^{1/} that not only very large foreign loans^{2/} but even larger domestic credit transactions have become inevitable. Commercial banks and investment houses are unable to provide the necessary funds without extensive government aid, and unplanned credit expansion would aggravate the danger of inflationary developments inherent in the post-war situation. For these reasons, the Netherlands Government has taken steps to assist in the satisfaction of credit needs of big business, small business, and individual consumers.

The Society for Financing National Reconstruction (Maatschappij tot Financiering van het Nationaal Herstel) is charged with financing projects of economic reconstruction of nationwide importance. Half of its capital of 300 million guilders is held by the State, most of the remainder by credit institutions, and a sum of ~~25~~ million guilders has been offered to the public. On shares held by credit institutions and the public, the government has guaranteed a dividend of 3.5 per cent, and the public has been permitted to use "blocked" deposits for its subscriptions. The Society will extend long-term credits to, or acquire participations in, enterprises which are economically sound but which are unable to cover their capital needs in the ordinary market. Its function thus will be similar to that of the Reconstruction Finance Corporation in the United States.

1/ See Review of Foreign Developments, November 5, 1945, p. 1.

2/ See Review of Foreign Developments, December 3, 1945, p. 1.

Small enterprises which suffered damage as the direct or indirect result of war and occupation are entitled to loans up to an amount of 20,000 guilders each. These are granted by the semi-public Netherlands Middle-Class Bank (Nederlandsche Middenstandsbank) and guaranteed by the State. The conditions under which enterprises can claim such loans are somewhat rigidly defined, and up to the end of 1945 only 250 loans totalling 2 million guilders were granted. In addition, small enterprises, upon certification by the War Damage Commission, may receive from the Bank advances up to 50 per cent of their substantiated war damage claims against the government. In cases of particular hardship, small enterprises may apply at the Bureau for War Victims for direct advances, free of interest charges. Special provisions have also been made for government payments to farmers and home-owners.

Finally, an Act of July 17, 1946, entitles needy individuals to apply for credits for the purchase of semi-durable or durable goods. Applications must be made not later than December 31, 1946, and the applicants must show that without a loan they would be unable to replace indispensable commodities, such as clothing and furniture. Credits are limited to 100 guilders for each member of the applicant's household, with somewhat more liberal provisions for large families. They are granted by the Treasury in the form of coupons, which must be honored by all retail merchants, and are repayable in weekly installments of 1 per cent. Employers of debtors are required to collect installments for the Treasury by deducting them from wage or salary payments. In spite of the small size of individual loans, the total may reach a very considerable amount since the greater part of the working population falls under the categories entitled to credits. The government will probably be compelled to adopt a strict interpretation of the Act as long as the supply of commodities lags behind the prospective demand.

All these arrangements together will provide for only a small fraction of the total reconstruction needs. The government expects much larger sums to be made available to the Netherlands economy out of domestic personal and business savings, which for 1946 alone have been established at 1.8 billion guilders.^{1/} The cautious and modest approach to reconstruction problems adopted by the Netherlands is symptomatic of the realistic policy of that country; if recent experience may be taken as a guide, it may lead eventually to better results than more grandiose plans of other nations.

^{1/} See Review of Foreign Developments, July 15, 1946, p. 9.

Estimates of Per Capita Income for Certain
Near Eastern Countries

Ali R. Bengur

There is general recognition of the fact that average income of the peoples inhabiting the area commonly known as the Near East is one of the lowest in the world. It is, however, only recently that attempts have been made to measure the level of income in different countries in this area, thereby making possible a quantitative comparison of incomes with countries in other world areas as well as among these countries themselves. The economies of Near Eastern countries, which are basically agricultural and at one time were relatively static, have shown signs of increasing development during the past quarter century. New industries have been established, methods of transportation improved, and irrigation works extended in the greater number of them, largely through state activity. This effort is expected to be continued with even greater determination and at an increased pace through support from outside sources, and more particularly from world agencies created for the purpose of assisting in the economic development of backward countries. It will therefore become increasingly important for outside agencies as well as for the countries concerned to determine the per capita income in each country carrying out a development program and to follow up changes in this income over a period of time.

There are no regular official national income statistics, so far as is known, for any of the Near Eastern countries, with the possible exception of Palestine. Turkey has an official national income estimate for 1935. For other countries the estimates available are private and of diverse origin. Moreover, the estimates refer to different years so that any comparison of incomes among countries for which estimates are available would be unsatisfactory. Accordingly, when per capita income data for member nations was sought by certain of the new international agencies, it was considered desirable to compute independent estimates for Near Eastern countries. The countries involved were Turkey, Lebanon, Syria, Egypt, Iran, and Iraq. Among these, Turkey is the only country which has an official publication available here containing reasonably comprehensive and detailed data regarding the national population and economic structure. Economic statistics relating to the remaining countries are incomplete and are usually found in secondary sources. The method used in estimating the per capita income of the countries in question was therefore determined by the nature of available information. An estimate was first made of Turkey's national and per capita income on the basis of information given in the official statistical yearbook of that country. The per capita income of each remaining country was then estimated by comparing all the relevant economic statistics available with similar data relating to the Turkish economy. General information regarding the economies of the various Near Eastern countries has aided in interpretation of the relationships shown.

Turkey's national income for 1939 was estimated at 1,668 million Turkish liras. This is equivalent to 1,298 million dollars at the official mid-rate of 77.85 United States cents per lira for that year. On the basis of a total population of 17,620,000 in 1939, the per capita income would be about \$1.95 or about 74 dollars.

The year 1939 was selected for two reasons as the basis of the present estimate. A division of the population according to occupational classes was available only for the census of 1935, the details of the two censuses made since that year being unobtainable. Furthermore, part of the data used in computing the estimate did not cover years beyond 1939.

The following method was used in computing Turkey's national income estimate for 1939. The occupational classes into which the active population was divided according to the 1935 census were taken as starting points. It seems safe to assume that between 1935 and 1939 relative sizes of these classes would not have changed significantly. The share of each class in the national income was determined by estimating either the total value of goods produced by each class of workers during the year, or the total annual remuneration of each occupational group, depending on the nature of available data.

In the case of agriculture and forestry, the first method was employed. Commodities produced in each activity were valued at the market price; the values of all items added up to 700 million Turkish liras for the total value of production in this class. Prices were not uniform, however, and did not in all cases apply to the same stage of production. Some represented the selling price of the producer, others were quotations in a regional market, and for still others quotations in the Istanbul market had to be taken for lack of more appropriate information. The value figures for some of the items may therefore include the income of people employed in commerce and transportation as well as that of farmers, thereby producing duplication. The error is not believed to be serious since the list of items in agriculture and forestry for which values were computed is not complete, and higher values for some items may therefore well be allowed to cover the values of items omitted.

The value of production for industry and mining is based on government statistics relating to the operations of protected industries, which include all types of industry in Turkey with the exception of handicrafts. The annual value of handicraft production is not given in Turkish statistics and would probably be extremely difficult to determine. This was computed for the purpose of the present study by assuming that the value added per worker in handicraft would be half of that for workers in industry, and by multiplying this average figure by the number of persons known to be engaged in handicraft operations.

For commerce and transportation, the first step was to determine the total wages for each, by using available data on the number of persons employed and the average wage per worker in each class. Profits for commerce were derived from the business tax which amounted to 27 million Turkish liras in 1939 and represented about 10 per cent of the net income from trade. Net receipts from transportation services relate to operations of state railways and are taken from official statistics.

The income of persons providing administrative and professional services was computed by taking as the average the modal salary of governmental employees.

An estimate of Turkey's national income and of its distribution by industrial groups is given in the following table:

Estimated Total and Distribution of the
National Income of Turkey in 1939

		Millions of Turkish L	Per Cent
1. Agriculture and forestry		700	42
2. Industry and mining			
Value of total production	331.3		
minus raw materials (domestic)	125.0		
Value added	<u>206.3</u>		
Handicraft	<u>34.7</u>	241	14
3. Commerce			
Wages	74.1		
Profits	<u>270.0</u>	344	21
4. Transportation			
Wages	48.8		
Net receipts from operation	<u>14.0</u>	63	4
5. Administrative and professional services		<u>320</u>	19
National Income		1,668	

Estimates of per capita income for Lebanon, Syria, Egypt, Iraq, and Iran were each computed as a percentage of the Turkish per capita income estimate. In each case the percentage figure used was no more than a very rough approximation. It was primarily based on a comparison between certain economic statistics in each country with similar statistics in Turkey and in other countries. A table containing these selected comparative statistics is appended. It will be seen from a study of this table that various comparisons for any one country do not always produce consistent results. In some cases they show considerable divergencies. This may be explained by the fact that the relative importance of economic factors used in the comparisons is not the same for all countries. For example, Lebanon has a very low per capita production of grains; but Lebanon has always depended on Syria for much of its foods. All the grain produced in the two countries is distributed by a joint grain commission. Also, Lebanon is the port for Syria so that the very high import figures for Lebanon must be discounted to some extent. The percentage figures derived from these comparisons were therefore adjusted in the case of each country on the basis of general information of economic conditions and practices. Estimates of per capita income computed by the use of this method as well as the per capita income estimate for Turkey are as follows:

Estimated Per Capita Income of Certain
Near Eastern Countries in 1939

Turkey	74	U.S. dollars
Lebanon	70	" "
Syria	60	" "
Egypt	60	" "
Iran	55	" "
Iraq	55	" "

The percentage of error in these estimates may well be very high. In the absence of official data and in some cases even of private estimates, however, the above estimates may prove useful regardless of the magnitude of any existing margin of error. No attempt was made to compute national income estimates on the basis of per capita figures because of lack of dependable population statistics for some of the countries concerned.

Selected Comparative Statistics for Turkey and Certain Other Near Eastern Countries
(Based on 1939 Data)

Country	Production of Wheat and Barley			Government Revenue			Currency in Circulation		
	Total (millions of kilograms)	Per capita (kilograms)	Per capita as percent of Turkey	Total (millions of U.S. dollars)	Per capita in U.S. dollars	Per capita as percent of Turkey	Total (millions of U.S. dollars)	Per capita (U.S. dollars)	Per capita as percent of Turkey
Turkey	6,815	387	-	305	17.3	23	248.44	14.1	-
Lebanon	41	41	11	4	3.9	23	14.59	14.6	104
Syria	451	167	43	7	2.6	15	11.27	4.2	30
Egypt	1,590	96	25	181	11.0	64	151.05	9.1	65
Iran	2,760	230	58	150	12.5	72	55.20	4.6	33
Iraq	1,737	404	104	41	9.5	55	21.40	5.0	35

Country	Industrial Labor Force			Imports			Railroad Receipts		
	Total (thousands)	Percent of total population	Percent of Turkey	Total (millions of U.S. dollars)	Per capita in U.S. dollars	Per capita as percent of Turkey	Total (millions of U.S. dollars)	Per capita (U.S. dollars)	Per capita as percent of Turkey
Turkey	549	3.1	-	75	4.2	35	35	1.97	-
Lebanon	39	3.8	123	(24	(6.5	(155	-	-	-
Syria	76	2.8	90	(109	6.6	157	28	1.68	85
Egypt	604	3.7	119	35	2.9	69	-	-	-
Iran	144	1.2	39	16	3.8	90	3	.74	38
Iraq	-	-	-						

The Rate of Industrial Growth in Russia, 1885 - 1940*

Alexander Gerschenkron

Introduction

The industrialization of Russia is one of the most important economic and political phenomena of our time. An essential element of this process is its absolute and relative speed. It has more than mere historical significance. The Russian experience cannot be ignored in discussing the general problem of industrialization of backward countries. Furthermore, whatever conjecture may be made about the future long-run development of Russia itself will have to take into account, among other things, the past rate of industrial growth.

The purpose of this paper is to compare the rate of industrial growth in various periods of Russian history between 1885 and 1940, and to describe briefly the specific factors which promoted, or obstructed, the industrialization of the country and were responsible for the given rate of industrial progress. History in the conditional mood is an enticing pastime. However, the writer has successfully withstood the temptation to concentrate on estimates of the relative level of production that Russia might have attained in the absence of a revolution. The few extrapolations of pre-war trends which have been made are designed primarily to accentuate the comparisons, although it has not been considered necessary to suppress a few hypothetical assumptions.

A description of the indexes used is given in Appendix I. Clearly the use of index numbers for comparisons over a long period of time cannot be very accurate. In Russian conditions four particular difficulties were faced: (1) the insufficiency and low quality of statistical information, particularly before the war of 1914-1918 and for a goodly number of years after the war; (2) the rapid change in the structure of the economy during the period of the Five Year Plans from 1928 onward; (3) the lack of price information (publication of price indexes was discontinued as early as 1931) and absence, also since the beginning of the 'thirties, of data on the value of industrial output at current prices; and (4) frequent changes in methods of preparation and presentation of Soviet statistical series.

The series dealt with in this paper are affected by all these difficulties, of which lack of continuity and outright gaps in information are perhaps the most exasperating. The cumulative effect of these inadequacies cannot be negligible. Nevertheless, it is believed that the

* The writer is greatly indebted for valuable suggestions to Messrs. Folke Hilgerdt and Alfred Landau of the Economic, Financial and Transit Department of the League of Nations, and to Messrs. Abram Bergson and C. R. Harley of Washington, D. C. Miss R. T. Giese has done much of the statistical drudgery. The U.S.S.R. Division of the Department of Commerce was most helpful in locating source material.

indexes used give a reasonably fair picture of the order of magnitudes involved. Deliberate distortion of statistical information is advisedly not mentioned among the problems encountered. Many serious students of Russian statistics agree that it is the Russian practice to withhold certain statistical information rather than to falsify it.^{1/}

A few critical remarks may be made with regard to the probable direction of errors contained in the series. The real problem in this respect is presented by data relating to the period of the Five Year Plans. There is undoubtedly evidence to suggest that the Soviet index of gross value of industrial output in constant prices may be inflated and the rate of growth overstated accordingly. Proper verification would require the construction of an independent index, and it is not certain that the information now at hand would warrant such an enterprise. To tackle this formidable task, moreover, would require the assistance of a special generously-staffed research organization.^{2/} The presentation in this paper, therefore, will be confined to a rather general discussion of the nature of factors that should be taken into consideration in determining the accuracy of the index in question, together with a few pertinent illustrations. In conclusion, something will be said about the rate of growth during the Fourth Five Year Plan now in operation, and about the long-run prospects of industrial development in Russia.

One final remark may be in order. Use of value indexes presupposes a meaningful price system. It is believed that the Russian price system is reasonably consistent in the sense of being based on more or less uniform purchasing power of the monetary unit over productive resources.^{3/} No more than a reasonable degree of consistency can be expected. This is particularly true of the price system of 1926/27 on which current Russian value indexes are based. Prices of 1926/27 reflect in part consumers' valuations and in part the allocation of resources desired by the Russian Government. In later years the latter

^{1/} Cf., e.g., Colin Clark, A Critique of Russian Statistics, London, 1939, p. 46; Abram Bergson, The Structure of Soviet Wages, A Study in Socialist Economics, Harvard Univ. Press, 1944, p. X; Alexander Baykov, The Development of the Soviet Economic System, Cambridge, 1946, p. XIV

^{2/} The German Institute for Business Research published in 1940 an independent index for the total industrial production in Russia. Apparently, no information has been given as to the methods of construction of the index. In view of the general situation in Germany at the time, the degree of its objectivity is a moot question. As mentioned later in the text, the opinion of the present writer is that while the revision of the Russian index by the Institute is in the right direction, it seems to go too far. Cf. German Institute for Business Research (Institut fuer Konjunkturforschung) Weekly Report, Vol. 13:11/12, pp. 41-46.

^{3/} Cf. W. B. Reddaway, The Russian Financial System, London, 1935, pp. 21 et seq.; Robert Mosse, L'Economie collectiviste, Paris, 1939, p. 137.

aspect has become predominant. Owing to the peculiarities of the Soviet statistics (of. the section on "The Problem of the Index"), the index was affected thereby. There is no doubt that the comparability of the index series with those of other countries as well as with those of pre-1914 Russia is impaired to some extent. It may be noted, however, that as a result of the widespread interference with price systems in other countries on the part of governments and private monopolies the problem is by no means peculiar to Russia.

Rates of Growth Before 1914

The period 1885-1913 was divided into four rather distinct periods of industrial development. The average annual percentage rates of industrial growth for each of these periods as well as for the whole pre-1914 period have been computed from the slope of the exponential trend curves fitted to the index series.^{1/} A tabulation of these rates follows:

<u>Year</u>	<u>Average annual percentage rate of growth</u>	<u>Output doubled in years</u>
1885-1889	6.10	11.7
1890-1899	8.03	9.0
1900-1906	1.43	49.0
1907-1913	6.25	11.4
1885-1913	5.72	12.5

The reforms of the 1860's (liberation of the serfs, judicial and administrative reforms) created important prerequisites for the industrial development of the country. A number of branches of industry showed very considerable increases in output, in particular during the fifteen to twenty years following the reforms. Rapid progress occurred in the textile industry, in machinery production and in the extraction of coal and oil. At the same time, output of ferrous metals developed very slowly. The production of pig iron, for example, was .34 million long tons in 1860 and .4 million long tons in 1877.^{2/} The very unreliable statistical information for the period suggests that the total industrial output may have doubled between 1863 and 1879. A large portion

^{1/} The trend equations are as follows:

$$\begin{aligned}
 1885-1889: & \log y = 1.28408 + .0257 t \\
 1890-1899: & \log y = 1.39849 + .033550 t \\
 1900-1906: & \log y = 1.77708 + .006120 t \\
 1907-1913: & \log y = 1.81344 + .02632 t \\
 1885-1913: & \log y = 1.31493 + .02424 t
 \end{aligned}$$

^{2/} P. I. Lyashchenko, Istoriya narodnogo khozyaystva SSSR, Vol. I, Moscow, 1939, pp. 396 and 404.

