Soviet Economic Performance[1]

Introduction

Between 1928 and the 1950s, the U.S.S.R. was transformed from an underdeveloped agrarian country to a major industrial power. In the 1950s Soviet output grew faster than that of all other industrial countries (2) except Japan and Germany. At the same time Soviet military power grew closer to that of the U.S.A., and her scientific prestige was greatly strengthened by her achievements in space. In the early 1960s, there has been a noticeable slowing down in Soviet growth. We have tried in this paper to put these developments in perspective and to judge the efficacy of Soviet policy in its attempt to achieve maximum growth and to transform an underdeveloped into a developed country.

Most of the attempts to compare Soviet and Western performance have used the United States as a yardstick. This is true of Soviet economists who have always been concerned with the effort to become the world leader in terms of total output, military power, technology and productivity. It is also true of Western scholarship on the U.S.S.R., most of which has been concentrated in the United States which has had large funds and an abundance of talent for this kind of quantitative economic research. These binary comparisons were also fostered by the fact that the absolute size of the U.S. economy is closer to that of the U.S.S.R. than is the case of any European country. As a result of this, there has been a tendency to get Soviet achievements in the wrong perspective. The lower

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(1) I am grateful to Emile Benoit for comments on an earlier draft. This essay is intended as a contribution to the Columbia University study on the international economics of disarmament and arms control.

(2) Table 1 compares the U.S.S.R. with the leading Western countries. The same comparison cannot be made with communist countries as we do not have Western style G.N.P. estimates for these countries. Estimates of the Soviet concept "net material product" are available which show a faster Soviet growth than in other Eastern countries except Roumania, see *Narodnoe Khoziastvo CCCR v 1962 g.*, Moscow, p. 73.

level of Soviet productivity and incomes is overstressed, and the rapidity of its growth is overstated. We have concentrated here on the comparison between the performance of Western Europe, Japan and the U.S.S.R. because the level of Russian productivity and its rate of growth are closer to those of Europe than to the U.S.A.

A major problem in a quantitative analytic study of this kind is that the basic Soviet concepts of output are somewhat different from those in the West, and there are no detailed national accounts statistics such as now exist in comparable form for all Western industrial countries. Similarly the Soviet figures on the labour force are different from those in the West.

As a compensation, Soviet statistics are more detailed in some fields, e.g. on the stock of skills, and most of the official series are available for very long periods. Furthermore, the massive American research effort has produced estimates of many of the important Soviet magnitudes on the basis of Western concepts, so that it is now possible to make comparisons which are reasonably reliable. In this paper we have based our major conclusion largely on Western studies of Soviet growth (3).

In the following sections, part I attempts to assess Soviet performance and policy at different stages of development; part II assesses the level attained; part III the purposes for which output is used; part IV the major factors responsible for Soviet performance. Finally we consider likely future developments.

I - The Stages of Growth

In order to judge the comparative performance of the Russian and Western economies in recent years, it is necessary to know something of their history over a longer period.

1870-1913

During the years before the first world war, Russian economic growth was faster than that in several West European countries and this period has been characterised by Rostow as the Russian

(3) This does not imply that they are necessarily inconsistent with Soviet official statistics, which we have consulted wherever possible. Those interested in details of the conceptual problems of Soviet statistics should consult the annex of Alec Nove's study, *The Soviet Economy*, London, 1961.

Table 1

G.N.P. GROWTH 1870-1960

Annual average compound growth rate adjusted to exclude the impact of territorial changes

	1870–1913	1913–28	1928–50	1950–60	1960–63
France	1.6	1.2	0.4	4.6	5.2
Germany	2.9a	0.4	1.8	7.6	4.2
Italy	1.4	1.8	1.0	5.9	6.5
Japan	4.8b	4.2	1.2	9.3	10.3
U.K.	2.2	1.6	1.9	2.6	2.7
U.S.	4.3a	2.9	3.0	3.2	3.8
U.S.S.R.	2.5	0.5	3.4	6.8	5.2

a 1871-1913.
b 1878-1913.

Source: A. Maddison, *Economic Growth in the West*, Twentieth Century Fund, 1964, for Western countries to 1960 (except for France); European Russia, 1870-1913 and U.S.S.R. 1913-28 from Simon Kuznets, *Economic Development and Cultural Change*, October, 1956. U.S.S.R. 1928-50 Abram Bergson, "National Income", in A. Bergson and S. Kuznets, *Economic Trends in the Soviet Union*, Harvard University Press, 1963, p. 36. The estimate is adjusted for territorial change on same basis as net national product, cf. pp. 4 and 36, *Op. cit.* U.S.S.R. 1950-60, *Dimensions of Soviet Economic Power*, Joint Economic Committee, Congress of the United States, 1962, p. 75. U.S.S.R. 1960-63 derived from R. W. Campbell, *Soviet Studies*, July 1964, p. 3. Japan, *Historical Statistics of Japanese Economy*, The Bank of Japan, 1962, figures refer to real national income for calendar years. 1960-63, for Western countries and Japan, and France 1950-63, figure supplied by O.E.C.D. National Accounts Division.

Table 2

PATTERN OF SOVIET GROSS NATIONAL EXPENDITURE 1928-55

Shares of G.N.P. at 1937 ruble factor cost

	1928	1937	1950	1955
Household consumption	79.5	52.5	45.7	48.0
Communal Services	4.6	10.5	10.2	8.7
Government Administration	2.1	3.2	4.3	2.1
Defence	1.3	7.9	12.9	13.1
Gross Investment	12.5	25.9	26.9	28.1

Source: A. Bergson, *The Real National Income of Soviet Russia Since 1928*, Harvard, 1961, p. 237.

Table 3

SHARE OF AGRICULTURE IN TOTAL EMPLOYMENT AND G.N.P.

	1928	1937	1940	1950
Employment	70.9	54.5	50.9	45.7
G.N.P.	49.2		28.9	24.1

Source: Employment, 1928-40 from A. Bergson, *The Real National Income of Soviet Russia Since 1928*, Harvard, 1961, p. 443, 1950 from *Dimensions of Soviet Economic Power*, *op. cit.*, p. 43, 615 and 649. G.N.P. from A. Bergson and S. Kuznets, *Economic Trends in the Soviet Union*, p. 344.

"take-off". This is something of an exaggeration considering the backward state of large parts of the economy, and the fact that the industrial sector was largely foreign. There was a large inflow of foreign private investment in mining and manufacturing as Russia had at that time something of the same attraction for foreign investors as Canada, Australia and the U.S.A. In the decade or so before the first world war Russian receipts of foreign capital were probably equal to about a quarter of its capital formation. By 1916-17 about 2.2 billion rubles of foreign industrial investment had been made in Russia. "In the mining industry the proportion of foreign capital was 91 per cent; in the chemical industry, 50 per cent; in metal fabricating, 42 per cent; in woodworking, 37 per cent; in the textile industry, 28 per cent" (4). In addition, a further 5 billion rubles of foreign funds were invested in Russian state, municipal, and state-guaranteed loans (5). There was a rapid process of industrialisation. Strumilin quotes a figure for the growth of industrial output from 1887 to 1913 of 6.4 per cent a year (6). Many of the industrial enterprises were modern large scale ones such as the Putilov works in St. Petersburg, and in 1903 more than 86 per cent of the 1.6 million factory workers in Russia were in establishments with more than 50 workers (7). This was a very high proportion as compared with other countries (8). The level of economic development was higher than in many underdeveloped countries today, but the modern sector of the economy was relatively small with about three-quarters of the population still employed in agriculture (9), the proportion of the labour force with high level skills was about the same as in modern India and there was a heavy dependence on foreign investment.

During the period 1870-1913, Goldsmith has estimated that the national income of European Russia rose by about 2.5 per cent a year. As population rose by 1.5 per cent, the per capita growth was around 1 per cent a year. During that period, therefore, the total

(4) See *Russia's Soviet Economy*, Harry Schwartz, London, 1961, p. 63.
(5) See *Soviet Economic Development Since 1917*, Maurice Dobb, London, 1948, p. 38.
(6) *Ocherki Ekonomicheskoi Istorii Rossii*, p. 546, Moscow, 1960.
(7) Cf. V. I. Lenin, "The Development of Capitalism in Russia", p. 320, in *Selected Works*, Vol. I, Lawrence and Wishart, London, 1936.
(8) *The World Economic Survey*, U.N., New York, 1962, p. 57 gives data of firm size distribution for 12 countries for the 1950s, and none of them (including the U.S.) had such a heavy concentration on large firms as Russia fifty years earlier.
(9) Lenin, *Op. cit.*, p. 312 gives a proportion of 77 per cent for 1897.

growth was a little faster than was typical in Western Europe, but income per head grew more slowly because of the faster population growth in Russia.

1913-1928

In the first years of Soviet power the economy was disturbed by civil war, foreign intervention, the hostility of many members of the old managerial and professional classes, the change in the governmental administrative apparatus, and the wastes and damage associated with the transfer of most privately owned means of production to the State and of land to the peasants. In fact the Soviet state was unable to cope adequately with the management of the economy, and the administrative methods for planning and allocating resources in a centralised way had not yet been divised. In the early 1920s, therefore, Lenin introduced the "new economic policy" which returned some production sectors to private entrepreneurs, in particular retail distribution and farming, and left the price mechanism to allocate resources. This fostered the growth of moneylenders, traders and substantial farmers (kulaks).

According to figures cited by Kuznets, Russian G.N.P. growth from 1913 to 1928 was only 0.5 per cent a year, and G.N.P. per head stagnated. Russian performance was similar to that of Germany which also suffered major economic disturbance as the aftermath of war and massive inflation, but it was worse than that of all other major industrial countries. The Russian index of freight movements from 1913 to 1928 shows a rise of only 4.3 per cent. In later periods the movement of freight in the U.S.S.R. has been faster than that of G.N.P. so that this index tends to confirm the Kuznets version of G.N.P. movements from 1913 to 1928.

1928-50

The period from 1928 to the outbreak of war was one of major economic achievement for Russia both in terms of its own goals and those of any developing country. The costs involved were also very high in terms of consumption standards, coercion of large sections of the population, and lasting damage to the productive capacity of agriculture. From 1928 to 1937 the rate of growth of G.N.P. was 4.8 per cent a year according to Bergson.

The technique of centralised planning and resource allocation was successfully developed. In line with the original aims of the revolution, the range of state control was greatly extended. More or less complete socialisation of agriculture was attained. The small entrepreneurs in distribution and handicrafts were eliminated and virtually everyone brought into state employment. Thus the degree of state control became more extreme than has since been the case in other communist countries (10). Between 1928 and 1937 ,the rate of investment was raised from 12.5 per cent to 26 per cent of G.N.P., and the output of heavy industry grew twice as fast as that of light industry. It is doubtful if any other country has achieved such a large savings effort in so short a period of time. At the same time, defence expenditures rose from 1.3 per cent to 7.9 per cent of G.N.P. As a result consumption was squeezed considerably. Per capita consumption declined in an economy where per capita output was rising at more than 3 per cent a year. During most of these years the majority of the population was worse off than at the beginning and some of them were much worse off. Food consumption fell because of the hostility of farmers to collectivisation which led to widespread slaughtering of livestock, and adversely affected crop production. During 1929-30 many people died of starvation. Housing construction was given low priority in spite of the rigours of the Russian climate and the big increase in urban population, and the amount of housing space per capita dropped substantially. This happened because housing was the most direct competitor for the resources used in productive investment. The living standards of the new town dwellers in Russia in this period of "primitive accumulation" were in some respects as miserable as those in Manchester during the worst period of British industrialisation, which Engels described in 1844. However, it should not be forgotten that in the early 1930s the living standards of large sections of the population of capitalist countries were cut drastically by mass unemployment and their sufferings did not have the virtue of contributing to the growth potential of the West.

By contrast with the decline in private consumption, "communal consumption" rose rapidly and there was a betterment of

(10) M. V. Kolganov, *Nationalnii Dochod*, p. 236, Moscow, 1959, shows a rise in the importance of the socialised sector from 44 per cent in 1928 to 96 per cent in 1934. For 1955 his figure for Poland is 74 per cent, Hungary 73 per cent, Czechoslovakia 89 per cent and Roumania 75 per cent (in 1954).

Soviet education and health standards, which greatly improved the capacity of the Soviet population to absorb new technology and increase its labour productivity.

Most developing countries have severe payments problems in the course of industrialisation, and in the U.S.S.R. the situation was even worse than usual. Before the revolution there had been large receipts of foreign private investment which had now disappeared. Foreign government loans were not available, and it was very difficult even to get normal commercial credit. The payments problem was somewhat eased by repudiation of all Tsarist government debt and nationalisation of foreign private property without compensation, but traditional exports of wheat had been hit by the farm crisis, and many foreign countries were actively hostile to trade with the Soviet regime. Furthermore the Russian industrialisation drive coincided with the Great Depression and a major fall in world income and export markets. The Russians were forced to build their own heavy equipment and armaments industry. Imports were concentrated on capital goods, and heavy emphasis was placed on goods for key sectors and on prototypes to be copied. The U.S.S.R. benefited from the unemployment in the outside world by hiring the services of foreign technicians to teach new techniques. In the period 1928 to 1937, Russian imports fell from 3 per cent to 1 per cent of G.N.P. This was of course a period of declining world trade but the contraction was bigger in Russia than elsewhere. There is little doubt that the foreign payments problem of the Soviet Union was worse than that of most developing countries today, because of the depressed state of export markets, difficulties in supplying its traditional exports and non-existence of credits.

From 1928 to 1937 there was a major change in the structure of the economy, with a rise in the non-agricultural proportion of the labour force from 29 to 46 per cent, and of non-agricultural output from 51 per cent to 70 per cent of total output. It was during this period that the U.S.S.R. "abolished" unemployment which in 1928 had affected about 2 million people in the cities (11). The elimination of unemployment and the recruitment of a greatly increased proportion of women into the labour force led to a very large increase in employment — three times as fast as population growth. Most of the increase in output was attributable to this

(11) See Maurice Dobb, *Op. cit.*, p. 189.

rather than the growth of productivity. Naturally there is still frictional unemployment as people change jobs, and the claim to have ended unemployment is overstated. However, the Russians did overcome quickly the problem of large scale structural unemployment which plagues many countries in the course of economic development (12), and they also abolished unemployment due to inadequate demand which was not eliminated in Western Europe until a couple of decades later.

The period 1928 to the outbreak of the war was one in which many of the problems of development were successfully solved and the take-off to self-sustaining growth was achieved. A big enough industrial base was established to enable the country to withstand the German military attack, and communism was firmly established as one of the major political systems of the world. However, Russian experience in this period can hardly provide a model to developing countries in the present day context even if they happen to be socialist in their leanings. In the first place, the external conditions of developing countries are not nowadays so grim. They nearly all have considerable possibilities of receiving foreign aid and they are not faced with a collapsing world economy. Most of them do not have so heavy a burden of defence spending as the Russians had and they do not have to consolidate a political system against the universal hostility of the outside world. Because of this they do not have to raise their own savings efforts so quickly, or to use the coercion employed in Russia. They should also learn a great deal about what policies to avoid in agriculture. The surplus squeezed out of the agricultural population was probably more than offset by the loss of output associated with collectivisation. Over the years 1929 to 1936 inclusive the cumulative loss of agricultural output was around 40 per cent of 1928 G.N.P. This is probably a minimum estimate of the cost of collectivisation — it is based on the shortfall in agricultural output from the level of 1928, but as one could normally have expected a rising trend, the true loss was bigger than this. More efficient methods could have been used to provide the savings, and the move towards state ownership of agricultural property could have been achieved by gentler and more

(12) The U.S.S.R. did not have to meet the problem of rapid population growth which now greatly complicates the development problem in most parts of the world. Population growth from 1920 to 1939 was only 1.2 per cent a year and from 1913 to 1950 was only 0.3 per cent.

gradual methods. It is also clear that the complete elimination of small entrepreneurs in distribution and services had a damaging effect both on the economy and on consumer satisfactions.

From 1928 to 1937 Bergson's estimates show a G.N.P. growth of 4.8 per cent a year. Russian performance was much better than that of the West where growth was retarded by the Great Depression. This was a period of rapid change in prices and economic structure in which unambiguous methods of output measurement are very difficult. The Soviet statistics would claim a much higher growth than Bergson, but it is generally accepted by Western scholars that their claims for this period are exaggerated. However, the broad outlines are clear. Industrial output grew rapidly. From 1928 to 1937 the official Soviet index of industrial production rose by 18 per cent a year, and the estimate of Nutter — who is not prone to exaggerate Soviet growth — also shows a very large rise of 12 per cent a year. Agricultural production, by contrast, was lower in 1938 and 1939 (according to the official Soviet index) than it was in 1928.