Indexes of Industrial Production ^{1/}
(1913 = 100)

(1) Index of Industrial Production in Russia 1885-1913		(2) Index of Gross Value of Output of Large-Scale Industry 1913-1938		(3) Index of Gross Value of Output of All Industry 1913-1950	
1885	20.57	1913	100.0	1913	100.0
86	21.18	14	100.6	14	100.0
87	24.24	15	110.5	15	102.7
88	22.65	16	116.1	16	109.4
89	26.74	17	74.8	17	75.7
1890	27.29	18	33.8	18	43.4
91	29.30	19	14.9	19	23.1
92	31.14	1920	13.75	1920	20.4
93	35.29	21	19.55	21	25.5
94	36.26	22	25.55	22	32.7
95	39.38	23	39.07	23	40.7
96	41.94	24	45.46	24	54.1
97	45.85	25	75.49	25	71.9
98	50.24	26	108.12	26	88.8
99	55.80	27	123.68	27	105.3
1900	61.05	28	154.31	28	110.8
01	61.11	29	194.35	29	158.3
02	61.60	1930	252.04	1930	196.1
03	63.80	31	314.73	31	237.6
04	66.97	32	359.12	32	265.9
05	61.97	33	380.5	33	281.4
06	67.09	34	457.0	34	340.3
07	70.88	35	562.6	35	411.6
08	73.08	36	732.7	36	528.8
09	74.66	37	816.4	37	588.9
1910	83.88	38	908.8	38	653.8
11	89.26			39	762.5
12	93.16			1940	852.4
13	100.0			1942 ^{2/}	1,132.4
				1945	781.6
				1950 ^{2/}	1,261.6

^{1/} For a general description of the indexes cf. Appendix I. For absolute data and sources cf. Appendix II.

^{2/} Plan.

of such increases as occurred in that period took place in the years preceding the crisis of 1873 which was followed by five years of stagnation. In 1881-82, another crisis caused a depression which lasted well into the middle of the 'eighties. Thus our index series begins in a period of industrial remise.

The period 1885-1889 with its considerable average rate of growth of 6.1 per cent per annum should be considered as a prelude to the 'nineties, the golden age of Russian industrialization in the pre-1914 period. In 1887, I. A. Vyshnegradski became Minister of Finance. A strong advocate of industrialization behind a high protectionist barrier, and of a balanced budget and stable currency as prerequisites for imports of capital for industrialization, Vyshnegradski introduced the strongly protectionist Tariff Act of July 1, 1891, which in part consolidated various increases which had been introduced between 1885 and 1890 and in part provided for further increases. As indicated by the following tables, Vyshnegradski's Russia had traveled a long way from the free trade Tariff Act of 1868.

Selected Tariff Rates 1/

<u>Commodity</u>	<u>1868 Tariff</u> (In gold kopeks per one pood)	<u>1891 Tariff</u>
Coal	free	2-3
Iron ore	free	10.5
Pig iron	5	45-52.5
Rolled iron	20-50	90-150
Rails	20	90
Machinery	30	250 2/
Locomotives	75	300
Agricultural machinery	free	70-140
Raw cotton	free	120-135
Cotton goods	28-110	33-135

The ratio between tariff revenue and the value of imported goods subject to duties varied as follows: 3/

1869-1876 - 12.8
 1885-1890 - 28.3
 1891-1900 - 33.0

1/ V. J. Pokrovski, ed., Sbornik svedeni po istorii i statistike vneshney torgovli Rossii (Collection of Information Concerning History and Statistics of Foreign Trade in Russia), Vol. I, Petersburg, 1902, p. XXXIII. One gold kopek equalled .5146 "old" gold cents; one pood equalled 36.1128 pounds.

2/ It may be noted that this tariff did not prevent imports of machinery from rising threefold between 1881-1885 and 1896. The tariff seems to have been much more effective in the case of agricultural machinery.

3/ M. N. Sobolev, Tamozhennaya politika Rossii vo vtoroy polovine XIX veka (Russia's Tariff Policy in the Second Half of the 19th Century), Tomsk, 1910, p. 826.

This ratio was at the time the highest in the world, and more than one-third higher than the contemporary ratio in the United States. As Schultze Gavernitz pointed out, the degree of protection of the Tariff Act of 1891 exceeded anything ever known in Europe. Tariff protection, however, was not the only, and perhaps not the most important, lever of industrialization. The chief characteristic of the economic growth of the 'nineties was the intensity of railroad building. The length of railroad lines increased as follows:

<u>Period</u>	<u>Increment in railroad mileage</u>
1886-1890	1,898
1891-1895	4,403
1896-1900	10,035

Participation of the Russian Treasury in this process was very great indeed. By the end of the period, the total investment in railroads was estimated at 4.7 billion rubles, of which 3.5 billion rubles belonged to the Treasury. The railroad building provided a tremendous impetus for the development of ferrous metallurgy and machinery production. It greatly enhanced the development of trade, domestic and foreign. The effect of the tariffs and of the increase in demand was reinforced by preferential placement of government orders at home rather than abroad and by direct subsidies to metal-working and machinery industries in the earlier part of the period, and by artificially high prices in the later years of the period. Thus in 1897-1898, the government paid 110-125 kopeks per pood of rails while private buyers paid 85-87 kopeks. ^{1/}

The name of S. J. Witte is closely associated with this period. Witte, a convinced adherent of Frederick List and a man of outstanding abilities, energy, and statesmanlike views, succeeded Vyshnegradski as Minister of Finance in 1893. Significantly, prior to 1893, Witte had spent 16 years in railroad administration and had been Minister of Transportation in 1892-93. More than any other man, Witte was responsible for the promotion of railroad building by the Russian government. He succeeded in improving the budgetary position of the country and prepared and carried through the introduction of the gold standard (1897). To a large extent as a result of these policies, the amount of foreign capital invested in Russian industry was almost doubled over the decade of the 'nineties, the greatest inflow taking place between 1895 and 1900. ^{2/} The foreign

^{1/} M. Shteinfeld, "Politika narodnykh zakazov," Narodnoye Khozyaystvo, 1902, No. 8, p. 35. When the construction of the Siberian Railroad began, British rails were offered at the price of .75 rubles per pood, yet the domestic tender of 2 rubles per pood was accepted. Cf. V. Biriukovich, "Likvidatsiya promyshlennogo ozhivleniya," Vestnik Yevropy, 1901, No. 3, p. 325.

^{2/} Cf. P. V. Ol', Inostrannyye kapitaly v dovoynnom khozyaystve Rossii (Foreign Capital in Russia's Pre-War Economy), Leningrad, 1925, p. 23 et seq. About 48 per cent of the capital invested by 1900 went into mining and 16 per cent into machinery production.

indebtedness of the government increased in the same period by about one billion rubles. An essential part of the system was Witte's increased emphasis on indirect taxes and the alcohol monopoly. The burden of this taxation on low income groups of the population was very high indeed. The peasants, already burdened by the necessity for maintaining redemption payments under the liberation procedure, were further hindered by taxes which discriminated against small land holdings and favored the large estates. These taxes had a double function: first, they increased government revenue; and secondly, they encouraged higher grain exports, an important element in the process of industrialization. Vyshnegradski's dictum, "Let us starve but export," remained characteristic of the policies of the 'nineties. 1/ The industrial worker suffered from long working hours and the absence of adequate social legislation. 2/ The wages of workers in textile and other light industries did not rise at all throughout the period 3/ and remained extremely low. 4/ Wages in metal factories, however, although still very low in absolute terms, were about twice as high as wages in textile industries. On the whole, the wages of metal workers rose about 10-15 per cent during the 'nineties. A large part of this increase, however, was rendered nugatory by concomitant increases in the cost of living. The high tariff on manufactured consumption goods weighed heavily on household budgets in the city and in the country. All this might have been mitigated had foreign credits been still greater and governmental corruption less. But on the whole the pressure on the standard of living was hardly separable under Russian conditions from a high rate of industrial progress.

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- 1/ Shvanebakh, Denezhnoye preobrazovaniye i narodnoye khozyaystvo (Monetary Reform and the National Economy), Petersburg, 1901, pp. 20-21. As a result inferior bread substitutes (even chaff) became increasingly important in the diet of the Russian peasants [cf. M. M. Kovalevski, Ekonomicheski stroy Rossii (Russia's Economic Regime), Petersburg, 1899, p. 53/]. The economic decline of the Russian peasantry over the period is illustrated by the fact that between 1888 and 1899-1901 the number of farms without horses increased by 22 per cent, that of farms with one horse increased by 25 per cent, while the number of farms with two or more horses decreased considerably. Cf. P. P. Maslov, Razvitiye zemledeliya i polozheniye krest'yan do nachala XX veka (The Development of Agriculture and the Conditions of the Peasants before the 20th Century), Petersburg, 1909, p. 14.
- 2/ The Act of June 2, 1897, set the maximum working day at 11½ hours. Even this limitation, however, was constantly evaded.
- 3/ M. M. Kovalevski, op. cit., p. 113.
- 4/ In 1900, the equivalent of about ninety current dollars a year. Cf. Ministerstvo Finansov, Statisticheskiye svedeniya o fabrikakh i zavodakh po proizvodstvam ne oblozhennym aktsizom za 1900 god (Ministry of Finance, Statistical Data on Factories and Mills in Branches not Subject to Excise Duties), Petersburg, 1903, p. 208.

These policies and conditions underlay what probably was the highest average annual rate of growth of industry in the last thirty years of pre-1914 Russia. It is reasonable to suppose that the development would have been even faster had industrial evolution not been obstructed by the historical legacy of pre-reform Russia, that is to say, by the retarding effect of the preservation of the field community system in agriculture, the strong social and political position of the large estate owners, the dishonesty of the administration, the retrogressive educational policy of the government, and the absence of constitutional guarantees.

On the other hand, the rapid industrial evolution of the 'nineties was facilitated by the fact that no major economic crisis affected the flow of international trade and capital movements during the period; the minor disturbance of 1893 passed almost unnoticed in Russia. Nevertheless, in appraising the factors which contributed to this high rate of industrial growth, it is clear that an enormous role was played by the government and that to a considerable extent rapid industrialization was achieved at the expense of the standard of living of the Russian people. It seems in order to point out the similarities in quality, if not in quantity, between the character of economic development in the eighteen nineties and in the 'thirties of the present century.

The index of the physical volume of production as used in this paper shows for the decade of the 'nineties an average percentage growth per annum of 8.03 per cent. It is not unlikely that this index series tends to understate the rate of growth. The index, as described in Appendix I, is based on changes in physical quantities and probably does not take adequately into account improvements in quality; moreover, the exclusion of machinery output from the index tends to work in the same direction inasmuch as output of the metal-working industries increased 75 per cent between 1887 and 1897, while output of mining, for example, increased only 28.5 per cent. ^{1/} On the other hand, the volume of machinery production was still small in this period; despite the higher value added, the gross value of machinery output was only 70.7 per cent of that of the mining output.

Assuming, as is certainly justified, that the government was willing, at the turn of the century, to continue the policies of Vyshnegradski and Witte, maintenance of the high rate of industrial growth depended first on the absence of a significant international economic crisis and second on the preservation of political stability despite the burdens placed on the majority of the population by the policy of industrialization. The following period (1900-1906), however, was characterized both by world economic disorder and domestic political strife.

The industrial crisis of 1900, which was preceded by increasing stringency of money markets both in Russia and abroad, brought a sudden end to the long period of upswing. A two-year period of stagnation followed.

^{1/} P. I. Lyashchenko, Istoriya narodnogo khozyaystva SSSR, Moscow, 1939, Vol. I, p. 439.

Railroad building continued throughout this period, however--the increase in railroad mileage in 1901-1905 being only 18.1 per cent less than in the preceding five years. An actual decline in production throughout the depression was thereby prevented.

The years of the depression were characterized by considerable labor unrest and a number of explosive peasant uprisings in 1902 revealed the weaknesses of the governmental structure. Prices began to rise again in 1903, but full recovery was prevented by the Russo-Japanese War and the revolution of 1905. In the latter year, the volume of production was again thrown back to the level of the depression years. The average annual rate of growth in this period was 1.43 per cent, a drop of 82 per cent from the rate of the preceding period.

The 1905 revolution with its widespread political revolt of industrial labor and equally widespread peasant uprisings revealed both the economic weakness of the regime (the archaic system of land tenure) and its political instability. Perhaps as never before, the Russian Empire "felt its huge frame not constructed right." Remedies were necessary in both directions. The policy of the government between 1907 and 1913 constituted an attempt to provide such remedies.

The decree of November 9, 1906, ^{1/} endeavored to cut the umbilical cord which tied the individual peasant to the field community by creating a relatively simple procedure for the transfer of land into the private ownership of the peasants. The reform favored the richer groups of the Russian village and doubtless was harsh and iniquitous in many respects. From the point of view of Russia's industrialization, however, its potential positive effects were undeniable. They were essentially twofold: (1) creation of an economically strong group among the peasantry with an attendant increase of demand by agriculture for industrial capital goods; (2) increase in the number of industrial workers through accelerated flight from the land. The period between the reform and the outbreak of the war was too short to allow these effects to materialize on a large scale. Despite brutal application of strong political power against the lower groups of peasants, the problems of land tenure could not be speedily solved and, on the whole, the potential threat to the regime from a dissatisfied peasantry was probably increased rather than diminished. The reform did, however, tend to accelerate the industrial development of the country, and it may be presumed that, over a longer run, it would have made a strong contribution in this direction. ✓

Russian industry emerged from depression, war, and revolution substantially strengthened. Many weak enterprises had been weeded out, and considerable concentration and technological improvement had taken place. The recovery in 1906 rapidly compensated for most of the decline in the revolution year and industrial development proceeded, although at a slower pace, in 1907. The international crisis of that year, however,

^{1/} Subsequently passed by the Duma as the Act of June 14, 1910.

resulted in a Russian depression lasting well into 1909. From that year on, industrial production increased at a high rate until 1913.

The annual rate of growth of 6.25 per cent in the period 1907-1913 ^{1/} is less impressive than that of the 'nineties. Even if the depression years were excluded, the average annual rate of increase between 1909 and 1913 would rise only to 7.5 per cent.

The question may again be raised as to whether the index series does not, for the reasons previously mentioned, understate the actual rate of growth. Machinery output may, indeed, have increased faster than that of industries included in the index. But since the value of machinery output in 1913 was only 7.3 per cent of total industrial production, effect of its omission cannot be very great. The index series employed here shows an increase of 63.8 per cent between 1900 and 1913. Comparison of the value of industrial gross output in 1900 and 1913 (at 1900 prices) shows a similar increase of 62.2 per cent ^{2/} and appears to confirm the index series. Yet even a comparison in constant prices may not properly reflect such increases in the value of output as are associated with improvements in quality. Numerous such improvements did take place between 1900 and 1913, and some of these may not be reflected in the prices of 1900: the quality of steel, for example, increased greatly over the period, yet the 1913 product was in all probability included in the computation at the price of the lower quality product of 1900. No estimate of the extent to which an understatement of the index may be involved is here attempted.

Between 1861 and 1913 (and particularly between the end of the 'eighties and 1913), Russia had made great strides on the road to industrialization. A very approximate Soviet computation estimated the share of industry in the national income of the country in 1913 (inter-war territory) at 28.0 per cent. ^{3/} It should be noted that the Soviet concept of national income is essentially, although not exclusively, a productivity concept and hence overstates the relative importance of industry in total national income including services. ^{4/} For this reason, among others, a

^{1/} For the purposes of this paper, the years between 1907 and 1913 are regarded as a single period. It was felt that the recovery of 1906, which year was primarily devoted to restoration of the damages caused in 1905, still belonged to the preceding period. On the other hand, the setback of 1907 and 1908 should be regarded as a normal cyclical fluctuation and as such to constitute a unity with the upswing of the following years.

^{2/} P. I. Lyashchenko, Istoriya narodnogo khozyaystva SSSR (The Economic History of the USSR), Vol. I, Moscow, 1939, p. 583.

^{3/} Gosplan SSSR, Perspektivnaya orientirovka na 1927-28 - 1930-31 gody (Gosplan of the USSR, Approximate Perspectives for the Years 1927-28 - 1930-31), Moscow, 1928, p. 12. Ibid. Kontrol'nyye tsifry na 1926-27 god, Moscow, 1926, p. 214. Figures relate to the inter-war territory of the U.S.S.R.

^{4/} At least a part of government services, passenger transportation, professional and domestic services are not included in the Soviet concept of national income.

direct comparison between Russia and, e.g., the United States is difficult unless complicated adjustments are made.

In comparison to other countries, the level of industry certainly was quite low. In 1913, the net value of industrial output (at 1926-27 prices) was 6.7 billion rubles, while the net value of agricultural production was 9.1 billion rubles. Thus the value of output in industry was 61 per cent of that of agriculture. ^{1/} In the United States in the same year the value of net output of industry was 170.25 per cent of that of agriculture. ^{2/} In 1913, the gross industrial output of large-scale (census) industry in Russia at 1926-27 prices was as little as 6.9 per cent of the gross industrial output in the United States. ^{3/} On a per capita basis, Russian production in 1913 was only about 4.8 per cent of American production.

The average rate of growth per annum for the entire period has been computed at 5.72 per cent. Gustav Cassel once estimated the industrial rate of growth in Western Europe, during some six decades before

^{1/} S. N. Prokopovitz, Russlands Volkswirtschaft unter den Soviets, Zurich-New York, 1944, pp. 358-359.

^{2/} National Bureau of Economic Research, Inc., Income in the United States, Its Amount and Distribution, 1909-1919, New York, 1921, Vol. I, p. 18. Since construction is not included in the Russian figure, it has been omitted from the U.S. figure.