Soviet suffering from war damage was much bigger than that of any Western country, but postwar recovery was rapid in spite of the repudiation of Marshall aid (13). From 1928 to 1950, Bergson estimates that Russian G.N.P. grew at 3.4 per cent a year, whereas the highest Western growth rate was in Sweden, with 3.2 per cent. For the whole period 1913 to 1950, the Russian growth performance was about 2.2 per cent a year, and at 1.9 per cent per capita was somewhat better than the average of Western Europe in spite of the upheaval of the revolution, the huge costs of social change and the consolidation of the communist system, and the bigger impact of two world wars.

1950 onwards

In the period 1950-60 Russian growth on Western definitions was higher than prewar and has averaged about 6.8 per cent a year. On a per capita basis Russian growth averaged 5.0 per cent a year. This is higher than in any Western country except Germany, Japan

(13) Although the Soviet Union did not receive Marshall Aid, she did receive reparations from Finland, Austria, Germany, Eastern Europe and Manchuria. These were, of course, less useful than Marshall Aid; as the range of choice of goods was limited. The total value of reparations has been estimated at about $4 to $5 billion. See H. Schwartz, *Russia's Soviet Economy*, London, 1951, p. 517.

and Italy. Output per man hour grew faster in the U.S.S.R. than in any other industrial country.

Growth in different sectors of the Russian economy has been better balanced in the postwar period. The growth of industrial output since 1950 has been at about the same pace as 1928 to 1950, but has contributed more to overall growth because industry is now much more important in the economy. By contrast with earlier years there was substantial growth in agriculture in the 1950s. This was achieved largely by expanding the cultivated area by a third, by stepping up agricultural investment, and by paying farmers better. However, agriculture grew more slowly than industry in the 1950s and its performance since 1958 has again been poor.

The Russian economy of the 1950s had reached a more normal state of dynamic equilibrium than it had enjoyed earlier. Its growth rate was a better reflection of its long run potential than that of earlier years. There was no great change in the rate of investment. The burden of defence spending probably fell somewhat, the armed forces declined from 4.7 to 3.3 million, and the growth of communal consumption was moderate. The resources available for private consumption rose faster than G.N.P. This Soviet experience was different from that in the West, where consumption generally rose more slowly than G.N.P. in the 1950s. Russian per capita consumption levels rose by 5.9 per cent a year from 1950 to 1958 (see Table I - 2) which was faster than in any Western country except Japan. Working hours were very substantially reduced, and are now lower than in Western Europe. The housing situation improved distinctly, and it is clear from the vast new blocks of apartments in Soviet cities that the housing situation has improved a good deal further since 1958. Apart from these benefits to consumers, there was an easing of the coercive pressure after the death of Stalin, an attempt to decentralise the administration, and an increase in the share of resources going into international trade, particularly with non-communist countries.

For the period before 1950 it is not possible to measure Russian productivity growth very accurately, but it seems clear that the most rapid progress has been made since then. In the 1950s the growth of employment was slower than the increase of population, and the fall in weekly working hours was about the same size as the increase in employment, so that nearly all the output increase was derived from the rapid growth of productivity. By comparison

with Western performance, Russian productivity growth was most impressive in the 1950s, with output per man hour growing at 6.8 per cent a year.

In the 1950s the overall rate of growth of output per man was 5.1 per cent, in industry it was 5.5 per cent, and in agriculture

TABLE 4

GROWTH OF OVERALL OUTPUT, POPULATION, EMPLOYMENT AND PRODUCTIVITY, 1918-50 - U.S.S.R.

Annual average growth rates

	1918-28	1928-40	1940-50
G.N.P. (at 1937 factor cost)	0.5	4.5	2.1
Population	0.5	1.2	- 0.8
G.N.P. per capita	0.0	3.2	2.9
Employment	n.a.	3.7	0.7
G.N.P. per employee	n.a.	0.7	1.4

Source: A. BERGSON and S. KUZNETS, *Economic Trends in the Soviet Union*, p. 337.

TABLE 5

SECTORAL RATES OF GROWTH OF PRODUCTIVITY U.S.S.R. AND WEST, 1950-60

Annual average growth rates

	Output per man				Output per manhour
	Agriculture	Industry	Other	Total	Total
France	5.8	4.3	2.2	4.2	4.1
Germany	6.4	5.8	2.6	5.3	6.0
Italy	4.1	5.0	1.5	4.2	4.2
Japan				6.9	6.1
U.K.	4.1	2.2	1.5	1.9	2.0
U.S.	3.8	2.3	1.1	1.9	2.2
U.S.S.R.	4.4	5.5	2.2	5.1	6.8

Source: See Tables I - 8 and I - 9 for Western countries and U.S.S.R.; hours from *Dimensions of Soviet Economic Power*, p. 158, and from A. MADDISON, *Economic Growth in the West*; Japan, output from Table 1, employment and hours from O.E.C.D. *Economic Survey of Japan*, 1964, hours for Japan 1950 from *Japan Statistical Yearbook*.

4.4 per cent (see Table 5). This pattern is different from that in the West where output per man grew faster in agriculture than in industry. In comparison with Western countries, the productivity growth in agriculture was not too impressive, but industrial performance was as good as Germany. Russian working hours declined more sharply than those in Western countries, so that in terms of output per man-hour Russian performance was better even than that of Germany.

The official Soviet index of agricultural output shows a growth of only 0.6 per cent a year from 1928 to 1950 whereas agricultural employment increased at a rate of 0.4 per cent in this period according to Bergson. Agricultural productivity growth therefore accelerated from 0.2 per cent a year in the earlier period to 4.4 per cent in the 1950s. This degree of acceleration probably did not take place in industry. Nevertheless there is little doubt that the rapid process of industrialisation in prewar years was not particularly conducive to productivity gains. Time was needed to accustom peasants to the discipline of industrial work and to train skilled workers, foremen and managers. In the period when labour was relatively plentiful the Soviet Union did not have to worry too much about improving industrial productivity as long as it increased output. This policy was quite rational, but it was feasible only because of the possibility of keeping down real wages. In a private enterprise economy this massive increase in industrial employment would probably have been accompanied by large pressure for wage increases from trade unions, which would have led to a greater emphasis on productivity growth and a good deal of unemployment, but in the U.S.S.R. real wages declined in the period of rapid industrialisation.

From 1958 to 1963, Soviet growth was considerably slower than from 1950-58, largely because of the slow growth in agriculture in the later period (analysed below in the section on agriculture), increasing difficulties in making the planning system work efficiently, and also because a good deal of the 15 per cent reduction in working hours was concentrated in this period. Recent U.S. Congressional estimates have suggested that Soviet growth was less than 5 per cent a year in the four years following 1958 (14). This

(14) See *Annual Economic Indicators for the U.S.S.R.*, Joint Economic Committee, U.S. Congress, 1964, p. 91.

estimate exaggerates the fall in the growth rate as the underlying index of G.N.P. gives far too heavy a weight to the slow growing agricultural sector (15). However, the estimates we have used also show a marked slowing down in this period, and for 1960-63 the growth rate was lower than in Italy and Japan which had a slower increase in labour input. The factors which caused this slowdown raise serious policy problems for the Soviet economy.

II - The Level of Development

The overall productivity level of the Russian economy is very much lower than that of the U. S. but it is not too far below that of Western Europe. Comparisons of productivity for a whole economy are very difficult and have been done on a detailed scientific basis only for 8 O.E.C.D. countries (16). In these countries price structures are determined largely by market forces, some of them international, and this facilitates the comparison, but in the U.S.S.R., the price structure is very different, and many of the detailed figures needed are not available. However, Morris Bernstein has tried to meet these difficulties in his comparisons (17) of relative expenditure levels for G.N.P. as a whole in the U.S.S.R. and U.S. His figures can be linked with O.E.E.C. estimates of real income levels for European countries, and used for measuring overall productivity. It can be seen from Table 6 that the level of overall productivity in Russia in 1960 was slightly above the lowest Western (i.e. Italian) levels when measured in U.S. prices and somewhat below in Russian prices. This would suggest that the overall Russian productivity level is about threequarters of that in the most advanced Western European industrial countries, and about a third of that in the U.S.A.

The productivity level in different economic sectors is more dispersed in the U.S.S.R. than in Western countries (see Table 1-7). Soviet industrial productivity is more than four times as high as

(15) It makes a large allowance for imputed rent on farm property which gives Soviet agriculture a greater weight than industry.

(16) Milton Gilbert and Associates, *Comparative National Products and Price Levels*, O.E.E.C., 1958.

(17) Joint Economic Committee, *Comparisons of the United States and Soviet Economies*, Part. II, 1959.

that of agriculture, and about twice as high as in the services sector. The reason for the lower overall level in Russia than in Western Europe is the lower productivity in non-industrial sectors, and the fact that 38 per cent of employment is still in agriculture,

TABLE 6

COMPARATIVE LEVELS OF OUTPUT, LABOUR INPUT AND PRODUCTIVITY IN 1960

	GNP		Employment (000)	Average Annual hours	Output per Man Hour	
	At 1955 U.S. relative prices	At 1955 European relative prices			U.S. relative prices	European relative prices
	$ billion				U.S. = 100	
France . . .	68.5	53.0	19,740	2,166	50	38
Germany . .	90.7	69.6	25,340	2,197	50	39
Italy	51.5	35.0	19,780	2,001	40	27
U.K.	84.3	67.2	24,635	2,250	47	38
U.S.	426.0	426.0	69,177	1,906	100	100
U.S.S.R. . .	278.2	139.7	98 992	1,968	44	22

Source: A. MADDISON, *Economic Growth in the West*, Table I - 8 p. 40 for Western countries. For the U.S.S.R., the national product estimates of Morris Bornstein for 1955 in " A Comparison of Soviet and United States National Product ", *Comparisons of the United States and Soviet Economies*, Part II, U.S. Congress, Joint Economic Committee, 1959, p. 385, were extrapolated to 1960 with the help of estimates in *Dimensions*, *Op. cit.*, p. 75-76. Civilian labour force for 1960 was derived from *Dimensions*, *Op. cit.*, p. 615 and military manpower from p. 43. From information on p. 158 of *Dimensions*, we have assumed that the Soviet workweek was 41 hours in 1960. It is assumed that the Soviet workyear consisted of 48 weeks in 1960. It is interesting to note that in *Narodnoe Khoziastvo 1962*, p. 74, a figure is given for per capita material product in the U.S.S.R. which is 50.6 per cent of that for the U.S.A. This implies a Soviet output per man of about 42 per cent of the American level, and an output per man hour somewhat lower.

as compared with 14 per cent for Germany and 4 per cent for the U.K. Industrial productivity in the U.S.S.R. is probably as high or higher than in Western Europe. The Russians themselves estimate their industrial productivity in 1962 at 40 to 50 per cent of that in the U.S. (18) which is a little better than the British relation

(18) See *Narodnoe Khoziastvo*, p. 72. This estimate is more modest than that implied by WALTER GALENSON, *Labor Productivity in Soviet and American Industry*, Columbia University Press, 1955, pp. 240 and 247, who suggests that Soviet industrial productivity had reached 40 per cent of U.S. levels in 1939 and 1950.

to the U.S. (19). The Russians suggest that their agricultural output is about a third of the U.S. level (20), but this is probably somewhat of an exaggeration.

III - The Use of Resources

The allocation of resources in the U.S.S.R. is different from that in the West, with a higher share going to investment and defence, and a smaller share to consumption. However, the share of investment and defence is no longer expanding and the squeeze on the consumer is abating. It is difficult to make very precise comparisons with the West as the Soviet authorities do not publish national accounts, and Western attempts to construct them for the U.S.S.R. are hampered both by lack of data and by the fact that Soviet prices are set in a different way. Most government revenue is derived from profits made in production or indirect taxes (turnover tax) levied on consumer goods. Food from collective and state farms also provides substantial revenue to the state because it is sold to consumers at prices far higher than the state pays to farmers. As the government owns all enterprises the distinction between profits (which go to the state) and indirect taxes is not the same as in the West. Certain Western elements of cost such as interest charges or rents are absent in a wide sector of the Russian economy, the concept of risk is different and profit rates are not expected to be the same in different enterprises.

Capital goods are relatively cheap in the U.S.S.R. as they are not taxed, nor do they have the large mark-up exacted on most manufactured consumer goods and foodstuffs. The Russian price system therefore understates Soviet investment relative to the weight it would get with a Western price system. This understatement also applies to military expenditure for the same reasons and because of the very low pay of the Soviet conscript soldier.

Estimates which attempt to adjust for these pricing problems so that the figures are more comparable with those of Western

(19) D. PAIGE and G. BOMBACH estimated that U.K. productivity in manufacturing was between 34 and 39 per cent of that in the U.S. in 1950. See *A Comparison of National Output and Productivity of the U.K. and U.S.*, O.E.E.C., 1959, p. 33.

(20) See *Narodnoe Khoziastvo*, *op. cit.*, p. 72.

countries suggest that the Soviet investment rate is higher than in any major industrial country of Western Europe. For the period 1950-55 Bergson has estimated the proportion of Soviet investment in G.N.P. at 28 per cent (in current ruble factor cost) and the defence expenditure at 11.3 per cent (21). The E.C.E. estimates Soviet gross fixed investment to have been 27.8 per cent of G.N.P. (at factor cost) in 1959 (22). Both of these figures are well above the West European average for the 1950s which was 19.7 per cent for investment and 5 per cent for defence.

Soviet expenditures on education and health are relatively high. In real terms they are as high as in Western Europe in spite of the lower general level of Soviet income. Soviet school enrolments are a somewhat lower fraction of the age group 5 to 19, but enrolments in higher education are considerably higher (see Table 1-13). There is one doctor for every 580 inhabitants in the U.S.S.R. — a better figure than in any Western country. The supply of nurses and midwives is better than most of Western Europe, and other medical facilities are reasonably good. Life expectation and infant mortality are not too far from the best Western levels (see Table 1-14).

In the 1950s, as we have already emphasised, the Soviet consumer improved his lot very substantially, but he still gets a smaller share of total output than in any Western country. There is a considerable contrast between Soviet living standards in town and country, but urban standards of consumption are fairly similar in all parts of the country, as are levels of education and health. This means of course that the rate of growth in some parts of the country has been much more rapid than others, particularly in Soviet Asia which had a semicolonial status in Tsarist times. The range of income dispersion has narrowed in the 1950s, and is much narrower than in the West. Those Russians who do have high incomes find much stronger physical constraints on consumption than their counterparts in the West because luxury items are in many cases not obtainable, e.g., well

(21) A. Bergson, *The Real National Income of Soviet Russia since 1928*, p. 245.

(22) Cf. *Some Factors in Economic Growth in Europe during the 1950s*, U.N. Geneva, 1964, Chapter II, p. 29.

trained servants, luxury hotels, yachts, service for motor cars, large town houses and apartments, foreign travel, etc.

If real G.N.P. per capita in the U.S.S.R. is about threequarters of that in the most advanced Western European countries, then real consumption standards will be lower than this, because the Soviet consumer still gets less than half of G.N.P. (excluding communal services) (see Table 2). In Western Europe, consumers get about 63 per cent of G.N.P. on average, and in no country is the share as low as in the U.S.S.R. (23). Therefore, the standards of private consumption of the U.S.S.R. are probably no more than 60 per cent of those in the most advanced West European countries.

IV - Factors Affecting Soviet Economic Performance

(A) Favourable Factors

(i) *Investment*

High Level of Investment. A major reason for the fast pace of Russian growth is the high rate of investment. Soviet investment in the 1950s was about 28 per cent of G.N.P., when ruble prices are adjusted to conform more closely to the Western price system. This is a good deal higher than in any Western country except Norway and Japan in the 1950s, it is much higher than in developing countries and it is very much higher than the historical experience of Western countries (see Table 1-11). It would seem from the evidence available that the Russians did not increase the rate of investment appreciably in the 1950s (24). This could be interpreted as a reflection of popular pressure for increased private consumption, but because of the relative easing in defence expenditures and communal consumption, there was in fact a very large increase in private consumption per capita

(23) See *Statistics of National Accounts, 1950-61*, O.E.E.C., 1964, pp. 26-27. The share is lowest in Germany and the Netherlands at 56.8 per cent. In Western countries some part of communal consumption is included in private expenditures, but a good deal of expenditure on health and education is treated as government expenditure just as it is in the U.S.S.R.