^{3/} Cf. СССР и капиталистические страны (The U.S.S.R. and the Capitalistic Countries), Moscow-Leningrad, 1939, p. 8. If the gross value of total Russian industry (large and small) at 1926-27 prices is related to the gross value of industrial output in the United States, the corresponding percentage is 8.33. For both countries mining is included. For the United States, industries with output of at least \$5,000 a year are included. The figure of 6.9 per cent used in the text was computed in Soviet Russia on the basis of price comparisons covering 60 per cent of total industrial production in Russia. In default of other information, this figure is accepted here. It follows that the parity dollar-ruble rate which was in effect in 1913 is not suitable for such a comparison. If we convert the gross value of total industrial output in 1913 (8,431 million rubles at 1912 prices) into dollars at the parity rate of exchange, the value of Russian industrial production would appear to be 16.12 per cent of United States industrial output in 1913; the corresponding figure for the large-scale (census) industry would be 12.22 per cent, as compared with 6.9 and 8.3 per cent, respectively. The implication that the 1913 ruble was overvalued against the dollar with regard to industrial prices is of course quite plausible. Industrial prices in the United States in 1913 were 41 per cent lower than in Russia (Birmingham Bureau of Research on Russian Economic Conditions, Memorandum No. 1, May 1931, p. 8). If this percentage is applied, the respective percentages become 9.5 and 7.2, or very close to the percentages given above (8.3 and 6.9). No complete correspondence may be expected on account of possible differences between the price systems of 1912 and 1926/27.

World War I, at 4.2 per cent. ^{1/} Cassel used the production of pig iron as the basis for his estimate. This may underestimate the actual rate of growth as the increasing degree of fabrication of industrial raw materials may have resulted in an increase of the values of total industrial production at a relatively faster rate. In any case, the rate of industrial production in Russia should be compared not only with the old industrial countries of Western Europe, but also with other countries in different stages of industrial development, as is shown in the following table: ^{2/}

Annual Average Percentage Rates of Growth
of Industrial Output

	<u>United States</u>	<u>United Kingdom</u>	<u>Germany</u>	<u>Sweden</u>	<u>Japan</u>	<u>Russia</u>
1870-1884	4.65	1.98	4.22	6.16	-	-
1885-1889	8.75	4.56	5.15	6.55	-	6.10
1890-1899	5.47	1.80	5.44	9.62	-	8.03
1907-1913	3.52	2.72	3.90	3.30	8.59	6.25
1885-1913	5.26	2.11	4.49	6.17	-	5.72 ^{a/}

^{a/} The rate for 1885-1913 for Russia, computed on a compound basis in the way indicated in the preceding footnote, amounts to 5.83.

The six countries listed in the preceding table may be assumed to belong to three age groups. The old industrial country--England--with a slow rate of growth; the group of the relatively young countries--Japan, Sweden, and Russia--with a rapid rate of growth; and Germany and the United States, which occupy an intermediate position.

The conclusion appears warranted that the relative rate of growth in pre-1914 Russia was by no means extraordinarily high. Throughout this period, the United States was much further advanced than Russia and, in this sense, an older industrial country by comparison. Yet the rate of growth in the United States over the period in question was only slightly lower than in Russia. In other words, the absolute difference between the volume of industrial production in Russia and in the United

^{1/} Gustav Cassel, The Theory of Social Economy, New York, 1924, p. 63.

^{2/} The rates for the five countries other than Russia have been computed on a compound basis, using the last year of the preceding and of the given periods. For Russia, the slopes of the trends are used. The indexes have been taken from: League of Nations, Industrialization and Foreign Trade, 1945, pp. 132-134 (cf. Appendix III). These indexes exclude mining and are, for this reason at least, not fully comparable with the Russian index as given in this paper.

States increased greatly over the period. In 1913, the industrial output of the United States exceeded the Russian output by far more than was the case in 1885. 1/ At the same time, Sweden, a country where no vigorous policies of industrialization were pursued by the government, and where the standard of living of the population was not deliberately depressed for the sake of industrialization, had a higher rate of industrial growth than Russia.

A few of the difficulties with which Russia had to cope have been indicated in the preceding pages. Inadequacy of the pre-industrial and extra-industrial accumulation of capital, abject ignorance of the overwhelming majority of the population, corruption in government and feudal remnants in agriculture, intensity of the popular discontent with the regime as expressed in the revolution of 1905--all these must be regarded as obstacles placed in the path of industrialization. The Western World of the 19th century had either solved these problems or reduced them to tolerable proportions. It was different in Russia. As we have seen, a serious attempt was made in Russia to cope with at least one of these obstacles. It is safe to say that in due time they would have been removed. But time was running short.

War, Revolution, and Civil War

At the end of 1920, the Russo-Polish War and the civil war were over. By that time the index of value of gross output of industries at 1912 prices (1913 = 100) stood for large-scale industry at 12.8 per cent and for large and small industry together at 20.4. 2/ This gigantic drop was not evenly spread over the whole period. On the contrary, after initial confusion, the years 1914-1916 witnessed an increase in industrial output. By 1916 the index of large-scale industry stood at 116.1 and of total industry at 109.4. In fact, Russian industry, in the third year of the war, developed far more favorably than German industry where the "selected industries" index in 1916 stood at 63 (1913 = 100). 3/ This divergent development seems to have been caused principally by the fact that production of non-essentials was not so drastically reduced in Russia as in Germany and that the German economy was more highly geared to foreign trade. Incidentally, attainment of peak industrial production in Russia in 1916 was to a large extent due to the fact that private industrial associations were created whose activities compensated for the inefficiency of the bureaucracy. 4/

1/ In 1885, the United States industrial production was larger than that of Russia by \$8,380 million; in 1913, the difference was \$34,860 million (Russian production in 1926-27 prices; for U.S. production, of. index in Appendix III; the dollars are of 1937 purchasing power). The approximate character of such computations is obvious.

2/ Somewhat different results are reached if the 1926-27 price system is used. Cf. Appendix I.

3/ Vierteljahrshefte zur Konjunkturforschung, Sonderheft No. 31, Rolf Wagenführ, Die Industriegewirtschaft, Berlin, 1933, p. 23.

4/ S. O. Zagorsky, State Control of Industry in Russia during the War, New Haven, 1928, pp. 82-94.

The turning point came in 1917, the year of two revolutions. In 1917 the index of large-scale industry fell to 74.8, that of total industry to 75.7. While in the first years after the outbreak of the war large-scale industry increased its output while small-scale industry declined, the relationship was now reversed. From 1917 to the end of the period, small-scale industry showed a great deal more adaptability to most unfavorable conditions. After 1917 the decline became irresistible. By 1920 almost three and one-half decades of industrial evolution were undone in terms of industrial output: the index returned to the level of the middle of the 'eighties. Comparison with indexes of output of basic raw materials tends to make this development appear quite probable. The causes of this catastrophic development are well known: sanguinary civil war, nationalization of industries coupled with syndicalist tendencies among the workers, other ill-advised industrial policies, inflation, and the transformation of basic property relationships in agriculture.

Rates of Growth in Soviet Russia

The period from 1920 to the outbreak of the second World War is divided naturally into two parts; the period of reconstruction, from 1920 to 1927, and the period of forced industrialization under the Five Year Plans during the years 1928-40. 1/ Rates of growth of the gross value of industrial output in the two periods were sharply different. 2/

	<u>Annual Average Percentage Rates of Growth</u>		<u>Output Doubled in Years</u>	
	<u>Large-Scale Industry</u>	<u>All Industry</u>	<u>Large-Scale Industry</u>	<u>All Industry</u>
1920-1927	39.45	27.45	2.1	2.9
1928-1938	19.08	18.26	4.0	4.1

More will be said about these rates presently.

1/ In Russian parlance, the former period is called "restoration period," the latter, "reconstruction period." Some confusion in this respect has been caused in the past by indifferent translations.

2/ The rate of growth was again computed from the slope of exponential trend curves fitted to the index series. The trend equations are as follows:

$$\begin{array}{l}
 1920-1927 \text{ Large Industry: } \log y = 1.00045 + .14130 t \\
 1928-1938 \text{ " " : } \log y = 2.15014 + .07585 t \\
 1920-1927 \text{ All Industry: } \log y = 1.20123 + .10533 t \\
 1928-1938 \text{ " " : } \log y = 2.03940 + .07285 t
 \end{array}$$

For the Russian method of computing gross values of industrial output as well as for a general description of the indexes, see Appendix I.

A. The Reconstruction Period, 1920-1927

At the end of 1920, Russian industry stood at the threshold of a new development which was to be as spectacular as the decline of the preceding four years. These years left great liabilities and a few assets to the Russian economy. The main liability was of course a catastrophic disorganization of industrial production of which the destruction of managerial talent and the resulting gross inefficiency of production was but a part. A second liability was the widespread destruction of capital in industry and still more in transportation. Another was Russia's economic isolation in the years to come, including the virtual cessation of what had been a great inflow of capital. But there were also assets, although some of these were of dubious quality. One of them was the repudiation of foreign debts. Service of foreign debts had amounted, between 1898 and 1913, to about 340 million gold rubles a year. ^{1/} To this would have been added service on the war debts of the Russian government. Another asset was the establishment of a strong political power and the ensuing political stability. Still another was the removal of the barriers to education. Furthermore, there was the monopoly of foreign trade which could be administered in such a way as to guarantee at any time the maximum amount of desired protection for domestic industry; compared with the policies of the foreign trade monopoly in subsequent years Vyshnegradski's tariff of 1891 looked like a medieval shield beside a tank. Finally, the separation of Russia from the financial markets of the West had the effect of divorcing the domestic economic system from international cyclical slumps. This, however, was of greatest importance in the second half of the inter-war period, when, under the Five Year Plans, unemployment was reduced to negligible proportions.

The least certain part of the balance sheet was the transformation in agriculture. The peasants had at length obtained the coveted land of the large estate owners. From the point of view of the industrial development of the country, the effects were twofold: (1) A great source of political instability was removed for the time being. (2) The flow of workers from the rural areas to the cities was retarded while the volume of agricultural marketings declined in relation to total agricultural production. Not until a decade later was this problem radically solved by the policy of collectivization. On the whole, it is probable that what happened in agriculture in 1917 and thereafter must be regarded as retarding the industrialization of the country and in this sense as a step backward compared with the policy of the Czarist government in the years 1906-1913.

The immediate problem facing the Soviet government was to start production rolling again. The turning point in the development of industrial production came at the beginning of 1921, when the government relinquished what has come to be called the policies of "War Communism" and initiated the NEP, the "New Economic Policy." Most of the measures taken in the first years of the NEP facilitated the resumption of industrial

^{1/} A. Engeyev, "O plateznom balanse dovoyennoy Rossii" (On Russia's Pre-War Balance of Payments), Vestnik Finansov (The Financial Courier), Moscow, 1928, No. 5, p. 35.

production either directly or indirectly. This is true of the restoration of the right of the peasants to sell their surpluses (minus taxes in kind) on a free market, and of the general resumption of private enterprise in trade, as well as of measures directly pertaining to the sphere of industrial production. As regards the latter, private enterprise was restored for small-scale industry. 1/ Large-scale industry remained in the hands of the government, but a number of measures were taken to restore working discipline, to provide inducements for workers, and to attract skilled workers and engineers (e.g., abolition of wage equality). The idea of militarization of industrial labor (compulsory recruitment of labor armies) was abandoned. At the same time the government-owned industry was reorganized. The general system of uncontrolled budgetary subsidies was increasingly replaced by the principle of "economic accounting" (khozraschet). Large productive units (trusts) were created. Each individual enterprise gradually received a good deal of independence with regard to purchases of raw materials and sales of its products. In general, interference of the planning authorities with the operation of the enterprises was reduced. 2/

At the same time Russian foreign economic policy was revised. An attempt on the part of certain Soviet groups to replace the foreign trade monopoly by a tariff system failed, but there was a certain relaxation of controls. A more generous policy in regard to foreign concessions attempted to induce participation of foreign capital in the reconstruction of industry. Although the total foreign participation was slight--only four-tenths of one per cent of the total industrial output of 1924-25 stemming from foreign concessions--in individual instances (gold and manganese) the contribution was considerable. 3/ Imports were resumed in 1921, although on a very low level, and in 1923-24 exports reached about one quarter of the pre-war level.

The over-all result in the field of industry was an extremely rapid recuperation. The average annual value increase of gross output over the period 1920-1927 was almost 40 per cent for large-scale industry and more than 27 per cent for total industry. This extraordinary rate should cause no surprise. To a very large extent the problem was not to build new factories and to train new workers but to put the already existing manpower back to work in existing factories, under the guidance of technicians trained in pre-revolutionary times. For the same reason it is not surprising that the rate of growth in this period was higher than

1/ Small-scale industry included enterprises employing 10 workers and a motor, or 20 workers without a motor. To avoid confusion, it may be noted that this definition of a small-scale industrial enterprise does not coincide with the one generally employed in Soviet industrial statistics.

2/ Cf. E. L. Granovski and B. L. Markus, ed., Economika sotsialisticheskoy promyshlennosti, (Economics of the Socialist Industry), Moscow, 1940, pp. 38 et seq.

3/ Alexander Baykov, The Development of the Soviet Economic System, Cambridge, 1946, p. 126.

in the ensuing years of high-pressure industrialization under the Five Year Plans. In the latter period, the problem was not to restore but to build anew.

At these rates of growth, it took the index of large-scale industry six years and that of all-industries seven years to exceed the 1913 level. The conclusion, however, that the government-owned large-scale industry rose faster than small industry is not necessarily warranted inasmuch as the industrial census of 1928 showed that a good deal of small industry was not included in the statistics of the previous years. ^{1/} It is more likely that both large-scale and small industry developed at approximately the same rate. The omission just mentioned may be a source of understatement in the "all-industries" index. On the other hand, there is little indication that the indexes overstate to any considerable degree the actual development of industrial output during the period. Such overstatement seems to be a problem peculiar to the following phase of industrialization in Russia.

Despite the fact that the period was chiefly devoted to a utilization of existing capacities, some changes in the structure of large-scale industry did take place between 1913 and 1927. In the earlier year 41.8 per cent of the total gross value of industrial output of large-scale industry was produced by heavy industry and 58.2 per cent by light industry. By 1927 the corresponding percentages were 45.2 and 54.8, respectively. Since in 1927 the index of large-scale industry stood at 123.7, this change in the relative structure implies that the output of heavy industry was 33.7 per cent higher than in 1913, while the output of light industry was only 16.5 per cent higher than in 1913. Yet the emphasis on heavy industry, so peculiar to the following period, was still at the incipience.

One final remark is in order. The initiation of the New Economic Policy occurred under the slogan of Smychka (clamp), which in the Russian political lingo of the period meant close union between the city and the village. Nevertheless, the rapid reconstruction of Russian industry placed a considerable strain on relations between the urban and rural groups of the population. In 1922, the terms of trade of industrial versus agricultural goods began to turn against the latter. This phenomenon, which in Russia was called "the scissors," assumed more and more serious proportions until, in the fall of 1923, the great "scissor-crisis" broke out. The exchange of goods between the cities and the villages was gravely jeopardized at a time when the continuation of inflation promoted industrialization and placed increasing burdens on the peasants. The crisis was overcome by a number of measures. Stabilization of the ruble in 1924 helped to ameliorate the situation. Yet the ratio of agricultural to industrial prices did not return to the pre-1914 position.

As was true in the 'nineties of the last century, industrialization in post-revolutionary Russia proceeded to a considerable extent at the expense of the peasants. The "scissors" development was an expression

^{1/} Cf. Appendix I.

of "the monopoly position of State industry." ^{1/} In the 'nineties, tariff duties and taxes were an important source for the financing of industrial growth; in Soviet Russia, high prices of the products of government-owned industry played the same role. This is not surprising. Rapid industrialization without restriction of consumption calls for the presence of special factors in the form of foreign credits in conjunction with a considerable agricultural overpopulation or a steady flow of immigration. But foreign credits of the size required were not available to Russia, and the land reform had reduced the extent of the agricultural overpopulation. Under these conditions, once a relatively high rate of industrial growth has been determined, a considerable sacrifice in consumption is inevitable. Still the magnitude of this sacrifice can vary with a number of factors: the higher or lower degree of efficiency exhibited in the process; the length of the period during which the desired rate of growth is to continue; the degree of preference given to heavy industries as against consumers' industries; the extent to which financial and commercial markets abroad are accessible; the degree of autarky aimed at as a result of industrialization.

Most of these questions, including the choice of the prospective rate of growth itself, were the subject of bitter struggles in Russia in the years 1927-1929.

B. The Period of the Five Year Plans

The group led by Bukharin, Rykov, and Tomsky opposed a high rate of industrialization, the emphasis on heavy industry, the high degree of autarky contemplated, and the burdens on consumption which all these implied. To a large extent, the struggle centered on the drafts of the First Five Year Plan. With due respect for the traditional Russian predilection for broad and vague terminology, the fight for and against a high rate of industrial growth was conducted as a struggle between the "teleological" and "genetic" methods. In the end the "minimalistic" drafts were rejected. Rapid industrialization with sweeping priorities for heavy industry became the guiding principle of Soviet industrial policy for the period here under review.

Collectivization and mechanization of agriculture during the First Five Year Plan were direct consequences of the decisions just mentioned. These measures purported to open up the man-power reservoir of the villages for the needs of industrialization; to break the political opposition of the peasants to the reduction of their standard of living; to assure necessary supplies of foodstuffs for the population of the growing cities; and to make the flow of these supplies largely independent of the terms of trade of industrial versus agricultural goods. The "scissors" issue was to lose much of its political significance.

^{1/} Maurice Dobb, Russian Economic Development Since the Revolution,
London, 1929, p. 236.

The policy of collectivization produced an economic and political crisis which placed the regime in its gravest jeopardy since the days of the civil war. Many peasants were unwilling to surrender their livestock to the collective farms. The result was the "great slaughter," the effects of which remained for years. In 1938, the number of cattle and hogs was still below the 1930 level. 1/ This, together with the manifold initial deficiencies in the organization of collective farms, the natural aftermath of a profound social change, kept the gross value of agricultural production in 1930-1933 somewhat below the 1929 level. 2/ The goal of an immediate increase in agricultural supplies was reached in a very narrow sense only. There was indeed a considerable increase in grain deliveries to the government--these deliveries in 1933/34 were more than twice as high as in 1927/28. But this increase in grain deliveries was in itself a result of the great diminution in livestock. The ratio of soil utilization as between food and feed was radically changed and there is no doubt that the share of converted products in the Russian diet was greatly reduced. It was only at the end of 1935 that adequate food supplies made possible the abolition of rationing. In the end, however, at a great economic and still greater human cost, the structure of agriculture was adapted to the needs of high speed industrialization.