(24) See V. Kudrov, "Social Production in the U.S.S.R. and the U.S.A.", *Problems of Economics*, New York, May 1964, p. 46.

in the 1950s, and one might therefore conclude that the Soviet authorities felt that they were already pressing investment to the point where further increases would yield sharply diminishing returns.

There are several reasons why one would expect the Soviet authorities to push investment further than in a capitalist country:

(a) The nature of the Russian pricing system, the absence of interest rates and rent, reduce the apparent cost of investment.

(b) Except when the immediate political situation is desperate, the Soviet authorities would be willing to sacrifice a bigger amount of present consumption for a given increase in future output than would be the case in the West, because they are keen on catching up with the West. They are therefore content with a somewhat lower return on investment at the margin.

(c) The major advantage of the Soviet planning process is the reduction of the uncertainty of investment decisions. The co-ordination of all investment decisions eliminates some of the problems which investors have in a private enterprise economy where entrepreneurs face the risk that other enterprises will duplicate their investment and create surplus capacity, or, conversely, that they will refrain from taking the complementary decisions which will determine whether or not their own view of the future is actually realised. Centralised planning makes it possible to assess future demand and productive opportunities more clearly and enables the overall investment level to be raised because of a genuine reduction of risks. This advantage of the Soviet system can be reproduced to a large extent under capitalism by planning of the French type, but in fact France is the only Western country to have made substantial efforts in this direction.

(d) Soviet planners do not worry about fluctuations in the overall level of demand in the economy. Western investors still have to weigh business cycle risks, although these have been greatly reduced by government policies for maintaining high and stable demand and entrepreneurs now have a much more buoyant view in capitalist countries than in prewar years.

The first two influences we have mentioned will tend to raise investment for reasons which are not particularly rational. The other two influences will tend to raise both investment and its

productivity as compared with Western countries. We should now inquire whether there are any other factors which tend to enhance the capacity of the economy to absorb profitably a high rate of investment.

Natural Resource Context. The U.S.S.R. has a wider range of natural resources than is the case in any West European country, but this is unlikely to make investment more profitable, for there are offsetting disadvantages in the more severe climate which increases construction costs (just as it does in Canada, Sweden and Norway). In transport, too, Russia suffers from vast distances, bad weather, poor ports and water communications as well as from a deliberate policy of industrial dispersion.

Standardised Output and Size of Market. One advantage which the U.S.S.R. has over the West is standardisation. This brings some losses of consumer satisfaction, but for intermediate and capital goods there is probably a substantially greater economy deriving from standardised runs than in Western countries, e.g. nearly all new Russian housing consists of massive standardised apartment blocks to which industrialised techniques are applied. This may reduce capital cost to some extent and helps in other ways to raise productivity. This tendency to economies of scale is further helped by the size of the Russian market which is bigger than that of all other European countries.

Intensity of Capital Use. The Soviet Union could economise on capital by using shift-working to a much greater extent than the West, as it could presumably more easily overcome the social obstacles to intensifying use of capital in this way. In fact, it does not seem that shift-working in manufacturing is any more widespread in the Soviet Union than in Western countries. However, in transport the capital stock is used much more intensively than in the West. " Soviet railroads now carry nearly four times as much goods per track mile as the American and the disparity is greater still in passenger traffic " (25). There are seldom empty seats on Russian passenger transport — either air, rail or subway. Soviet

(25) See A. Nove, *Communist Economic Strategy*, National Planning Association, Washington, D.C., 1958, p. 18.

policy has been to keep private automobile transport to negligible proportions, and this has helped to economise on the need for roads.

Replacement. Up to about 1955, it was Soviet policy to scrap equipment only when it was worn out. Industrial equipment therefore had a longer life in the Soviet Union than in Western countries. This happened both because of the smaller pressure to

TABLE 7

BREAKDOWN OF GROSS DOMESTIC FIXED INVESTMENT BY SECTOR 1960

per cent of total fixed investment

	Agriculture	Industry	Transport & Communications	Housing	Other
France	6.1	38.5	15.4	25.3	14.7
Germany	6.5	36.8	14.5	22.5	19.7
Italy	12.1	29.5	16.8	24.8	16.8
U.K.	3.7	39.4	13.1 b	19.7 c	24.3 b
U.S.	4.0	25.6	7.4	27.4	35.6
U.S.S.R. a	15.1	38.6	8.4	22.2	15.7

a 1958-62.
b Road investment included under other.
c Including legal fees, stamp duties, etc.

Source: Western countries from *Statistics of National Accounts 1950-61*, O.E.C.D., Paris, 1964; U.S.S.R. from *Narodnoe Khoziastvo, op, cit*, p. 434.

change consumer goods for stylistic reasons and because the previously abundant supply of labour made productivity considerations less important than in the West. Since 1955 there has been much greater emphasis on the need for increased labour productivity, and equipment is now scrapped when it is considered technologically obsolete. For this reason a higher proportion of new investment is now required for replacement, but the ratio of replacement to total gross capital formation is probably smaller than in the West, both because the Soviet capital stock is newer, and the rate of new capital formation is higher.

Structure of Investment. The impact of investment on growth may be enhanced by reducing the amount which goes to housing, for housing is very costly in relation to the flow of income which

it yields. In the years 1928 to 1950 Soviet investment was concentrated heavily on industry, and housing was given much lower priority than in Western countries. More recently, the structure of Soviet investment has become much more similar to that in the West. From 1958 to 1962 about 22 per cent of investment went to housing and about 38.6 per cent to industry (26). This is rather like the situation in the major countries of Western Europe.

The major structural differences between the Soviet Union and Western Europe are that the Russian investment in agriculture was twice as high a proportion of total investment, and investment in transport was only half as high. The high level of investment in agriculture reflects the greater importance of agriculture in Russian than in Western G.N.P. but it is also a reflection of the high cost of output increases in this sector. Russian agricultural output rose faster than that of the West in the 1950s but productivity rose more slowly than in most Western countries. In transport the relatively lower Russian effort reflects the savings made by a much more intensive use of capacity.

Capital Widening. A good deal of Russian investment in prewar years went into capital widening, i.e., providing extra

TABLE 8

PERCENT INCREASE IN EMPLOYMENT 1950-60

Belgium	4.1	Netherlands	12.8
Denmark	10.5	Norway	2.3
France	3.8	United Kingdom	6.3
Germany	24.4	Canada	20.8
Italy	18.9	U.S.A.	14.0
Japan	25.0	U.S.S.R.	17.4

Source: A. MADDISON, *Economic Growth in the West*, p. 61, and Annex Table I - 8.

workers with equipment. It is always possible to do this without running into diminishing returns for it does not involve a change in factor proportions as is the case with productivity-raising invest-

(26) These estimates should be treated with caution. The Soviet pricing system leads to understatement of aggregate investment as compared with a Western price system, and it may be misleading as regards the relative importance of different types of investment.

ment (27). Between 1950 and 1960, Russian employment increased by 17.4 per cent which was higher than in several Western countries, but smaller than in Japan, Germany, Canada and Italy. Thus this factor contributed to lowering the Soviet capital-output ratio relative to some Western countries, but not relative to the fastest growing ones.

Capital Deepening. The fundamental source of economic growth is increased productivity. The return on investment which is devoted to raising productivity (i.e. capital deepening) will depend on the level of productivity at which the economy is currently operating. The Soviet productivity level is below that in Western Europe and very much below that of the United States, which means that the U.S.S.R. should find it profitable to push the rate of investment a little further than Western Europe and a good deal further than the U.S.A. because it is exploiting a range of technology which is already known. Some sectors of Soviet industry such as chemicals, automobiles or textiles are much more backward than Western Europe so it can be expected that the recoupment of the backlog will be a source of rapid growth in future. The lower productivity level in agriculture would also provide an opportunity for future rapid growth if it were not frustrated by political and institutional obstacles.

The return on investment destined to raise productivity will also depend on the rate of increase in productivity which is to be achieved. There will be more and more sharply decreasing returns, the further the process is pushed. There will be increasing human and administrative strains in adapting production processes, work habits, skills and managerial capacities to more modern technologies. The U.S.S.R. has mitigated some of these problems by its gigantic effort in training and research which have increased the capacity to absorb high rates of investment, but the Russian system is not altogether weighted in favour of progress. Planning controls and targets may inhibit new processes or introduction of new products. The lack of a pricing system which reflects relative scarcities may lead to waste of resources, as happened in the over-

(27) For a more extensive discussion of this point as it affected Western countries, see Chapter III of my book *Economic Growth in the West*, Twentieth Century Fund, New York, 1964.

development of hydropower. Mistaken policies may sometimes be carried further than in Western countries because of the reliance on campaigns and controls instead of market competition and initiative of individual firms.

Conclusion on Investment. The factors and policies we have examined may have presented the U.S.S.R. with a somewhat more favourable schedule of returns on new investment in the 1950s than in most West European countries. However, there were no great recovery elements in Russian growth in the 1950s which were not available in Western Europe, nor was the situation as favourable to investment as it was in Germany or Italy. The main difference between the Western and Soviet situation is that in the U.S.S.R. investment was pushed further, and because of this the U.S.S.R. may have obtained a lower return at the margin than in Western Europe. There is, of course, no way of measuring empirically the schedule of potential returns on investment which any country faces. All we can do is look at the *ex post* results of investment decisions and this will reflect the total impact of all the influences we have described. For various reasons which I have analysed at length in my book, *Economic Growth in the West,* it is not possible to judge from *ex post* figures how far a country has pushed its capital deepening investment into the area of diminishing returns. Within a certain range, an increase in gross investment will appear to produce increasing returns because of the lower relative burden of replacement in a high investment economy. The incremental gross capital output ratio (I.C.O.R.) in the U.S.S.R. in the 1950s was lower than in most Western countries but higher than in Japan, Germany and Italy. With investment at 28 per cent of G.N.P. and a G.N.P. growth rate of 6.8 per cent, the I.C.O.R. (including stocks) was about 4.1 compared with 3.2 in Germany and Japan, 3.5 in Italy, 4.3 in France, 5.9 in the U.K. and 5.8 in the U.S.

(ii) *Training*

The Soviet Union has made a very large investment in education, and was the first country to plan its education systematically to promote economic growth. This has greatly increased the skills available and technical and managerial capacity to use new invest-

ment effectively. The education effort is the major reason why it has been possible to get a reasonable pay-off on such a high rate of investment.

The rate of spending on communal services — mainly health and education — rose from 4.6 per cent of G.N.P. in 1928 to 10.5 per cent in 1937. Between 1920 and 1939 illiteracy was eliminated amongst the population aged less than 50, and the literacy level is now equivalent to that in the developed countries of Europe. The level of educational attainment amongst the population as a whole is probably still below that in Western Europe, and school enrolment amongst those aged 5-19 is also below that in all the major industrial countries of the West. However, in secondary technical education and in higher education the Soviet effort is bigger than in Western Europe, and the stock of people with higher education is at least comparable with that in Western Europe. In some key professions such as engineering and medicine the Soviet stock of skills is superior to that of Western Europe.

The impressive thing about the skills of the Russian labour force is not that they are markedly superior to those of Western Europe, but that they have grown so quickly. At the time of the Russian revolution, the technical capacity of the labour force was relatively less than in present day India. By 1950 it was something like that of present day Greece, but by 1962 it was somewhat better than that of the U.K.

High Level Manpower. In 1913 the number of people with higher education in the labour force was 136,000, by 1950 it had reached 1,443,000 and by 1962 4,050,000 (28). In 1959, about 3.8 per cent of the Soviet labour force had higher education as compared with 2.9 in France (1954), 3.0 per cent in Italy (1961), 3.7 per cent in Japan (1960), and 11.3 per cent in the U.S. (1960). From 1950 to 1959, the U.S.S.R. tripled its stock of engineers and agronomists from 402,000 to 1,209,000. In the same period the increase of engineers and agronomists was less than 6 per cent in France; Italy had the fastest rise in Western Europe, but the increase was only 95 per cent. Engineers and agronomists were 1.2 per cent

(28) These figures on the U.S.S.R. are derived from *Narodnoe Khoziastvo*, *op. cit.*, p. 464. The figures in this section on Western technicians are derived from *Resources of Scientific & Technical Personnel in the O.E.C.D. Area*, O.E.C.D., Paris, 1963.

of the Soviet labour force in 1959 as compared with 1 per cent in the U.K., 0.9 per cent in Italy and 0.8 per cent in France. The proportion of engineers and agronomists in the Russian labour force is thus higher than in any West European country, but lower than the 1.7 per cent in the U.S.A.

The sectoral distribution of employment of people with higher education in the U.S.S.R. is broadly similar to that in Western Europe. Less than 0.3 per cent of the labour force in agriculture has had higher education, about 2.5 per cent in industry, and about 8.7 per cent in services. However, the U.S.S.R. has very few people with higher education in trade and distributive services — only about 0.15 per cent of the labour force in this sector has higher education. This is in sharp contrast with the West which attaches greater importance to salesmanship, advertising and consumer satisfaction. In Russia less than 2 per cent of the high level labour force are in this service sector compared with over 20 per cent in the U.S.A. (29). However, the rate of increase of high level manpower in this sector has been higher than any other in Russia in the past few years.

It is interesting to note that higher educational attainments in the Asiatic parts of Russia are not significantly lower than in European Russia. 83 per cent of the Russian population now lives in Europe (30), and 85 per cent of the people with higher education live there. The ratio of people active in the labour force with higher education to total population is 1.9 per cent in European Russia and 1.6 per cent in Asiatic Russia.

In 1960 enrolment in higher education in the U.S.S.R. was 11.5 per cent of the age group 20-24, as compared with 8.3 per cent in France, 5.8 per cent in the U.K., 5.3 per cent in Germany and 4.1 per cent in Italy. However, more than half the 2,944,000 Russians enrolled in higher education in 1962-63 were part-time students. 374,000 of these were in evening classes, and 1,283,000 were taking correspondence courses. The part-time students and correspondence students are allowed a fair amount of time off work to pursue their studies, but drop-out rates for these students

(29) Cf. *Narodnoe Khoziastvo*, p. 466, and *Dimensions*, p. 266.

(30) The term Europe is used loosely here to include seven republics — the Russian, Ukrainian, White Russian, Lithuanian, Moldavian, Latvian and Estonian. The Russian Republic includes Siberia.

are higher than in Western Europe (though lower than in the U.S.), so that the Soviet advantage over Western Europe was smaller in terms of new graduates than in terms of student enrolment. The proportion of Soviet graduates in science and medicine is no higher than in Western Europe. However, the Soviet education system is more highly specialised than in the West, and much more closely linked to manpower needs. There are only 40 universities in the U.S.S.R. but about 700 other specialised institutions of higher education. There were only 249,000 university students in 1960-1961 (31) or only about a tenth of those in higher education.

Middle Level Manpower. As far as middle level manpower is concerned, the Russian effort has been even larger than at the higher level. In 1913 the number of middle level technicians active in the labour force was 54,000. By 1952 the figure was 2,227,000, and by 1962 5,906,000. Thus the increase since 1913 was 97 fold, as compared with a 26 fold increase for high level personnel. Before the revolution, Russia suffered from the same shortage of middle level technicians as many developing countries today. The ratio of middle to high level personnel was about 0.4 in 1913, in 1962 it was 1.5.

Middle level technicians are trained in semi-professional secondary schools (technicums) which provide very intensive highly specialised courses. Up till 1950 they ran 4 year courses but they are now shorter. In recent years they have had an enrolment of about 1,800,000 students aged 14 to 30. Instruction hours are about 40 a week. There are also part-time evening courses for students already working. The total graduations from these schools were 7,600,000 between 1928 and 1960, of which 2.7 millions were engineering-industrial technicians, 1.1 millions agricultural, 0.6 million socio-economic, 1.7 millions educational or cultural, and 1.5 millions health-medical personnel (32).

One notable feature of the Soviet labour force is the high participation rate for women. In the U.S.S.R. 48 per cent of the labour force are women, compared with about a third in Western Europe. About 53 per cent of the labour force with higher education

(31) See *Annual Economic Indicators, op. cit.*, p. 82.
(32) See *The Dimensions of Soviet Economic Power*, p. 254.

are women and 63 per cent of those with semi-professional jobs. There is therefore less wastage of women's education than there is in the West.

Another indication of the massive educational effort in Russia is the output of books. About four times as many titles are published as in the U.S. or U.K., and the output of volumes per head of population is much higher. Public library facilities and their stock of books are much better in the U.S.S.R than in Western Europe. In Moscow the Lenin Library has 22 million books and there are two libraries in Leningrad each with 15 million volumes.