As has been indicated previously there are grounds for the belief that the rate of industrial growth in the period from 1928 on, as given by Russian statistics, tends to overstate the actual development. This refers also, in some measure, to reported changes in the structure of industry in the same period. Since it is not possible at present to provide any exact measurement of the degree to which the index may be inflated, it is proposed here to present first the Russian data, to compare these with data of pre-war periods, and then to proceed to a discussion of factors which may have caused an inflation of the index. The rates of growth under the First and Second Five Year Plans as well as in the first three years of the Third Five Year Plan as reported in official Russian indexes were as follows:

Annual Percentage Rates of Growth of Industrial
Output (gross values)^{3/}

	<u>Large-scale Industry</u>	<u>All Industry</u>
1928-1932	23.76	20.35
1933-1937	17.85	17.24
1938-1940	--	13.12
1928-1938	19.08	18.26
1928-1940	--	17.50

1/ Sotsialisticheskoye stroitel'stvo, Statisticheskii yezhegodnik, SSSR (Socialist Construction of the USSR Statistical Yearbook), Moscow, 1934, p. 226; ibid, Statisticheskii sbornik (Statistical Handbook), Moscow-Leningrad, 1939, p. 103.

2/ According to Colin Clark, the combined food consumption of city and country dwellers was only one per cent higher in 1934 than in 1913. Cf. Colin Clark, A Critique of Russian Statistics, London, 1939, pp. 13 and 68.

3/ Figures for the first three periods are computed on a compound basis (footnote continued page 20)

The following index numbers summarize the development over the entire period:

<u>Year</u>	<u>Large Industry</u>		<u>All Industry</u>	
	1913=100	1928=100	1913=100	1928=100
1938	908.6	588.8	653.8	499.8

Over the period 1928-1936 the structure of industry changed as follows:

Share of Selected Industries in Total
Output of Large-Scale Industry 1/

	<u>1928</u>	<u>1936</u>
	(In per cent)	
Coal	2.4	1.9
Coke	.5	.5
Oil	4.3	2.6
Ferrous Metals	4.7	4.8
Non-ferrous Metals	1.4	1.5
Metal-working Industry	13.5	32.5
Of which, machinery	11.0	26.9
Chemical Industry	2.3	4.2
Cotton Textiles	17.1	6.2
Wool Textiles	3.3	1.2
Foodstuff Industry	22.3	17.2

The shares of heavy and light industries in the industrial output of all industries was as follows in selected years of the period: 2/

(In per cent of total)

	<u>1913</u>	<u>1928</u>	<u>1929</u>	<u>1933</u>	<u>1938</u>
Heavy Industry	33.3	43.9	42.4	53.6	58.5
Light Industry	66.7	56.1	57.6	46.4	41.5

(Footnote 3 continued from page 19) using the last year of the preceding and of the given periods. Figures in the fourth and fifth rows are computed from the slopes of the trend curves fitted to the index series. It should be noted, however, that since a portion of output in territories occupied by Russia between September 1939 and the end of 1940 is included in the 1940 figure, the rates which include 1940 are not fully comparable with the others. The equation of the trend curve for "all industry" for 1928-1940 is $\log y = 2.05211 + .07004 t$.

1/ Based on values of output at 1926/27 prices. Cf. Granovski and Markus, op. cit., p. 108. No data are available for years later than 1936.

2/ Cf. Sotsialisticheskoye stroitel'stvo, op. cit., Moscow-Leningrad, 1939, p. 34.

Thus, the Russian statistics indicate that by 1938 large-scale industry had increased ninefold since 1913 and almost sixfold since 1928 and that, by the same year, the output of all industry was six and one-half times larger than in 1913, and five times larger than in 1928. At the same time, an increase in the share of the metal-working industry in total output by about two and one-half times and a consistent decrease in the share of the textile industry to about one-third of what it used to be stood out as monumental changes in the structure of Russian industry over the period 1928-1936.^{1/} If we accept the Russian figures the relation between the industrial output of large-scale industry in Russia and industrial output in the United States seems to have developed, between 1913 and 1938, as shown in the table on page 22.

The reservation previously made may well be repeated here. The difference in the value systems in Russia and in the United States limits somewhat the validity of comparisons between values of output in the two countries. This difficulty is additional to those of a purely statistical nature. The data therefore should not be taken as an exact expression of the relationship in question. According to the figures, the ratio of Russian to American industrial output changed between 1913 and 1937 from 6.9 to 31.4 per cent, and rose to 45.1 per cent a year later. On a per capita basis these percentages are reduced to about 4.8 in 1913 and about 34.7 in 1938. One should also take into account the fact that the difference between actual and capacity output is much larger in the United States than it is in Russia. Nonetheless, the development as shown is very impressive. It will be remembered that the ratio of industrial production in Russia to that of the United States changed very little between 1885 and 1913.

The contribution of industry to the national income of Russia increased from 28 per cent in 1913 to 53.4 per cent in 1937, while the contribution of agriculture fell from 45.25 per cent in 1913, to 15.6 per

^{1/} Some indications of these shifts as compared with 1913 were apparent as early as 1928, but the extent of the changes was slight.

	<u>Share in Value of Total Output</u>	
Metal-working Industries	1913	- 11.0%
	1928	- 13.5%
Cotton and Wool Textiles	1913	- 21.4%
	1928	- 20.4%

Russia and the United States

	<u>Russia:</u> Gross Value of Out- put of Large-Scale Industry	<u>United States:</u> Index of Out- put of Mining and Manufac- turing ^{2/}	Gross Value of Output of Large- Scale Industry in Russia as Percent- age of the Gross Value of United States Industry ^{4/}	
Index ^{1/}	Values at 1926/27 pri- ces in mil- lions of 1937 dollars ^{3/}			
1913	100.00	2,584.2	100.00	6.90
1920	13.75	355.2	117.19	.80
1921	19.55	505.2	90.63	1.49
1922	25.55	660.2	114.06	1.55
1923	39.07	1,009.6	137.50	1.96
1924	45.46	1,174.5	128.10	2.44
1925	75.49	1,950.1	140.63	3.70
1926	108.12	2,793.7	150.00	4.97
1927	123.69	3,195.8	148.44	5.75
1928	154.31	3,986.8	154.69	6.88
1929	194.35	5,021.5	171.88	7.80
1930	252.04	6,511.8	142.19	12.23
1931	314.73	8,131.8	117.19	18.53
1932	359.12	9,279.3	90.63	27.34
1933	380.50	9,832.0	107.81	24.35
1934	457.00	11,808.5	117.19	28.56
1935	562.60	14,537.8	135.94	26.72
1936	732.70	18,932.0	160.94	31.41
1937	816.40	21,094.2	176.56	31.90
1938	908.80	23,482.0	139.06	45.09

^{1/} From table on page 4.

^{2/} For the United States index cf. the Report to the Committee on Banking and Currency, Basic Facts on Employment and Production, Senate Committee Print No. 4, September 1, 1945, p. 4.

^{3/} The value of Russian output at 1926/27 prices in 1937 dollars has been computed by applying the percentage for 1937 from column four to the gross value of output in manufacturing and mining in the United States in 1937 (Statistical Abstract of the United States 1942, pp. 885 and 836). The index numbers in column one (converted to 1937 = 100) were then applied to the 1937 value in dollars. The percentage for 1913, computed by Soviet statisticians, makes it possible to compute the rate between dollars and the 1926/27 rubles with respect to industrial goods. The 1926/27 ruble equaled about 26 United States cents of 1937 purchasing power. For the fact that the rubles in question are not exclusively 1926/27 rubles, see the Section on "The Problem of the Index."

^{4/} The percentages for each year have been computed on the basis of the (footnote continued page 23)

cent in 1937. ^{1/} The following table shows the ratio of the net output of agriculture to that of industry in Russia and in the United States in current prices:

Ratio of Net Output of Agriculture to that of Industry

	<u>Russia</u> ^{2/}	<u>United States</u> ^{3/}
	(In per cent)	
1913	163.90	58.74
1937	29.20	28.85

Thus, in 1937 the ratio of net agricultural output to industrial output was nearly equal in the two countries. This change is very great indeed, even if it is considered that Russian industrial output was over-valued in relation to agricultural output since the peasants were forced to deliver the major portion of their produce to the state at relatively low prices.

The rates of growth over the whole period 1885-1940 may now be summarized as follows:

	<u>Average Annual Percentage Rates of Growth</u>		
	<u>Selected Industries</u>	<u>Large-Scale Industry</u>	<u>All Industries</u>
1885-1889	6.10		
1890-1899	8.03		
1900-1906	1.43		
1907-1913	6.25		
1885-1913	5.72		
1920-1927		39.45	27.45
1928-1938		19.08	18.26

These figures show that rates of growth in the period of the Five Year Plans were 2.3 - 2.4 times higher than the rate of the 'nineties, the period of most rapid development in pre-1914 Russia.

(Footnote 4 continued from page 22) percentage for the ratio between Russian and American industry in 1913 as given in SSSR i kapitalisticheskiye strany (The USSR and the Capitalist Countries), Moscow-Leningrad, 1939, p. 8. Accordingly the percentage for a given year = percentage for 1913 times the USSR index number for the year divided by the United States index number for the year.

^{1/} S. N. Prokopovicz, op. cit., p. 356.

^{2/} S. N. Prokopovicz, op. cit., pp. 356, 358, 359.

^{3/} National Bureau, op. cit., p. 18, Statistical Abstract of the U. S. 1942, pp. 356-357 (including mining).

The comparison may also be expressed in terms of the relative levels of industrial output that might have been reached in 1938 under certain assumptions about the continuation of the pre-1914 rates of growth. The following alternative assumptions have been made:

1. That the trend of the 1890's continued without interruption;
2. That the trend of the immediate pre-1914 years (1907-1913) continued without interruption;
3. That the trend of 1885-1913 continued without interruption;
4. That continuation of the trend of the 'nineties and of 1907-1913 was interrupted by the First World War and by the Great Depression in such a manner (1) that the level of output of 1918 equaled that of 1913, and (2) that the level of output of 1934 equaled that of 1929.

Actual developments during the war of 1914-1918 make the first portion of this assumption not unreasonable. It may also be assumed that the depression of the 'thirties would seriously have affected the Russian economy had the close interconnection between that economy and the rest of the world not been severed by operation of the planned economy and the foreign trade monopoly. While the 1907-1913 trend includes the effects of minor cyclical fluctuations, that of 1890-1899 reflects no such disturbance.

Extrapolations based on assumptions 1, 2, and 4 are shown in the two attached charts, and in the following tabulation:

Comparison of Actual Industrial Output in 1938
and Indicated Output on the Basis of
Extrapolations of Earlier Trends
(1913 = 100)

<u>Actual Index of Output</u>	<u>1938</u>
(a) Large-Scale Industry	909
(b) All Industries	654
<u>Extrapolations</u>	
Uninterrupted Trend 1890-1899	1,103
Uninterrupted Trend 1907-1913	453
Uninterrupted Trend 1885-1913	421
Trend, 1890-1899, assuming periods of stagnation during World War I and the Great Depression	509
Trend, 1907-1913, assuming periods of stagnation during World War I and the Great Depression	247

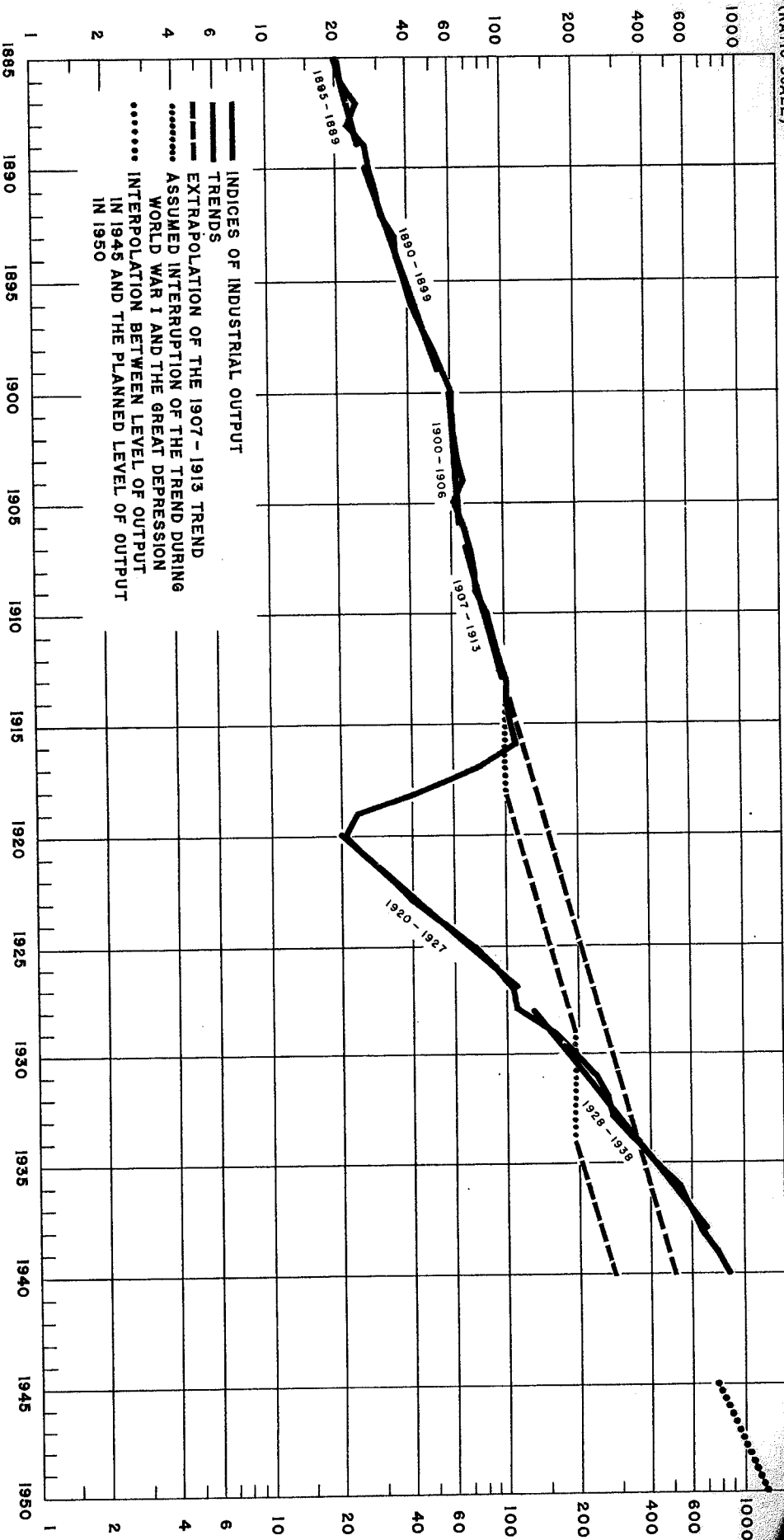
The figures in the preceding table once more accentuate the comparative order of magnitude of the rate of growth of industrial development in the period of the Five Year Plans. It shows that only the least

GROWTH OF INDUSTRIAL OUTPUT IN RUSSIA

INDEX, 1913 = 100
(RATIO SCALE)

1885 - 1913 SELECTED INDUSTRIES
1913 - 1950 ALL INDUSTRIES

INDEX (RATIOS)

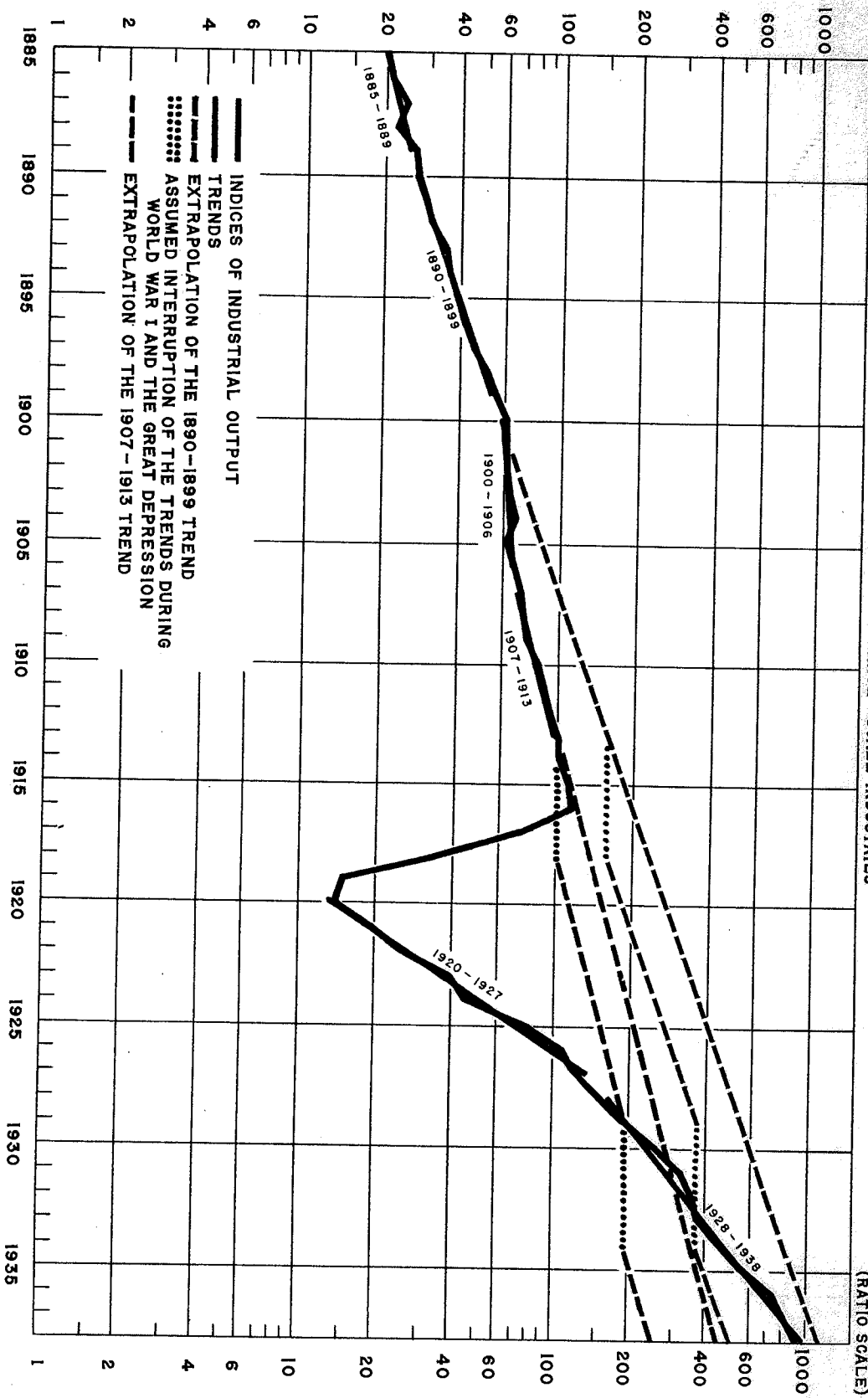


GROWTH OF INDUSTRIAL OUTPUT IN RUSSIA

INDEX, 1913=100
(RATIO SCALE)

1885 - 1913 SELECTED INDUSTRIES
1913 - 1938 LARGE - SCALE INDUSTRIES

INDEX, 1913=100
(RATIO SCALE)



realistic of the extrapolations (that of an uninterrupted continuation of the development of the 'nineties) reaches a point in 1938 above the level reached by either one of the Soviet indexes. The implied assumption that neither the Revolution of 1905, nor the First World War nor the Great Depression, nor, for that matter, any other cyclical disturbance would have affected the trend between 1899 and 1938 is not too reasonable. On the other hand, all other extrapolations have remained considerably below the level reached by large-scale industry and also below that reached by the all-industry series, although the broken extrapolation of the trend of the 'nineties is only 28 per cent below the point reached by the all-industry series. At the average rate of the 'nineties, this would mean a lag of a little more than three years. The other extrapolations shown involve, at the appropriate rates of growth, longer lags of six to sixteen years.