The Russians have not hesitated to change wage differentials to make the acquisitions of new skills attractive and they have not, of course, been restrained in this by trade unions. Their policy in this respect has varied a good deal, but they have enjoyed more freedom of action than the West. Their system has inculcated a respect for manual effort and technical skills which is absent in many developing countries.

(iii) *Research and Development*

The economy of the U.S.S.R. works well below the level of best practice technology as exemplified by the technological leader — the United States. The Soviet aim has always been to catch up with the United States. It has not been interested simply in reaching the intermediate level of Western Europe. In fact in many parts of industry its present technical level is abreast or beyond that of Western Europe. Its lower overall level is due primarily to the large size of its lagging agriculture. In view of these goals a good deal of its scientific programme has been devoted to catching up with the most advanced part of the industrial world, and in some fields such as atomic and space technology, the U.S.S.R. is in a leading position. Russian scientists have won a number of Nobel prizes, and their contributions in fields such as physics and medicine have been outstanding. It is extremely expensive to be in a pioneering position where you are attacking the frontiers of knowledge for the benefit of the world as a whole. On purely economic grounds the size of the Russian research effort is hardly justifiable. The reasons for it are both military and ideological. Marxist theory is based on a rejection of religion and a materialist

conception of reality which places heavy emphasis on science. For this reason Soviet scientists have a very high prestige, high pay and great resources for their work, in fundamental as well as applied science. In some fields politics have interfered with academic freedom to the detriment of science. This is particularly true in the social sciences. The economic repercussions of this have probably been greatest in agriculture, where economic performance has been poorest, where politicians have hoped for miracles, and where Lysenko has dominated the scene. Soviet achievements in agricultural research seem to have been less successful than those in smaller countries such as Mexico, Israel or Japan which have had better returns on a smaller expenditure which was aimed to solve practical economic problems. In some respects Soviet technology is simpler than that of the West, simpler machine tools, lathes, tractors, cars that work on cruder petrol, etc., and may therefore in some lines be marginally more useful to developing countries (33), but Soviet scientific research has not made any major contribution in devising a technology appropriate for countries which are poor in capital. It has always been dominated by the aspiration for the technical optimum.

Therefore a good deal of Russian scientific effort has been devoted to the progress of the world as a whole rather than to solving specifically Russian economic problems. It is, however, more centrally directed than Western science, because of the powerful role of the Academy of Sciences, and in many military fields has been able to produce quick results when heavily concentrated.

According to E.C.E., Soviet expenditure on research and development was 2.5 per cent of G.N.P. in 1960, a figure surpassed only by the U.S.A. However, Russian research in the 1950s appears to have absorbed an even bigger share of G.N.P. than in the U.S.A. A good deal of this research was for military purposes. In France, 40 per cent of research outlays have been for military purposes. In the U.K., the defence departments financed 59.1 per cent of research in 1955, and 38.7 per cent in 1961. It seems likely that the defence proportion in the U.S.S.R. has been at least as high as in the U.K. and France.

(33) See comments on Russian technology by David Granick, p. 276 ff. in *Value and Plan* edited by G. Grossman, University of California Press, 1960.

Table 9

RESEARCH AND DEVELOPMENT EXPENDITURE AS SHARE OF G.N.P.

	1950	1955	1960
U.S.A.	1.0	1.4	2.8
U.S.S.R. a	1.2	1.5	2.5
U.K.		1.7	2.5
Germany (F.R.)		0.8	1.3
France			1.1 b

Source: E.C.E., *Some Factors in Economic Growth in Europe During the 1950s*, Geneva, 1964, Chapter V, p. 5.

a Share of net material product.

b There may be some understatement here, arising from the fact that the fiscal treatment of private research outlays is less favourable in France than elsewhere.

In 1962, the U.S.S.R. had 4,476 scientific institutes of which 1,911 were research establishments (34). For 1959, the E.C.E. gives the following figures on the comparative number of personnel engaged on civilian scientific research:

Table 10

SCIENTISTS AND ENGINEERS ENGAGED IN CIVILIAN RESEARCH IN 1959

U.S.	U.S.S.R.	U.K.
327,000	318,000	98,000

Source: E.C.E., *Op. cit.*, Chapter V, p. 12.

It seems clear that the Soviet scientific effort is relatively bigger than that of any European country except the U.K.

A major drawback of Russian science and technology is its isolation from the Western effort. There are very few foreign technicians working in Russia. Those who come are mostly engaged

(34) See *Narodnoe Khoziastvo*, *op. cit.*, pp. 581-2.

in installing machinery purchased in the West, and there are very few working under contract as there were in the 1920s. In Western countries there is a good deal of foreign private investment which helps to diffuse new technologies as well as a very free interchange of scientists. But the proportion of Russians who study abroad is very small indeed — about 300 in 1960 as compared with many thousands of Western graduate students.

The Russians have done a great deal to combat this isolation and to adapt foreign technology. They have no legal constraints such as royalty, copyright, patent or licensing arrangements to inhibit them from copying the West, and they will where necessary pay for licenses. Similarly their firms do not hide trade secrets from each other.

In addition they have an abstracting service which digests 400,000 foreign scientific papers a years (35). This effort is an important reason for their capacity to adapt new technology and to maintain such high levels of investment without sharply diminishing returns.

(iv) *Structural Change*

Most of the Russian output increase in the 1950s was due to the rise in productivity, whereas the bulk of the output gains from 1928 to 1950 were due to the increase in employment. In the 1950s Soviet productivity growth was faster than that of all Western countries, whereas from 1928 to 1950 it was generally lower.

Less than a quarter of the Russian output growth in the 1950s was in services and more than three-quarters of it was attributable to the commodity producing sectors of the economy. This was a somewhat higher proportion than in most West European countries, and much higher than in the U.S. where services accounted for 60 per cent of the output increase in the 1950s. This concentration on commodity production was favourable to productivity growth because productivity rose faster there than in services. However, the Russians had a bigger relative increase in agricultural output where their productivity gains were slower than in industry.

(35) Cf. JOHN GUNTHER, *Inside Russia*, Penguin Books, p. 311.

In analysing the impact of structural change on productivity growth, the important thing is the switch of employment between sectors with a low *level* of productivity to those with a higher *level*. This is more significant than the impact of employment movements between sectors with different *rates* of productivity growth. In fact the differences between productivity levels in the major sectors are much wider in the U.S.S.R. than in Western countries, so that a given change in employment structure will have a bigger impact on output there than it would in a Western country. If the Russian employment structure had remained as it was in 1950 without affecting productivity developments within sectors, then Russian output in 1960 would have been 9.5 per cent lower. This is larger than the impact of structural change in Western countries — if we make the same assumptions for Italy, the 1960 output would have been 7.5 per cent lower, German output 6.8 per cent lower, French output 6.3 per cent lower, U.S. output 1.7 per cent lower, and U.K. output 0.1 per cent lower (36).

Although the impact of structural change was bigger in the U.S.S.R., the change in Russian employment structure was not as favourable to productivity growth as that in Western Europe. The impact of the Soviet change was larger simply because of the stark contrast between productivity in the backward agricultural sector and modern industry. If the U.S.S.R. had had the same change in employment structure as Germany (but had retained its own in-sector productivity characteristics), its 1960 output would have been 2.4 per cent higher than it actually was; if it had followed the French pattern its output would have been 16.1 per cent higher (37).

Thus structural changes contributed to Soviet growth in the 1950s, but not on a substantially greater scale than in continental

(36) Estimates derived from annex Tables I - 5 to I - 10.

(37) These hypothetical exercises involve unrealistic assumptions about the transitivity of economic structures. Even when the analysis of structural shifts is confined to one country, as in the preceding paragraph, the in-sector productivity movements are not causally independent of the intersectoral shifts. Apart from this our measures of productivity levels and trends by sector are less accurate than those for the economy as a whole; furthermore, the definition of structural change can be altered simply by dividing the economy into more sectors; and finally it should be noted that the statistical measurement we have used slightly exaggerates the impact of structural change. The reason for this is technical and of minor importance here, and is explained in A. MADDISON, "Productivity in an Expanding Economy", *Economic Journal*, September 1952, p. 587 ff. where a similar method was used.

Western Europe. If the Soviet Union manages to release a significant amount of labour from agriculture, structural factors could well play a greater role in the future than in the 1950s.