The chart on the following page which compares the rate of growth in Russia with that in five other countries shows that, in the inter-war period, none of the latter experienced a rate of growth comparable to that of Russia.

The Problem of the Index

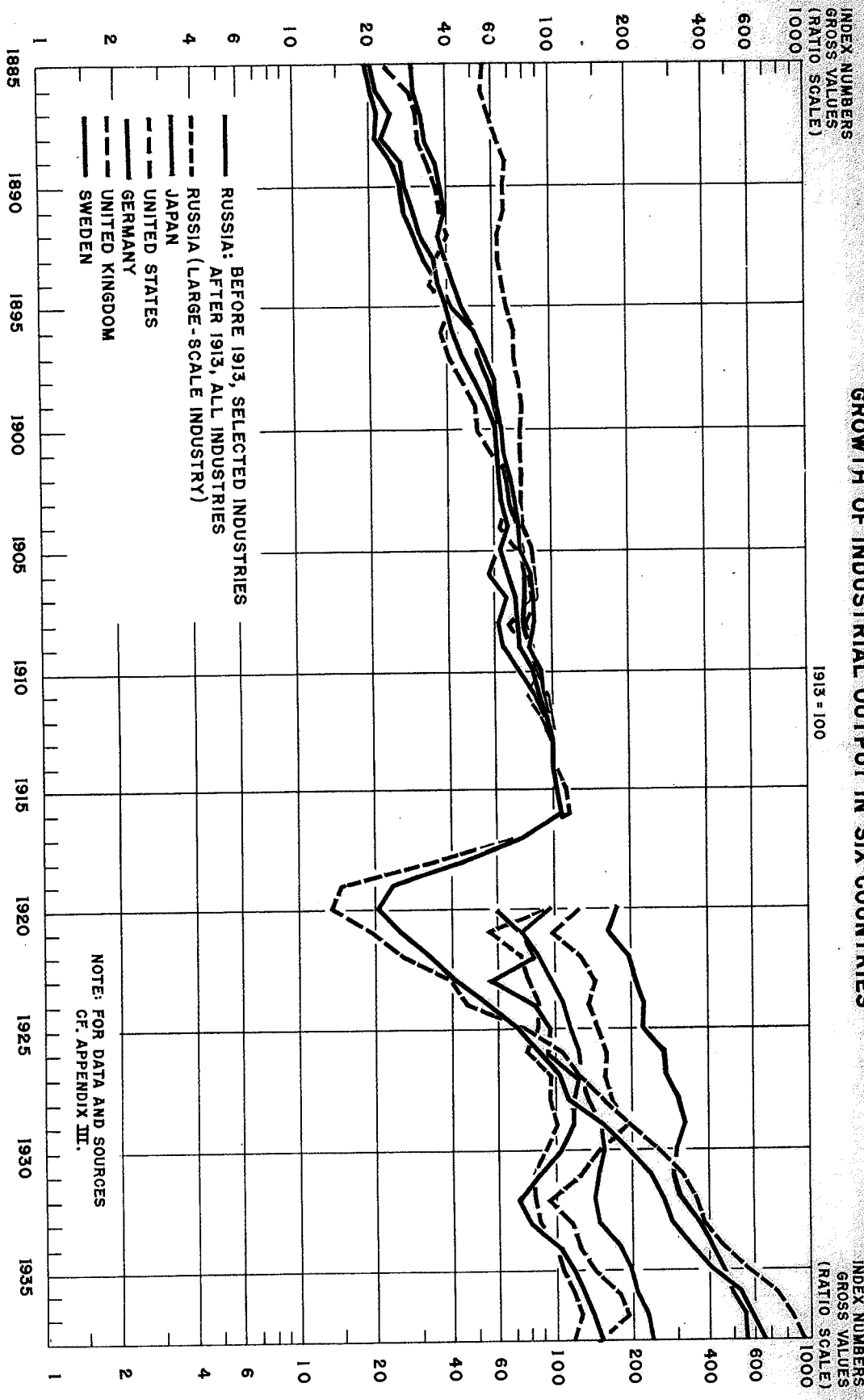
There are several reasons why the Soviet indexes of gross value of industrial output may be inflated.

1. The index of output of large-scale industry tended to be inflated by the transfer of formerly small-scale industrial enterprises into the category of large-scale industry, a process of some importance in the years of the First Five Year Plan. 1/ This, however, cannot have caused a very considerable inflation of the index, since the aggregate product of such enterprises must be assumed to be very small; enterprises with less than 50 workers produced, in 1935, only three per cent of the total output.

2. A second source of error, which affects the "all-industry" series, relates to development of small industrial enterprise as shown by the official statistics. During the years of the First Five Year Plan small industry showed a sudden upsurge which over the period amounted to an increase in output of about $3\frac{1}{2}$ billion 1926/27 rubles. 2/ Much of this recorded increase was probably not a genuine accretion to output. As explained elsewhere (cf. Appendix I), the 1928 census of small industry revealed the existence of small industries whose output had not been recorded before. During the same period, moreover, many privately-owned small industrial enterprises were taken over by the State or by the cooperatives. Small private enterprises in general had not previously been included in the "all-industry" series expressed in 1926/27 rubles. On the other hand,

1/ Charles Bettelheim, La planification Soviétique, Paris, 1945, p. 274.
2/ Sotsialisticheskoye stroitel'stvo SSSR (Socialist Construction of the USSR), 1935, p. 24.

GROWTH OF INDUSTRIAL OUTPUT IN SIX COUNTRIES



as suggested under (1) above, some of the small industry may have been transformed into large-scale industry. The extent of the artificial increase of the index may therefore have been even larger than is indicated by the output figures in the years 1928-1932. On the other hand, allowance should be made for such genuine increases in the output of the small-scale industry as may have taken place during the period. Since it is impossible to measure the significance of the individual factors involved, it may be well to assume for the purpose of illustrating the magnitude of possible effects that between 1928 and 1932 about three billion rubles represented merely a statistical rather than a real increase in output. This would amount to 6.9 per cent of the 1932 output of all industries and reduce the 1928-1932 rate of growth from 20.35 to 18.20 per cent.

In so far as the trend of industrial development over a longer period is concerned, it should be noted that a portion of the three billion rubles can be presumed to have been included in the statistics of 1913. This category may well have represented about one-half of the sudden increase revealed after 1928. We may assume, still for the sake of illustration, that the balance of this amount consisted of never-recorded output of very small industrial enterprises, and that as much as two-thirds of the 1.5 billion rubles of output were in existence, but not recorded, in 1913. Adding one billion rubles to the 1913 output figure would reduce the index for years subsequent to 1928 by about 6 per cent and, in particular, would reduce the 1938 index figure from 653 to about 616.

3. Of much more interest, and much more difficult to attack, is another bias of the index. As mentioned before, the Soviet index of industrial output is expressed in constant prices of the year 1926/27, a year well chosen for the purpose. By that time not only had the "scissors" been reduced to tolerable proportions, but also the lack of balance in the structure of industrial prices left by the period of inflation had been largely corrected. There is no doubt that when in 1928 this price system was made the basis of Russian output--and income--statistics, the change constituted a very great improvement over the use of 1912 prices. The prices, that is to say, the weights of 1912 had become a very imperfect means of representing the considerably different economy of the middle 'twenties. Nevertheless, the rapid transformation of the ensuing years created considerable statistical difficulties. These difficulties, however, would have been much smaller had not the Soviets, from 1931 on, suppressed publication of price indexes and information on the value of industrial output at current prices.

As the range of the commodities produced by industry widened and new articles began to appear, the problem of pricing arose since 1926/27 prices for these commodities were not available. The Russian economic authorities solved the difficulty in the following fashion. Such commodities were included in the gross value of output not at prices of 1926/27 but at current prices of the period when the commodities in

question were for the first time produced on a large scale. 1/ This was the main method used in accordance with instructions of the central planning and statistical authorities. It appears, however, that, particularly during the period of the First Five Year Plan, other methods were occasionally used. 2/

It is this method of evaluation of new commodities which gives a basis for the belief that the Russian index series overstate the actual development. Inflationary tendencies are natural in a rapidly developing full employment economy. Although the actual degree of inflation is not known, it has been established that a considerable price inflation did take place, particularly in the years of the First Five Year Plan. 3/ Accordingly, when "new" commodities were valued in 1931 or 1932 at current prices, these prices were a good deal higher than they would have been on the basis of wages and costs of raw materials in 1926/27. This is doubtless a source of an inflationary bias of the index.

1/ Gosplan SSSR, Leningradski planovy institut, Zapiski planovogo instituta (Leningrad Plan Institute, Publications of the Plan Institute); A. I. Rotshtein, "Problemy otsenki produktsii v tverdykh tsenakh" (Problems of Evaluation of Production at Constant Prices), Leningrad, 1936, Vol. I, p. 161.

2/ For example, certain products were valued at prices of the first year of production rather than at prices of the first year of large-scale production. In other instances a single coefficient was used for conversion of current prices into 1926/27 prices, and was applied to the total value of output, irrespective of changes in the structure of output. Ibid., p. 174.

3/ It is not unlikely that this inflation, in conjunction with a new widening of the "scissors," was the reason for the discontinuance of the publication of price information in 1931.

In default of price information, the degree of inflation which took place during the First Five Year Plan may be illustrated by the following comparison of indexes (1928 = 100).

	<u>Money in Circulation</u>	<u>Deposits with the Gosbank (Central Bank)</u>	<u>National Income at 1926/27 Prices</u>
1928	100	100	100
1932	334	455	182
1936	395	-	336

Cf. Sotsialisticheskoye stroitel'stvo, op. cit., 1935 and 1939; State Bank of the USSR, Economic Survey, Vol. IV: 1, p. 4; Vol. VII: 4-5, p. 11. The figure for Gosbank deposits in 1932 refers to May 1, 1932, later data not being available. The disparity between money in circulation and deposits on the one hand and real national income on the other must have been even greater than indicated by the tables because the national income index was not completely impervious to inflationary effects.

Another factor, reinforcing the preceding, is closely allied. Since, in general, prices for the first year of large-scale production were used in evaluation of new products and since the assumption is reasonable that production of the first year was relatively inefficient, and the cost unduly high, subsequent increases in output would raise the value index more than would be the case if prices of the second or third year of large-scale production were used.

The last-mentioned source of error, however, represents a specific case of a general index problem. This may be stated as follows: In a country in the first stages of industrialization the spread between prices of industrial goods of a low degree of fabrication and those of highly fabricated goods is relatively larger than in a well-developed industrial country. This is often reflected in the structure of protective tariffs. As the country progresses on the road of industrialization, the spread tends to become narrower. At the same time, the share of relatively highly fabricated goods in total output increases in relation to less highly fabricated goods. This has the effect that, if prices of the first year of the period are used as weights, the increase in output over the whole period appears greater than it would if prices of the last year of the period were employed. It is quite likely, therefore, that if prices of 1938 had been used in Russia, the index for the period 1928-38 would have shown a smaller rise than is the case on the basis of 1926/27 prices. 1/

1/ The proposition may be expressed in algebraic terms, using the following symbols:

- qso - output of pig iron (low-fabricated commodity) in the first year of index period
 - qsn - output as above in the last year of the index period
 - qmo - output of machinery (highly-fabricated commodity) in the first year of the index period
 - qmn - output as above in the last year of the index period
 - ps0 - price of pig iron in the first year of the index period
 - psn - price of pig iron in the last year of the index period
 - pmo - price of machinery in the first year of the index period
 - pmn - price of machinery in the last year of the index period;
- if it is stipulated that -

(a) $\frac{qmn}{qno} > \frac{qsn}{qso}$, and that

(b) $\frac{pmn}{psn} < \frac{pmo}{ps0}$, then

$$\frac{qsn \cdot ps0 + qmn \cdot pmo}{qso \cdot ps0 + qmo \cdot pmo} > \frac{qsn \cdot psn + qmn \cdot pmn}{qso \cdot psn + qmo \cdot pmn}$$

The choice between the two methods of approach is in general arbitrary; the weights (prices) of the last year of the period suit the first year of the period as little as vice versa. But in the situation under consideration a recomputation of the index in prices of a later year would also have removed the specific inflationary bias caused by introduction of new commodities at higher prices than the general price level of 1926/27, and eliminated the hybrid character of the index.

It should be noted that Russian economists are aware of the inadequacy of the index and have suggested improvements. 1/ In 1935 the Russians attempted to eliminate inconsistencies in the methods of evaluation by providing individual enterprises with a list of "1926/27 prices" for a number of new commodities and improving the procedure for evaluation of such new commodities as were not contained in the list.

As pointed out before, available data do not permit precise measurement of the errors involved. It may be possible, however, to obtain a general idea of the upper and lower limits of the aggregate error, to determine the occurrence of errors in time, and to see whether these are spread evenly over the whole period or are peculiar to some portion of it.

It is natural in the case of a suspected error in the industrial value indexes to turn for comparison to the series of quantity indexes of important industrial materials used in Russia and to indexes of freight tonnages originated. Data for appropriate years are given in the following table: 2/

	Freight Originated	Crude Oil	Coal	Pig Iron	Steel	Large Industry	All Industry
	(1913 = 100)						
1920	--	41.75	26.33	2.73	3.82	13.75	20.4
1927	--	119.45	112.45	71.87	88.41	123.68	105.3
1928	141.69	134.26	121.94	79.95	100.93	154.31	110.8
1932	202.34	233.43	219.03	146.00	140.72	359.12	265.9
1937	390.26	303.29	415.20	343.29	411.58	816.40	588.9
1938	389.95	314.60	450.12	345.97	427.35	908.80	653.8
1939	418.13	321.92	455.58	361.14	446.25	--	762.5
1940	--	323.71	497.24	354.27	453.47	--	852.4

1/ Cf. *Ibid.*, pp. 170-172, where use of chain indexes is proposed. Also Sh. Turetski, "O khozyaystvennom raschete," *Planovoye Khozyaystvo*, ("On Economic Accounting," Planned Economy), Moscow, 1939, Vol. 1, p. 122 et seq.).

2/ Cf. Appendix IV for sources and for complete series for coal, crude oil, pig iron, and steel. For freight originated the absolute figures in millions of metric tons are:

1913 - 132.4	1937 - 516.7
1928 - 156.2	1938 - 516.3
1932 - 267.9	1939 - 553.6

The sources are as follows: for 1913, 1928, 1932 and 1937: *SSSR i kapitalisticheskoye strany*, p. 296; for 1938: *Sotsialisticheskoye stroitel'stvo, Statisticheskii sbornik, 1933-1938*, p. 105; for 1939: Wm. Mandel, "Soviet Transport Today and Tomorrow," *American Review of the Soviet Union*, Feb. 1941, pp. 28-45.

Examination of these figures may lead to unwarranted conclusions. It is clear that the physical indexes in 1938 stood, in comparison to 1913, at points between 315 and 450, the former being the index figure for crude oil, and the latter for coal; that the large-scale industry index was more than twice, and the all-industry index 1.45 times the level of coal output. It is tempting to conclude that these comparisons provide the necessary supporting evidence to confirm the supposition that the gross value series are badly inflated and that accordingly the all-industry figure should be reduced at least to the level of the coal index, and perhaps to the level of the steel index. On the same basis one might argue that the large-scale industry figure should be reduced even more drastically in proportion inasmuch as it is clear that large-scale industry relies even more than small industry on the basic industrial materials listed. ^{1/} A suggestion along these lines has been made by N. S. Prokopovicz. ^{2/}

Such a conclusion, however, seems premature. Another look at the table on page 29 shows that as early as 1928 the index of value of output of large-scale industry had increased considerably more than the average of the physical indexes. True, the all-industry index by 1928 had overtaken only two physical indexes (steel and pig iron). This early disparity between the physical indexes and the large-scale industry index cannot be attributed to inflationary effects, since between 1926/27 and 1928 prices were falling rather than rising. ^{3/} Factors other than inflation must have been at work and these will be discussed presently. It would be well, however, first to have another glance at the development of the disparity between 1920 and 1938.

Tabulation of the average annual percentage rates of growth of the physical indexes in comparison with the value indexes gives the following picture: ^{4/}

Period	Physical Indexes				Gross Value Indexes	
	Crude Oil	Coal	Pig Iron	Steel	Large-Scale Industry	All-Industry
1920-1927	16.20	23.05	67.07	56.65	39.45	27.45
1928-1932	14.34	14.26	15.23	10.73	23.76	20.35
1933-1937	5.38	13.65	18.65	22.83	17.85	17.24
1928-1938	9.20	13.20	15.35	15.40	19.08	18.26

^{1/} This line of reasoning could be supported also by the fact that coal and oil played in 1936 an even more important role than in 1913 as sources of the energy supply of the country, oil and coal supplying 68.8 per cent in 1913 and 80.1 per cent in 1936. Cf. SSSR i kapitalisti-cheskiye strany, p. 148.

^{2/} Op. cit., p. 148.

^{3/} Birmingham Institute for Research on Russian Economic Conditions, Memorandum No. 7, October 1932, p. 14.

^{4/} All figures (except for large-scale industry and all-industry for 1928-38) have been computed on a compound basis using the last year of the preceding and given periods.

The rates of growth of the individual indexes during the period 1920-1927 are largely determined by the degree of decline suffered by the respective industries in 1917-1920; they may, therefore, be left out of consideration. The striking aspect of the preceding table is the marked divergence between the years of the First and the Second Five Year Plans. During the First Five Year Plan, the rates of growth shown by value indexes considerably exceed those of the physical index series. The situation is different in the Second Five Year Plan; with the exception of lagging crude oil production, rates of growth shown by the value indexes of output are located well within the range of the rates of the physical indexes and are exceeded both by the rate of growth of steel and by that of pig iron. In other words, such disparities as exist between the two types of indexes were on the whole created between 1927 and 1932. A tentative explanation would be that while the rates of growth shown by value indexes for the First Five Year Plan, i.e., for the period 1926-1932, may be exaggerated (and accordingly the average rate of growth over the whole period), the rate of growth during the Second Five Year Plan may be quite correct. Yet to regard the whole disparity which arose during the First Five Year Plan as due to an inflationary bias in the index is to neglect other important factors. The problem of the inflationary bias refers largely to two branches of industry--the electrical products and the machinery industries--since it was overwhelmingly in these two fields that new products, for which no prices were in existence in 1926-27, were developed in the following years. The growth of the machinery industry is the most significant single feature of the growth of industrial output in Russia. It may therefore be advisable to compare the growth of this industry with the growth of ferrous metals production and particularly with the production of steel and with the structure of rolled steel consumption. In so doing the problem of the inflationary bias may be related to a number of other pertinent factors.

The value of output of the ferrous metals industry and of the machinery producing industry was as follows: 1/

Value of Output in Millions of 1926-27 Rubles

	<u>Machinery</u>	<u>Ferrous Metals</u>	<u>(2) as percentage of (1)</u>
1913	748.3	758.6	101.37
1928	1,739.9	743.4	42.72
1932	7,620.3	1,362.1	17.87
1936	20,204.3	3,605.2	17.84
1938	28,079.0	4,023.0	14.33

1/ Years 1913-1936: Computed from Granovski and Markus, ed., Economika sotsialisticheskoy promyshlennosti (Economics of Socialist Industry), Moscow, 1940, p. 109. For 1938: Sotsialisticheskoye stroitel'stvo SSSR, Statisticheski sbornik, Moscow-Leningrad, 1939, p. 36.

In one respect this table bears a strong resemblance to the previous comparisons between the output of basic industrial materials and the total value of industrial output. Between 1932 and 1936 the ratio between the two indexes was almost unchanged. On the other hand, it shows also that the change in relationship between the two industries by 1928 was a great deal larger than could have been forecast from earlier comparisons; as previously shown, such bias as may have been inherent in the index during this period would have been deflationary rather than inflationary. The main changes in the relationship between the two industries accordingly took place between 1913 and 1928, and 1928 and 1932. It is only the latter period in which the index might have been affected by the general price inflation. 1/

There are, however, a number of factors that must enter into consideration of this development. It is clear that changes (1) in the structure of consumption of basic industrial materials, (2) in the degree of fabrication, that is, in the amount of value added per unit of basic materials, (3) in the volume and structure of foreign trade, and (4) in the efficiency of utilization of basic materials must affect the relationship in question. A few statements on the four factors mentioned follow.

1. Change in the structure of steel consumption. Data on the structure of iron and steel consumption unfortunately are not available prior to 1931. Still a few generalities may be essayed. In the earlier stages of industrial development a large portion of metal production is devoted to simple consumption goods as well as to simple capital equipment (e.g., rails, tools). It is only at a later stage of industrialization that consumption of iron and steel by the machinery industry begins to assume an important position in total consumption of these products. It is quite plausible to assume that between 1913 and 1928 the share of the machinery-producing industry in total consumption of ferrous metals had increased to an appreciable extent. From occasional statements in Soviet literature it seems correct to infer that the big change in the structure of consumption took place in the first years of the NEP when the use of ferrous metals for consumption goods was drastically reduced. 2/

Between 1929/30 and 1938 the share of the machinery industry in total consumption of rolled steel varied as follows:

<u>Share of the Machinery-Producing Industry in the Consumption of Rolled Steel (In Percentages of Total Steel Consumption)</u> <u>3/</u>			
1929/30	44.91	1935	53.70
1931	49.78	1936	52.07
1932	55.20	1937	47.65
1933	54.61	1938	48.86
1934	54.96		

1/ It should be noted that the index of gross value of output of ferrous metals is unlikely to be seriously affected by the inflation because of the relative fewness of new products in this branch of industry.

2/ Cf., e.g., Narodnoye i gosudarstvennoye khozyaystvo (National and State Economy), Moscow, 1923, pp. 217 et seq.

3/ Computed from L. P. Shul'kin, Potrebleniye chernykh metallov v SSSR (footnote continued page 33)

The figures show an increase in the share of machinery production in the years of the First Five Year Plan. This was to be expected. The increased industrial use of steel as distinguished from construction (including railroad building) must be presumed to have made for higher values of industrial output in relation to total steel production.

2. The Degree of Fabrication. No data are available to show the development that has taken place in this respect. Yet a few general remarks may be adduced in connection with this factor. Because the Five Year Plans concentrated on the increase of machinery output while use of basic industrial materials for purposes of mass consumption was kept at a minimum and railroad construction developed at a much slower pace than was the case before the revolution, and because use of steel for construction had not progressed very far during the period, the presumption is that the amount of value added per ton of steel or pig iron consumed must have increased. Value added in the production of machine tools and tractors is doubtless greatly in excess of the value added in the production of pots and pans, or scythes, or rails. ^{1/} In other words, the ratio of the value of total industrial output to the production of steel was increased.

3. Volume and Structure of Foreign Trade. Through the medium of foreign trade lumber and grain were also converted into steel or machinery. On the other hand, however, coal and oil were exported in appreciable quantities, thus reducing the supply of fuel available for domestic production. Some idea of the significance of the two factors may be gleaned from the following statistics. If foreign trade in ferrous metals, builder's hardware and machinery is reduced to steel equivalents, the Russian supply of steel was increased by the following percentages: ^{2/}

1913	7.02
1928/29	4.92
1932	5.56
1933	2.11
1934	.78
1935	--
1936	.53

(Footnote 3 continued from page 32) (Consumption of Ferrous Metals in the USSR), Moscow-Leningrad, 1940, pp. 20-21. Data for the years 1929/30 and 1931 refer to consumption of non-quality steel only; from 1932 on the data refer to both quality and non-quality steel.

^{1/} It would have been desirable for our purposes to measure the progress of value added in machinery production in the United States in relation to steel consumption over a significantly long period of time. Unfortunately, inquiries directed to the American Iron and Steel Institute and to Iron Age magazine were without results as earlier breakdowns of steel consumption appear not to be available.

^{2/} Computed from SSSR i kapitalisticheskiye strany (The USSR and the Capitalist Countries), Moscow, 1939, pp. 38 and 39.

These percentages are in general relatively low, yet it must be noted that they represent high-priced foreign machinery which doubtless had higher value-creating power than the corresponding weight of domestic steel. The preceding figures seem to show that, in the years of the First Five Year Plan, the share of imported steel (in all forms) was somewhat smaller than in 1913. Thus, with the inclusion of foreign trade, the disparity between the steel index and the total value index appears to be even greater. It should be considered, however, that in the period 1928-1932 much more expensive machinery was imported than was the case in 1913. It may be presumed that the contribution of this machinery to the value of domestic output per unit of steel was correspondingly higher.

In 1909-1913, the value of one ton of imported machinery, etc. (including electrical equipment and precision instruments), was 2.2 times greater than the value of one ton of imported ferrous metals. In 1928-32 the same ratio was 7.8. Assuming constancy of relative prices, machinery and equipment imported in 1928-32 was 3.5 times as valuable per unit of weight as was the case in 1909-13. ^{1/} Thus the role of imports of steel and steel products in relation to domestic steel production, if the value effect is taken into account, may have been as much as twice as great in the period of the First Five Year Plan as in 1909-13. Thus developments concerning imports of steel and steel products tend to explain in part the disparity between the steel index and the index of value of total industrial output during the First Five Year Plan. Steel imports during the Second Five Year Plan rapidly fell to negligible proportions. ^{2/}

The situation is different, however, with regard to crude oil and derivatives, and coal. The percentages of quantities exported to quantities produced were as follows:

^{1/} Computed from S. N. Bakulin and D. D. Mishustin, Vneshnyaya trgovlya SSSR za 20 let, 1918-37: Statisticheski spravochnik (Twenty Years of Foreign Trade of the USSR: A Statistical Handbook), Moscow, 1939, pp. 75, 80, 81. Since the determination of the proper ratio between the Russian foreign trade ruble and the 1926-27 ruble is a very complex problem, the indications given in the text must suffice here.

^{2/} It is quite possible that inexperience and inefficiency of their purchasing organizations in the years of the First Five Year Plan caused the Russians to overpay for their imports. It is furthermore possible that such overpayments were somewhat larger for highly fabricated industrial goods (machinery) than for less highly processed ferrous metals. But it is not believed that the difference could have been significant.

	<u>Crude Oil and Derivatives</u>			<u>Coal (Bituminous and Anthracite)</u>		
	<u>(1)</u>	<u>(2)</u>	<u>(3)</u>	<u>(1)</u>	<u>(2)</u>	<u>(3)</u>
	<u>Production</u>	<u>Exports</u>	<u>(2) as % of (1)</u>	<u>Production</u>	<u>Exports</u>	<u>(2) as % of (1)</u>
(Quantity data in thousands of long tons)						
Annual Average 1909/13	9,143	845	9.25	23,651	117	.50
1929	14,248	3,797	26.25	41,140	1,317	3.20
1930	18,159	4,638	25.54	48,046	1,828	3.80
1931	22,038	5,142	23.33	55,856	1,648	2.95
1932	21,074	6,010	28.52	63,643	1,768	2.78
1933	21,149	4,817	22.77	75,002	1,788	2.38
1934	23,836	4,247	17.82	92,457	2,132	2.31
1935	24,842	3,315	13.34	107,279	2,149	2.00
1936	26,953	2,624	9.74	121,726	1,775	.15
1937	27,382	1,899	6.93	120,644	1,254	1.04

The preceding figures show that the share of coal exports in total coal production increased in the years of the First Five Year Plan much more than the respective figures for oil. Yet the coal percentages were still so low absolutely that the development is of no great consequence. It is different in the case of oil. During the First Five Year Plan, a little more than one-fourth of production was exported, as compared with less than one-tenth in 1909-13. There is no doubt that this increases significantly the disparity between the supply of crude oil to the domestic economy and the index of gross value of output. To what extent the increased disparity was compensated for by developments mentioned under (4) below is a moot question.

It should be noted, finally, that, for the period of the Second Five Year Plan, the previous figures indicate that the ratio of exports of both coal and oil to domestic production declined very considerably and foreign trade in these commodities ceased to be of major importance in connection with the problem of the disparity between the indexes. Even in the case of oil, the percentage of exports to domestic output was lower in 1937 than in 1909-13, for the first time since 1929.

4. Better Utilization of Raw Materials. Considerable progress in better utilization of raw materials was achieved over the period under consideration. Better utilization of steel scrap is an important factor influencing the relationship between the production of steel and the value of machinery output. Various improvements in the use of fuel contribute to an explanation of disparities in the rates of growth of the relevant indexes. Employment of large generating units, higher steam pressures and superheat temperatures (rendered possible by improvements in the quality of boiler steel) increased recapture of waste heat, use of pulverized coal installations, improved assortment of coal as well as reduction of its humidity and ash contents--all these have played a considerable role in Russia and may

be presumed to have resulted in a sizeable saving of fuel. 1/ According to Russian statistics, between 1930 and 1938 the quantity of fuel employed for production of one kilowatt hour was reduced from .860 kilograms to .615 kilograms, a decrease of 28 per cent. 2/ It has been stated that fuel savings by electrical power stations and by ferrous metals plants amounted in 1933-37, on the basis of consumption norms which had been in effect in 1932, to 27.5 million tons of conventional fuel units, an amount which almost equaled total coal production in 1913. 3/ If this computation is correct, it goes a long way toward explaining the disparity in the indexes.

Still another factor may be mentioned. It is known that, until the practice was discontinued in 1936, heavy industry in Russia, including machinery-producing enterprises, was generously subsidized. These subsidies resulted in a relatively lower level of prices for the products concerned. It will be noted that it is many of these subsidized products for which no prices were in existence in 1926-27 and which therefore were evaluated at current prices. In other words, subsidies tended to limit to some degree the overstatement of the index.

In summary, it may be said that while the index undoubtedly has some inflationary bias, the significance of this bias should not itself be unduly inflated. There are a number of factors which tend to explain a part of the disparity between the development of the gross value of industrial output and of the quantities of output of basic industrial materials. If the writer may venture a guess, he would suggest that, on the whole, the average annual rates of growth of the First Five Year Plan are artificially increased by the inflationary bias by approximately 2 per cent. Under no circumstances would it seem permissible to regard the development of some physical index, e.g., that of coal output, as a true measurement of the growth of total industrial output. Taking into account the adjustment of the all-industry series by about two per cent which was made earlier, 4/

1/ Cf., e.g., A. Probst, "Problemy toplivnogo khozyaystva v poslevoyenny period" (Problems of the Fuel Economy in the Post-war Period); Planovoye Khozyaystvo (Planned Economy), 1945:6; also, Za ekonomiyu topliva, 1944: 8-9; p. 15; 1946: 1; pp. 15-16; 1946: 4; p. 1 et seq.

2/ Sotsialisticheskoye stroitel'stvo, Statisticheski sbornik, (Socialist Construction, Statistical Handbook), 1933-38, Moscow-Leningrad, 1939, p. 46; *ibid.*, Moscow, 1935, p. XXXI. These figures are secured by converting weights into thermal units (7,000 calory units = 1 kilogram of conventional fuel) by use of appropriate coefficients. In the case of Donbas coal, for instance, 1 kg. = .98 thermal unit. Cf. A. I. Rotshtein, Problemy promyshlennoy statistiki SSSR (Problems of Industrial Statistics of the USSR), Vol. II, Leningrad, 1938, p. 70.

3/ Gosplan SSSR Itogi vypolneniya vtorogo pyatiletnego plana razvitiya narodnogo khozyaystva SSSR (Results of Fulfillment of the Second Five Year Plan for the Development of the National Economy of the USSR), Moscow, 1939, p. 29.

4/ Cf. p. 26.

the total adjustment in this series may reduce the 1932 index figure from 265.9 to 224.0 and the 1938 figure from 653.8 to 552.0. ^{1/} The index of large-scale industry, to which the adjustment mentioned earlier does not apply, would be reduced in 1932 from 359.12 to 330.98 and in 1938 from 908.8 to 837.6. The average annual rate of growth between 1928 and 1938 would be reduced by about two per cent and the large-scale industry rate by about one per cent. Needless to say, these computations are designed to do no more than indicate the personal opinion of the writer.

The Fourth Five Year Plan (1946-1950)

As indicated in Appendix I, Voznesenski's speech on the Fourth Five Year Plan revealed both the planned figure for industrial output in 1950 and the actual output for 1945. ^{2/} The latter amounts to 127 billion 1926/27 rubles and is 9.17 per cent below the 1940 figure. Apart from possible resurgence of the inflationary bias, ^{3/} it appears also that the slackening of controls during the war led to a tendency on the part of industrial enterprises to overstate their output. Charges to this effect were recently made by the U.S.S.R. Ministry of State Control and given prominent place in the Russian press. At least in one case, it was alleged that the 1926/27 prices were increased in order to raise the output figures. ^{4/} Thus the

^{1/} The index of the Konjunktur Institut to which reference was previously made, compares as follows:

	<u>All Industry</u>	<u>Konjunktur Institut</u>	<u>All Industry Adjusted as in the Text</u>
1913	100	100	100
1932	265.9	179.4	224.
1938	653.8	417.2	552.

It will be noted that the Institute's figure for 1938 is below both coal and steel index figures for that year. While the adjustment made in the text is very approximate, it seems that in view of the development of output of basic industrial materials in conjunction with the pertinent factors mentioned in the text, the figures of the Institute tend to understate the actual growth (cf. German Institute for Business Research--Institut fuer Konjunktur Forschung Weekly Report, Vol. 13: 11/12, pp. 41-46.

^{2/} The figures refer to the all-industry series.

^{3/} It may well be that the war-time inflation in conjunction with the appearance of a number of new products (new types of planes, tanks, etc.) may have again caused an inflation of the index. It is not proposed to analyze this inflation, but it should be noted that this bias will persist in the Russian index to the extent that output of war materials continues to play an important role in industrial output.

^{4/} Cf. Department of War, Foreign Broadcast Intelligence Service, Daily Report, European Section, No. 128, 1946, June 28, 1946; also, Pravda, July 31, 1946, p. 1.

actual 1945 output may well be somewhat below the figure given. Even if allowance is made for some exaggeration in production data and for Russian territorial accretions, it is clear that, despite the destruction caused by invasion, reduction of output on a disastrous scale was avoided. This fact testifies to the degree to which increased industrial output in unoccupied territories was able to offset the loss of output in invaded areas.

Nevertheless, in order to appraise the rate of industrial growth proposed for the next five years, consideration must be given to the conditions under which wartime production was maintained. While it is recognized that some technological progress was achieved during the war, and most notably, the assembly line was for the first time introduced on a considerable scale, it should be clear that the level of the 1945 output was doubtless achieved not only at the expense of a tremendous effort on the part of industrial labor, but also at the expense of orderly maintenance of fixed capital. To continue and to expand production will require capital investments which will be disproportionately greater for each increase in the rate of growth than was the case in the past decade. Moreover, even the Russian dictatorship cannot fully suppress the natural psychological reactions on the part of labor after five years of sustained and terrible strain. The average annual percentage rate of growth proposed for the period of the Fourth Five Year Plan apparently takes cognizance of this situation. Total industrial output in 1950 is scheduled to amount to 205 billion 1926/27 rubles. This is, of course, a very great absolute increase. The 1950 production, if actually attained, would exceed the 1913 output by 12.6 times according to the official index. ^{1/} Yet this increase implies an average

^{1/} It may be noted that the disparity between production of basic industrial materials (with the exception of coal output) and total industrial output is expected to increase rather than decrease during the Fourth Five Year Plan as may be seen from the following table:

	Index (1940 = 100)				
	<u>Crude Oil</u>	<u>Coal</u>	<u>Pig Iron</u>	<u>Steel</u>	<u>All Industry</u>
1938	98.18	90.52	97.66	94.24	76.60
1940	100.00	100.00	100.00	100.00	100.00
1950 (plan)	116.95	167.14	128.26	130.55	148.00

The decision to attain a strong rise in coal output may be the result of the difficult situation with regard to oil. The great number of factors involved in an appraisal of the significance of the disparity in conjunction with a complete lack of information on the prospective development of these factors make it difficult to form a considered opinion. The future will show whether or not the supposition of the London Economist (July 6, 1946, p. 7)--that this lag of output of basic materials behind that of total production may become the major stumbling block of the Fourth Five Year Plan--is correct. It should be noted, however, that our knowledge is at present very limited. In particular, we know very little of the Russian plans for the development of foreign trade in the period under consideration. A conclusion that the growth of the disparity indicates that the Russian calculations provide for a substantial volume of imports from abroad is too uncertain to be ventured.

annual rate of growth between 1945 and 1950 of only about 10 per cent a year. Even though the decline in rate of growth may be exaggerated, it is certainly considerable if compared with the Five Year Plans of the 'thirties. Is this drop to be attributed solely to the causes just described or are there some general forces at work which are tending to slow down the rate of Russia's industrial growth? Will the pattern of Russian industrialization, viewed over a long period, be similar to that of other and older industrial countries? A few remarks on these questions will be made in the following paragraphs.

Conclusion

The main conclusion which can be drawn from the foregoing is that the rates of industrial growth in Russia in the period of the Five Year Plans greatly exceeded those of the pre-1914 periods. If all adjustments are considered, the rate of growth of industrial output in Russia during the 'thirties may still have been almost double the rate of growth of the 1890's.

This result was achieved (a) by removing certain important obstacles which had obstructed the rate of growth in pre-1914 Russia; (b) by establishing a full-employment economy; and (c) by concentrating all efforts of the government on industrialization, and accepting relative and, at times, absolute sacrifices in consumption.

But will these high rates of industrial growth continue in the future unabated? Past Russian experience throws little light on this question. The all-industry series indicated the following rates of growth during the sub-periods of the Five Year Plans; to these may be added the rate of growth of the present Five Year Plan:

Annual Average Percentage Rate of Industrial Growth 1/

First Five Year Plan	20.35
Second Five Year Plan	17.24
Third Five Year Plan (3 years)	13.12
Fourth Five Year Plan	10.00

While the preceding series do, indeed, show a clear falling tendency, the data must be interpreted with caution. The actual rate of growth during the First Five Year Plan might prove, if the necessary adjustments are made, to be lower rather than higher than the rate of the following period. The decline in the rate from the Second to the Third Five Year Plan is striking in view of the territorial acquisitions made by Russia after September 1939. Yet the later period was also one of far-reaching conversion to a war economy and as likely as not the rate of growth was affected thereby. Finally the anticipated lower rate of growth during the

1/ Concerning the figure on the rate of growth during 1937-1940 (Third Five Year Plan), cf. footnote on page 19.

present Five Year Plan must be to some extent attributable to the aftermath of the war. It may be that past experience is too short to serve as an indicator of future trends. Other indications must be sought; Stalin's Election Speech, delivered in February 1946, may provide some hints. Stalin discussed plans for "longer periods," the longer period being defined as "three Five Year Plans or more," and listed the following long-term goals for crude oil, coal, pig iron, and steel production (in millions of metric tons): ^{1/}

Crude Oil	60	Pig Iron	50
Coal	500	Steel	60

Attainment of these figures would mean that in, say, 1960-1965 Russian output of these commodities would compare with that of the United States in 1929 as follows:

Planned 1960-1965 Output in Russia
as Percentage of the 1929 Output of the United States ^{2/}

Crude Oil	43.6	Pig Iron	117.8
Coal	90.6	Steel	104.7

In other words, apart from crude oil, Russia would, some 15-20 years from now, reach the levels of output which existed in this country in 1929.

It may be worthwhile to compare the rates of growth suggested by these figures with the rates of growth for these commodities in the period of the pre-1941 Plans. It is assumed that the levels of output as listed above will be attained in the third year of the Seventh Five Year Plan, that is to say in 1963. The rates of the pre-1941 period are then compared with those to be attained between 1951 and 1963, assuming also that the aims of the present Five Year Plan materialize. The result is as follows:

^{1/} Cf. New York Times, February 10, 1946, p. 30.

^{2/} Sources: Annual Statistical Report of the American Iron and Steel Institute for 1939, New York, 1940, Pig Iron, p. 8, Steel, p. 15; Statistical Abstract of the U.S. 1942, Coal, p. 866; League of Nations, International Statistical Yearbook 1930/31, Crude Petroleum, p. 126. The absolute figures compare as follows (converted into millions of long tons):

	<u>United States, 1929</u>	<u>Russia, 1960-65</u>
Crude Oil	135.7	59.1
Coal	543.6	492.1
Pig Iron	41.8	49.2
Steel	56.4	59.1

Annual Average Percentage Rates of Growth 1/

	<u>Crude Oil</u>	<u>Coal</u>	<u>Pig Iron</u>	<u>Steel</u>	<u>All Industry</u>
1928-1939 (12 years)	8.60	12.36	14.4	14.4	17.94
1951-1963 (12 years)	4.60	5.95	8.17	7.4	?

The rates of growth required for reaching the proposed levels of production are little more than half as great as the rates attained in the earlier period. Does this indicate the value rate of growth for total industrial output will decline in proportion? As shown before, the ratio between the value of total industrial output and the physical output of basic industrial raw materials is the result of a number of factors. The presumption is that the ratio tends to grow with progress of industrialization. Nevertheless it is difficult not to answer the foregoing question in the affirmative. It seems quite improbable that industrial output can increase so much as to make the rates of growth of the period after 1950 equal the pre-1941 rates. In fact, it is very unlikely, in view of the rates of growth proposed for basic industrial materials, that the annual average rate of growth in 1951-63 will be in excess of 10 per cent. Taking the whole period 1945-1963 into account, maintenance of even a 10 per cent rate seems problematic. Although it is not proposed to analyze the problem, the order of magnitude involved may be illustrated as follows. If we assume an annual increase in output by 10 per cent from 1945 to 1963, the value of output in 1963 should be about 150 per cent higher than the 1937 value of output in the United States or about one-third larger than our output in 1945. ^{2/} ^{3/} But the production of steel in Russia would be only 17 per cent higher than the 1937 output and 17 per cent smaller than the 1945 output in the United States. ^{4/} Even if we assume that the factors making for an increase in the spread between physical output of basic industrial materials and the value of total industrial production would continue to be at work, the discrepancy is very large indeed.

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- ^{1/} All rates are computed on a compound basis as before. The all-industry index is unadjusted.
- ^{2/} In both cases, output refers to that of manufacturing and mining.
- ^{3/} Projected per capita computations are naturally extremely uncertain. On the basis of the Russian 1945 census, which showed a population of about 193 million, and the rate of population growth as computed by Frank Lorimer (League of Nations, The Population of the Soviet Union, History and Prospects, Geneva, 1946, p. 256), the relationship between the 1963 industrial output in Russia and the 1945 industrial output in the United States, as given in the text, would mean that on a per capita basis the Russian output in 1963 would be about 17 per cent lower than the United States output in 1945.
- ^{4/} American Iron and Steel Institute, Release, June 11, 1946.

A sustained rate of growth of 10 per cent in 1951-1963 would, of course, be a relatively high one, although much lower than the rates of the 'thirties. 1/ 2/ The absolute increase in output over the period, under the assumptions made, would greatly exceed that of the years 1928-1939. 3/ Under conditions of large absolute increases, maintenance of the previous rate of growth tends to become difficult. 4/ The role of basic industrial materials as a limiting factor is one of the forces which are likely to reduce the future rate of growth of industrial output in Russia. 5/

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- 1/ Presumably the development of atomic energy may change the picture radically and allow for higher rates of industrial growth than would otherwise be possible. The writer's complete ignorance of the subject effectively bars him from discussing this aspect of the problem.
 - 2/ The high rates of growth which Russia attained in the inter-war years and the probability that relatively high rates of industrial growth may continue for quite a long period throws some light on the role which foreign capital could play in the process of industrialization in Russia. An approximate computation shows that in 1890-1899 Russia received in the form of loans from abroad about 5.5 per cent of the gross value of Russia's industrial output for the decade. To attain the same percentage in 1945-1963 amounts in the order of 75 billion of 1937 dollars, or more than 100 billion current dollars would have to be lent to Russia by foreign countries. This is obviously impracticable. It is fair to say that whatever the foreign economic policies of the Soviet Government, foreign capital cannot play the same role in Russia's industrialization that it did half a century ago. It appears that such foreign loans as Russia may need, will be required primarily for the reconstruction period. Even in this period the function of the loans would be less to increase the aggregate amount of capital ~~than~~ to remove specific bottlenecks in Russian industry. Oil, and iron and steel, in raw form or in finished products, may represent the most important of these bottlenecks, particularly in the years 1946-1950. If the discussion in the text is correct, it is quite possible that for, say, the next 15 years, the Russians will desire to import appreciable amounts of steel and steel products, such imports to be financed partly by exports of raw materials and gold and partly by loans. Repayment of the loans might be financed through proceeds from growing exports of industrial products. It may well be that the importance attributed by the Russians to such foreign loans depends upon their usefulness in bridging the gap between the growth of steel output and the desired expansion of industrial production. If this is the case, the value placed on additional increments of loans from abroad may decrease rapidly.
 - 3/ For example, between 1927 and 1939 steel output increased by 14.8 millions of long tons; the planned increase 1950 to 1963 is 34.6 million long tons.
 - 4/ It must be noted in this connection, however, that the absolute increases of the period 1928-1939 were much greater than those of the 'nineties, and yet the rate of growth was much higher in 1928-1939 than in 1890-1899.
 - 5/ Cf. Arthur F. Burns, Production Trends in the United States, National Bureau of Economic Research, New York, 1934, pp. 120 et seq.

There are, moreover, other forces working in the same direction. In the past, as a young industrial country, Russia enjoyed the substantial advantage of being late. The results of centuries of technological progress in other countries could be used in Russia from the start, a fact that undoubtedly tended to accelerate industrial development. It may be assumed that the importance of this factor is going to diminish in the years to come. This is likely to affect the future rate of industrial development.

In a rather long run, another development may prove equally important. A powerful force, among others, slowing down the rate of industrialization in advanced countries has been the growth of tertiary production, which has attracted manpower and capital which otherwise would have been employed in secondary production. The growth of tertiary production is directly geared to levels of consumption. Will this factor assert itself within the different climate of the Russian planned economy? It would seem that for the foreseeable future the rate of industrial growth in Russia will be little affected thereby. This may well be true even if the international situation should develop favorably and the rumors of war should gradually die away. Before tertiary production will assume significant proportions in Russia, a change in the structure of industrial production will have to take place. Increasing emphasis will have to be given to the production of consumers' goods, placing heavy industry partly in the service of light industry and partly directly in the service of the consumer. This can occur with rates of industrial growth still relatively high. It may also be that a prerequisite for the growth of tertiary production will be a considerable change in the political system of the country. Before the heroic task of high speed industrialization gives way to the more prosaic business of increasing the welfare of the people, the "age of heroes" in Russia must have worked its fill, and significant participation of the people in government must replace what Bagehot would have called the "stern, incessant, and implacable rule" of few.

No one can predict whether this development will take place in any foreseeable future, if at all. But unless it should begin and the momentous economic transformation it entails be allowed to proceed to a considerable length, rates of industrial growth in Russia may be expected to remain at a higher level than would be indicated by the history of industrialization in other countries.

APPENDIX I

Description of the Indexes

I. Indexes of Industrial Production

A) The Period 1885-1913

Data on industrial output prior to the middle of the 'eighties are quite unreliable. From 1885 on, a continuous and increasingly reliable index series is obtainable. This index was published in 1926 in the Economic Bulletin of the Business Cycle Research Institute under the direction of Professor N. D. Kondrat'ev.^{1/}

Production of the following products was included in the index: (1) ores, (2) coal, (3) oil, (4) ferrous metals, (5) cotton textiles, (6) sugar, (7) tobacco, (8) alcohol, (9) matches, and (10) yeast. Information on items (6) to (10) was available because these products were subject to excise duties. The index was constructed on the basis of weighted geometric averages of the relative changes in the physical volume of production of the industries listed. Weights were based on data concerning the number of workers and the horsepower employed. For industries (7) to (10), only the number of workers was available; the number of workers in these four industries amounted to 7.2 per cent of the total number of workers included in the index. The weights referred to the year 1900, and were as follows:

<u>Mining</u>		
Coal	7.7	
Oil	6.6	
Iron ore	2.4	
Manganese ore	.2	
Copper	.5	
Zinc	.1	
Gold	3.6	
Salt	1.0	
Total mining		22.1
 <u>Manufacturing Industry</u>		
Pig iron	8.6	
Iron and steel	23.1	
Cotton yarn	12.0	
Raw cotton tissues	18.2	
Sugar	8.7	
Tobacco	3.1	
Matches	1.4	
Alcohol	2.6	
Yeast	.2	
Total manufacturing		77.9
Total		100.0

^{1/} Ekonomicheski bulletin' Kon'yuktornogo Instituta (Moscow, February 1926), Vol. 5:2, pp. 12-20.

The index covered industries with a total number of 1,269,500 workers in 1900, or 53 per cent of the number of industrial workers in Russia in that year. It should be noted that in particular the index does not include machinery production. Moreover, it relates to the whole territory of pre-1914 Russia, that is to say, includes also the development of the textile center in Russian Poland and of coal extraction in the same region. No attempt has been made here to adjust the index to the territory of the U.S.S.R. Accordingly, the precarious assumption had to be made that the rate of industrial development in territories lost after World War I was the same as in the rest of the country. Nevertheless, despite its obvious inadequacies, the index is undoubtedly the best statistical series of industrial production in pre-war Russia. It should be remembered that it was prepared under the supervision of one of the most outstanding Russian economists and statisticians.^{1/} For the purposes of the present paper, the base year has been changed from 1900 to 1913.

B) The Period 1913-1940

Indexes of industrial production after 1913, as published by the Soviet Government, refer to the values of gross industrial output. Gross industrial output is in general computed according to what is called in Russia the "Factory Method," which excludes the value of semi-manufactured goods to the extent that they were used within the same industrial enterprise in which produced and takes into account changes in unfinished production. If in a given period A is the value of finished goods, B the value of semi-manufactured goods (sold or retained for further fabrication), C the value of semi-manufactured goods further fabricated by the enterprise, U the unfinished production left over from the preceding period, and R the unfinished production of the given period, then the gross value of output for the enterprise (V) in the given period is

$$V = A + (B - C) + (R - U).$$

The gross value of the national output is obtained by the process of summation of outputs of individual enterprises. Obviously, the aggregate absolute values would be smaller if the preceding formula were applied to larger industrial units (trusts) rather than to individual enterprises. On the other hand, every split in production as a result of which the process of semi-manufacturing is carried out by an independent enterprise tends to increase gross values of output.^{2/} Thus, changes in industrial organization are likely to affect the index.

The gross values of output are expressed in constant prices. There are two main groups of such indexes: (1) indexes based on values expressed in 1912 prices, and (2) indexes based on values expressed in

^{1/} The index has been reprinted several times in non-Russian publications, most recently in the League of Nations study Industrialization and Foreign Trade, 1945, pp. 137 et seq. For the purposes of that study, however, mining has been excluded.

^{2/} A. I. Rotshtein, Problemy promyshlennoy statistiki SSSR, Leningrad, 1936, Vol. I, pp. 129 et seq.

1926-27 prices. The former was in use from the Revolution until 1928, when the latter was introduced. Differences between the 1912 and the 1926-27 price systems were considerable, so that the two index series diverge a good deal; indexes based on 1912 prices were employed as sparingly as possible.

In this paper, two index series have been used: (1) index of gross value of output of large-scale industry, and (2) index of gross value of output of all industry. These indexes include mining, but exclude construction.

(1) Large-scale industry. According to the Russian concept, an industrial enterprise, in order to be classified as a large-scale enterprise, must have at least 16 workers and a motor, or 30 workers without a motor. There are two sets of figures referring to large-scale industry, one including and the other excluding the lumber industry and fisheries. The former group is also frequently referred to as "Census Industry." The Russian statistics provide an index of the output of Census Industry, at 1926-27 prices, for 1913 and for all years between 1920 and 1933. No figures on this base are available for the years from 1914 to 1919. In the present paper, this gap has been filled by using the corresponding data from the index based on 1912 prices. There is a discrepancy between the two indexes. In 1920 the index based on 1912 prices stood at 12.80 while the index based on 1926-27 prices stood at 13.75 (1913 = 100). The index figures from 1933 on include the lumber industry and fisheries. Inclusion of fisheries in an industrial index is curious; such a classification would make the Eskimos appear more industrialized than Great Britain. Nevertheless, this series has replaced the Census Industry series and was used by Stalin in his speech in 1939 on the Third Five Year Plan.^{1/} The existence of the two series has in the past occasionally caused confusion.

A slight discrepancy between the Census Industry index and the Large Industry series, including the lumber industry and fisheries, was apparent in 1933; the former stood at 391, while the latter stood at 380.5 (1913 = 100). In this paper, the figure of 380.5 has been used for that year. On the whole, the Large Industry series shows a substantial amount of continuity.

(2) All industry. This series in 1926-27 prices includes the Large Industry series as just described plus small industry. It should be noted, however, that privately owned small industry is not included. In the early years of the NEP period as much as 87.3 per cent of small industry was in private hands. By 1928-29 this ratio had fallen to 43.8 per cent, and was rapidly reduced to negligible proportions in the following years. A good deal of formerly private small industry was taken over by the Government or by the cooperatives.

^{1/} Stalin, Voprosy Leninizma (Problems of Leninism), Eleventh Edition, Moscow, 1945, pp. 576 et seq.

The series of gross value of output of all industry in 1926-27 prices appear to be available only for the years 1913, 1928 and 1929, 1931 to 1933, and 1935 to 1940. The missing years 1930 and 1934 have been computed as geometric averages of the immediately preceding year and the immediately following one, and may in both cases be somewhat overstated. For the years from 1914 to 1927 the old series based on 1912 prices was used. After 1920-21 this series referred to harvest years; the data were converted to a calendar year basis by applying the rate of change between the last year for which calendar data were available and the end of the next eighteen months period to the twelve months period and repeating the performance throughout the series. The index based on 1912 prices stood in 1928 at 124.6 while the index based on 1926-27 prices stood at 110.8 (1913 = 100). The figure from the latter index was used for 1928. This considerable discrepancy must be attributed to the non-inclusion of privately owned small industry in the series in 1926-27 prices as well as to possible differences between the price systems of 1912 and 1926-27.

While in the inter-war period the attention of the Russians was largely fixed on the index of gross value of output of the large-scale industry, no data for this series are given in the Fourth Five Year Plan, which refers exclusively to the "all industries" series. There the plan figure for 1950 is given together with an oblique indication by Voznosenski of the volume of industrial output in 1945.^{1/}

Because of the territorial changes that took place after September 1939, the index figures after that year are not fully comparable with the rest of the series. Sources and data for gross value indexes are given in Appendix II.

II. Commodity Indexes

It has been assumed that the pre-1914 rate of growth in territories lost by Russia after World War I was the same as in the rest of the country. The absolute figures in long tons for the years 1885-1913 have been reduced by the following percentages:

Pig iron	9.0%
Iron and steel	9.4%
Coal	18.1%
Oil	-

These percentages of total 1913 production of the respective commodities were produced by regions which were lost after the war.

Sources and data for commodity indexes are given in Appendix IV.

^{1/} "The volume of gross output of all industry of the U.S.S.R. is set for 1950 at 205 billion rubles (at 1926-27 prices) or an increase of 48 per cent over the pre-war level.... In order to assure such a substantial rise in production.... it will be necessary to achieve an annual absolute increase in production by 15.6 billion rubles." Cf. speech of N.A. Voznesenski at the First Session of the Supreme Soviet of the U.S.S.R., Pravda, March 16, 1946, p. 2. Accordingly, 205 - (5 x 15.6) = 127 billion rubles, gross value of output of all industry in 1945.

APPENDIX II

Gross Value of Russian Output
(In millions of rubles)

	Large-Scale Industry		All Industry
	Excluding lumber and fisheries	Including lumber and fisheries	
1913	6,391 ^{1/}	--	8,431 ^{1/}
1913	10,251 ^{2/}	--	16,249 ^{2/}
1914	6,429 ^{3/}	--	8,429 ^{3/}
1915	7,056	--	8,656
1916	7,420	--	9,220
1917	4,780	--	6,380
1918	2,160	--	3,660
1919	955	--	1,955
1920	818 ^{4/}	--	1,718
1921	1,410	--	2,148
1922	2,004	--	2,759
1923	2,619	--	3,435
1924	4,005	--	4,565
1925	4,660	--	6,066
1926	7,739	--	7,483
1927	11,083	--	8,874
1928	12,679	16,891 ^{6/}	18,000 ^{8/}
1929	19,923	21,243	25,725
1930	25,837	27,759	31,876
1931	32,263	34,219	38,600
1932	36,813	38,831	43,218
1933	39,005 ^{5/}	42,030	45,724
1934	46,847	50,477	55,303
1935	57,672	62,137	66,885
1936	75,109	80,929	85,921
1937	83,689	90,166	95,697
1938	93,161	100,375	106,244
1939	--	--	123,900
1940	--	--	138,500
1942 (Plan)	--	--	184,000
1945	--	--	127,000
1950 (Plan)	--	--	205,000

^{1/} In 1912 rubles.

^{2/} In 1926/27 rubles.

^{3/} Figures for 1914-1919 in 1912 rubles.

^{4/} Figures for 1920 and the following years in 1926/27 rubles.

^{5/} Figures for 1933 and the following years are computed on the assumption of a parallel development in 1933-1938 of this series and the series of output of large-scale industry including lumber and fisheries.

^{6/} All figures in 1926/27 rubles.

^{7/} Figures from 1914 to 1927 are in 1912 rubles. Original fiscal year data converted to calendar year (cf. Appendix I).

^{8/} Figures for 1928-1950 in 1926/27 rubles. From 1928 on, the "all industry" figures appear to include data on lumber and fisheries.

Sources for the Preceding Table and for Table on Page 4 of Text:

1885-1913

Ekonomicheski Bulletin' Kon'yunktornogo Instituta, Vol. 5:2
Moscow, February 1926, p. 18. The base year has been
changed from 1900 to 1913.

1913-1950

Large-Scale Industry:

For 1914-1919: N.S. Prokopovicz, Russlands Volkswirtschaft unter
den Soviets, Zurich-New York, 1944, pp. 176 and 181. (1912 prices.)

For 1920-1932: Sotsialisticheskoye stroitel'stvo SSSR, Statisticheski
yehgodnik (Socialist Construction, Statistical Yearbook), Moscow,
1935, p. 3.

For 1933-1938: Sotsialisticheskoye stroitel'stvo SSSR, Statisticheski
sbornik (Socialist Construction, Statistical Handbook), Moscow-
Leningrad, 1939, p. 34.

For absolute figures on output, including lumber and fisheries,
1928-1932: Sotsialisticheskoye Stroitel'stvo SSSR, op. cit., p. 3;
for 1933-1938: Stalin, Voprosy Leninizma, 11th Edition, Moscow,
1945, p. 576.

All Industry:

For 1914-1927, 1939, and 1942: S.N. Prokopovicz, op. cit. pp. 176,
181, 195.

For 1928, 1931, and 1932: Sotsialisticheskoye stroitel'stvo SSSR,
Sotsialisticheski yehgodnik (Socialist Construction, Statistical
Yearbook), Moscow, 1934, p. 36.

For 1929, 1933, and 1938: Sotsialisticheskoye stroitel'stvo SSSR,
Statisticheski sbornik (Socialist Construction, Statistical Hand-
book), Moscow-Leningrad, 1938, p. 36.

For 1935, 1936, and 1937: League of Nations, Statistical Yearbook
1940-41, p. 159. Base year converted from 1929 to 1913.

For 1930 and 1934: Geometric averages of the preceding and the
following years.

For 1940 and 1950: Zakon o pyatiletnem plane vosstanovleniya i
razvitiya narodnogo khozyaystva SSSR na 1946-1950 gody (Law con-
cerning the Five Year Plan of Reconstruction and Development of
the National Economy of the U.S.S.R. for the years 1946-1950),
Pravda, March 21, 1946, p. 3.

For 1945: Speech of the President of Gosplan of the U.S.S.R.,
N.A. Voznesenski, Pravda, March 16, 1946, p. 2.

APPENDIX III

Growth of Industrial Output
in Five Countries
(1913 = 100)

	<u>United States</u>	<u>Germany</u>	<u>United Kingdom</u>	<u>Sweden</u>	<u>Japan</u>
1885	23.8	29.2	55.8	19.5	-
1886	28.9	29.6	54.5	20.2	-
1887	30.5	32.0	57.5	21.3	-
1888	31.0	33.0	62.2	21.0	-
1889	33.3	35.7	66.7	24.1	-
1890	36.1	37.3	65.8	26.3	-
1891	37.0	38.2	65.9	27.0	-
1892	40.0	36.8	62.6	29.5	-
1893	35.2	39.3	62.1	32.2	-
1894	34.2	42.0	64.8	36.6	-
1895	40.9	44.9	67.4	40.8	-
1896	37.3	50.3	71.4	50.2	-
1897	40.4	53.1	71.4	55.4	-
1898	45.9	57.7	74.7	60.0	-
1899	50.5	60.1	77.4	60.1	-
1900	51.5	60.9	76.7	63.5	-
1901	58.1	61.7	75.7	64.2	-
1902	65.2	66.0	76.6	66.7	-
1903	66.7	67.7	76.4	70.7	-
1904	62.6	72.9	75.7	73.9	-
1905	74.8	75.5	81.9	74.8	61.0
1906	80.3	79.9	84.4	81.0	56.2
1907	81.4	79.5	85.1	83.6	65.8
1908	67.2	76.6	79.7	84.6	61.8
1909	79.8	80.9	81.2	80.5	64.2
1910	84.8	86.9	85.0	90.4	73.8
1911	81.4	94.5	88.2	90.5	84.8
1912	93.4	97.7	91.0	93.3	94.6
1913	100.0	100.0	100.0	100.0	100.0
1920	122.2	59.0	92.6	97.2	176.0
1921	98.0	74.7	55.1	74.7	167.1
1922	125.8	81.8	73.5	87.2	197.9
1923	141.4	55.4	79.1	96.8	206.4
1924	133.2	81.8	87.8	109.9	223.3
1925	148.0	94.9	86.3	112.7	221.8
1926	156.1	90.9	78.8	123.5	264.9
1927	154.5	122.1	96.0	126.8	270.0
1928	162.8	118.3	95.1	136.0	300.2
1929	180.8	117.3	100.3	150.8	324.0

APPENDIX III (Continued)

	<u>United States</u>	<u>Germany</u>	<u>United Kingdom</u>	<u>Sweden</u>	<u>Japan</u>
1930	148.0	101.6	91.3	154.1	204.9
1931	121.6	85.1	82.4	148.3	288.1
1932	93.7	70.2	82.5	140.5	309.1
1933	111.8	79.4	68.3	146.7	360.7
1934	121.6	101.8	100.2	175.7	413.5
1935	140.3	116.7	107.9	193.6	457.8
1936	171.0	127.5	119.1	208.1	483.9
1937	185.8	138.1	127.8	228.8	551.0
1938	143.0	149.3	117.6	232.2	552.0

Sources: League of Nations, Industrialization and Foreign Trade, 1945, pp. 132, 134.

For Russian index numbers as used for the chart following page 25, of table on page 4 and Appendix II. The Russian curves include mining. All other indexes exclude mining.

APPENDIX IV

Output of Selected Industrial Raw Materials in Russia
(Quantities and Quantity Indexes)
1913 = 100
(Long tons in thousands)

Year	Crude Oil		Coal		Pig Iron		Iron and Steel		Steel	
	Long tons	Index	Long tons	Index	Long tons	Index	Long tons	Index	Long tons	Index
1885	1,854.0	20.54	3,441.8	11.85	452.8	10.90	413.3	11.47	-	-
1886	1,983.0	21.96	3,690.0	12.70	464.1	11.17	441.6	12.26	-	-
1887	2,498.9	27.68	3,655.7	12.58	535.1	12.88	448.5	12.45	-	-
1888	2,934.2	32.68	4,181.4	14.39	581.4	14.00	409.5	11.37	-	-
1889	3,095.4	34.46	5,010.8	17.24	652.0	15.70	519.3	14.41	-	-
1890	3,643.5	40.36	4,849.6	16.69	820.4	19.75	583.7	16.20	-	-
1891	4,433.5	49.11	5,025.3	17.29	882.3	21.24	656.0	18.21	-	-
1892	4,610.9	51.07	5,601.1	19.28	941.5	22.67	758.3	21.05	-	-
1893	5,239.6	58.04	6,138.6	21.13	1,011.0	24.34	840.2	23.32	-	-
1894	4,788.2	53.04	7,064.4	24.31	1,175.5	28.30	884.5	24.55	-	-
1895	6,077.9	67.32	7,336.5	25.25	1,281.4	30.80	952.8	26.45	-	-
1896	6,500.3	72.00	7,561.0	26.02	1,432.3	34.49	1,113.2	30.90	-	-
1897	7,251.6	80.32	9,032.3	31.09	1,658.2	39.92	1,265.7	35.13	-	-
1898	8,123.8	89.98	9,923.8	34.15	1,988.4	47.87	1,436.2	39.87	-	-
1899	8,873.5	98.29	11,268.3	38.78	2,406.0	57.93	1,563.5	43.40	-	-
1900	10,174.5	112.70	13,026.1	44.83	2,615.5	62.97	1,936.7	53.76	-	-
1901	11,386.9	126.12	13,454.0	46.30	2,544.9	61.27	1,792.3	49.75	-	-
1902	10,809.7	119.73	13,275.7	45.69	2,304.8	55.49	1,788.4	49.64	-	-
1903	10,160.0	112.54	14,407.6	49.58	2,211.7	53.25	1,987.8	55.18	-	-
1904	10,582.4	117.21	15,810.2	54.41	2,650.1	63.81	2,231.6	61.94	-	-
1905	7,350.0	81.41	15,052.1	51.80	2,437.0	58.70	2,103.2	58.38	-	-
1906	7,920.7	87.73	17,519.1	60.29	2,415.7	58.16	2,040.6	56.64	-	-
1907	8,443.0	93.52	20,308.5	69.89	2,532.5	60.97	2,166.6	60.14	-	-
1908	8,522.0	94.39	20,865.6	71.88	2,524.1	60.77	2,156.7	59.86	-	-
1909	9,081.5	100.59	20,967.5	72.16	2,578.0	62.07	2,380.5	66.08	-	-
1910	9,486.1	105.07	20,109.0	69.21	2,729.2	65.71	2,691.9	74.72	-	-
1911	9,005.7	99.75	22,968.4	79.05	3,225.8	77.67	2,962.7	82.24	-	-
1912	9,113.7	100.95	25,151.5	86.56	3,766.4	90.68	3,324.9	92.29	-	-
1913	9,028.3	100.00	29,056.2	100.00	4,153.4	100.00	3,602.7	100.00	4,145.5	100.00
1914	8,978.3	99.45	31,347.6	107.89	4,019.6	96.78	3,590.4	99.66	-	-
1915	9,158.8	101.45	30,720.2	105.73	3,632.1	87.45	3,215.1	89.24	-	-
1916	7,933.6	87.88	31,513.2	108.46	3,738.1	90.00	3,318.9	92.12	-	-
1917	6,813.1	75.46	28,163.8	96.93	3,072.0	73.96	2,508.4	69.62	-	-
1918	3,754.8	41.59	11,775.4	40.52	507.3	12.21	351.7	9.76	-	-
1919	4,340.0	48.07	8,244.7	28.38	111.5	2.68	176.5	4.90	-	-
1920	3,769.3	41.75	7,652.2	26.33	113.3	2.73	197.1	5.47	158.5	3.82
1921	3,969.2	43.96	8,542.9	29.40	114.2	2.75	-	-	179.1	4.32
1922	4,872.8	53.97	8,579.4	29.53	189.0	4.55	-	-	354.3	8.55
1923	5,192.7	57.52	14,275.0	49.13	377.9	9.10	-	-	720.4	17.38
1924	6,388.5	70.76	15,627.3	53.78	688.9	16.59	-	-	1,385.8	33.43

APPENDIX IV (Continued)

Year	Crude Oil		Coal		Pig Iron		Steel	
	Long tons	Index	Long tons	Index	Long tons	Index	Long tons	Index
1925	7,364.8	81.57	17,358.5	59.74	1,510.8	36.37	2,101.3	50.69
1926	8,681.7	96.16	27,164.2	93.49	2,402.5	57.84	3,091.4	74.57
1927	10,784.0	119.45	32,675.8	112.45	2,985.1	71.87	3,665.2	88.41
1928	12,121.5	134.26	35,431.6	121.94	3,320.7	79.95	4,183.9	100.93
1929	14,248.4	157.82	41,140.0	141.58	4,251.6	102.37	4,924.0	118.78
1930	18,159.7	201.14	48,046.2	165.35	4,937.8	118.89	5,770.4	139.20
1931	22,038.4	244.10	55,855.9	192.23	4,794.1	115.43	5,531.3	133.43
1932	21,074.9	233.43	63,643.0	219.03	6,063.7	146.00	5,833.4	140.72
1933	21,149.7	234.26	75,001.7	258.12	6,997.7	168.48	6,780.2	163.56
1934	23,835.9	264.01	92,456.7	318.19	10,263.3	247.11	9,539.9	230.13
1935	24,841.5	275.15	107,278.9	369.21	12,291.8	295.95	12,401.0	299.15
1936	26,952.6	298.53	121,726.1	418.93	14,167.7	341.11	15,987.5	385.66
1937	27,381.7	303.29	120,643.5	415.20	14,258.3	343.29	17,062.3	411.58
1938	28,403.3	314.60	130,789.7	450.12	14,369.5	345.97	17,715.8	427.35
1939	29,063.7	321.92	132,376.2	455.58	14,999.4	361.14	18,499.2	446.25
1940	29,231.0	323.77	144,482.0	497.24	14,713.9	354.27	18,798.4	453.47
1950(Plan)	34,841.0	385.91	246,052.5	846.82	19,192.1	462.08	24,998.9	603.04
1960-65(Plan)	59,100.0	654.61	492,100.0	1,693.61	49,200.0	1,184.57	59,100.0	1,425.64

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APPENDIX IV (Continued)

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