(v) *Disarmament*

According to the estimates of Bergson, the U.S.S.R. devoted 13 per cent of its G.N.P. to its military effort in 1955. This ratio is one which is subject to error as it involves estimates of magnitudes which are military secrets. It is, however, a field in which Western experts have done a great deal of research, and there is little reason to think that it is very much out of line. At the end of the 1950s the figure was probably a little lower than this.

If we assume that there were an arms freeze in the course of the 1960s, in which the absolute size of Soviet military expenditure remained unchanged, then the Soviet Union would have extra resources available which during the 1960s would average around 3 per cent of G.N.P.

It is difficult to say where the extra resources would go, but we can safely dismiss the hypothesis that a fall in military demand would simply lead to unemployment. Some of the resources released would be of a type which could be switched to space programmes, and others would be highly suitable for building up consumer durable output for which there would be a very ready demand, e.g. transistor radios and automobiles. It is also possible that the Soviet authorities would find it profitable to increase the rate of investment. This is already high, but could be pushed higher. After all, the Japanese rate of gross investment in the early 1960s was as high as 40 per cent of G.N.P. If we assume that half of the resources released by an arms freeze were devoted to investment, and that the return on investment remained the same, then the rate of growth would be increased by about half a per cent a year, e.g. from about 6.5 to 7.0 per cent in the 1960s. My own hunch is that the organisational difficulties in agriculture and in the service sector, and some of the organisational problems of running an overplanned economy will not make it profitable to push investment much higher than present levels, and that the consumer would therefore probably claim a sizeable part of the resources released from an arms freeze.

(vi) *Foreign Trade*

The Russian economy improved resource allocation in the 1950s through increased international trade. Total trade rose faster than output, but trade with non-bloc countries rose about three times as fast as output. This was a move away from the extreme autarky which had been developed between 1917 and 1953. The earlier period was dominated by feelings of insecurity which are no longer appropriate to a country with hydrogen bombs, and in a world where communism is a well established political system adopted by thirteen other countries. A narrowly autarkic system would not be consistent with the belief in the possibility of peaceful coexistence and of co-operation with the new neutralist world created with the ending of colonialism. In fact the foreign trade of the Russian economy is now as big as that of the U.S. relative to G.N.P., so that one might well expect the trade ratio to have reached a peak, particularly as the U.S.S.R. is a larger country than the U.S.A. However, the U.S.S.R. is less well endowed with the wide variety of natural resources which the U.S. enjoys; it is contiguous to a large number of other countries unlike the U.S.; it is at an earlier stage of development in which commodity output (i.e. tradeable output) is a much higher proportion of G.N.P. than in the U.S. — the U.S. once traded 7 per cent of its G.N.P.; the Soviet economy's range of comparative advantage in different industries is wider than in most countries as a result of past policies and the nature of its institutions — such as collectivisation. There is therefore every reason to expect that the U.S.S.R. could still find it profitable to expand considerably the proportion of output which is traded. In particular it would seem highly attractive to export capital goods and import more consumer goods, raw materials, tropical foodstuffs, and cereals. In many respects its technology is such that it has a natural complementarity with the underdeveloped countries. An increased foreign trade ratio would lead to additional uncertainty in the economy, and is for this reason unappealing to Soviet planners, but this can be tempered by long term trading agreements and many underdeveloped countries welcome the type of long term trading arrangements which the U.S.S.R. likes to make. Some of the problems of expanding trade are technical. In a country which has practised autarky for so long, the knowledge of foreign markets may be inadequate, particularly for

consumer goods. Arrangements for credit may not be easy and the non-convertibility of its currency is also a handicap. But none of these points can be expected to prove a serious obstacle to more rational trading policies.

(B) *Unfavourable Factors*

(i) *Centralised Controls and Inefficient Price Mechanism*

The Soviet economy is one in which all means of production are publicly owned, and where private enterprise is virtually non-existent apart from the small private plots of members of state and collective farms. Private house ownership is largely confined to the countryside. The extent of public ownership is more extreme than in other communist countries in some of which agriculture is still to a good extent in the hands of peasant farmers — such as Poland or Yugoslavia — or where small shopkeepers and traders still exist. Unlike Western economies there is no pluralistic interplay of countervailing pressure groups in the economy. Because the government wields power directly, it has no need of an elaborate tax system to redistribute income. It can directly determine what it feels to be equitable or economically useful. Similarly it does not need to compensate fluctuations in private activity by monetary and fiscal policy. It does not have to worry about the maintenance of enough private demand to maintain full employment as do Western governments. It does not have to appease the interests of trade unions or employers, and is much less sensitive to regional pressure groups than most countries. The system relies on very detailed government controls to allocate resources according to the priorities of the planning authorities. Soviet policy has always preferred economic enterprises to be run on a giant scale so that they would be easier to administer from the centre. There are, of course, some very real economies of scale to be obtained from large enterprises. Gigantomania probably does little damage to efficiency in industry, but it hurts agriculture, and did very great damage to handicrafts, small repair shops, etc. Because of these direct controls over all economic activity the administrative burden of running the U.S.S.R. is higher than that of a Western country, and a good deal of the state's economic discipline is reinforced by the activities of the communist party. This group is no longer particularly enthusiastic

and dedicated, as in the early days of the Soviet regime, nor is it brutally coercive as in the days of Stalin, but it is bureaucratic and heavy handed. The efficiency of the system can be very high in key sectors, but in those with lower priority it is bumbling and unsatisfactory. Hence the different sectors tend to move in uneven leaps as campaigns are directed to make good deficiencies arising from previous neglect.

One of the major disadvantages of this system of resource allocation is its inflexibility in responding to sophisticated consumer tastes and meeting changes in demand. The output criteria of enterprises are fixed in terms of planned targets and these may predominate over the consumers' needs. As the economy becomes more complex it becomes more difficult to take rational decisions centrally. Nails will be big if the plan target is in terms of weight, and small if the target is fixed in number of nails. Therefore the number of directives to be given is very large. In many cases managers have devised semi-legal substitutes for the price mechanism, and there have been substantial administrative changes since 1957 in an attempt to decentralise decision making, but these do not seem to have been highly successful. In recent years there has been a considerable development of econometric models and data processing but these tools have not yet made a major contribution to the efficiency of economic policy.

A major defect in the Soviet economic system is the inefficiency of the price mechanism as a device for allocating sources and as an indicator of scarcity relations. There is a reluctance to use rent or interest payments as a device for rationing the use of scarce resources, because under capitalism these payments are a reward to property owners. There is still a strong utopian strain in Soviet thought in spite of Marx's rejection of Utopian socialism as unscientific. Marxist politicians tend to assume that human wants are satiable or that technology will be revolutionised to a degree where certain goods will become free. They retain an austere and technologically obsolete view of what constitutes a decent standard of personal consumption. As a result some scarce items such as accommodation and public transport are sold at ridiculously low prices, and availability of automobiles is restricted to such a degree that their use for private transportation is regarded as almost immoral.

The consumer suffers a good deal because of the failure of prices to reflect the state of supply and demand and this also impe-

des the efficiency of production. As the standard of living rises, the state also finds itself with the problem of inventories of unsaleable products. At the beginning of 1965 the chairman of the state committee on commerce drew attention to inventories in the garment industry of 270 million rubles (38). There have been increasing complaints from Soviet experts that lack of an interest rate leads to misallocation between investment projects (39) or that absence of rents for scarce natural resources has led to squandering of mineral wealth or wasteful use of land in farming or as between farming and building uses. When the detailed directives of the plan are not clear or consistent the price relationships do not help to reinforce the plan objectives by pushing resources in the right direction, because the price structure has not been designed to perform an allocatory function.

The Soviet economy therefore suffers from two major defects — overcentralised planning, and an inefficient price system. These defects of the Soviet system are not a necessary feature of all communist economies, just as the genuine advantages of planning need not be denied to capitalist economies.

In Yugoslavia, enterprises have much more autonomy than in the U.S.S.R. Prices are fixed much more like those in a Western economy and managerial decisions can be made largely in response to market forces. This is also true of peasant agriculture in Yugoslavia. As a result the Yugoslav planning authorities are largely concerned with "global proportions" (40), and their task is closer to that of French planners who like to define their system as "indicative" as opposed to the "imperative" planning of the U.S.S.R.

Soviet economists have been increasingly critical of the usefulness of such heavy reliance on direct controls as a mechanism for allocating resources. The official reluctance for change is due not merely to conservatism but to reluctance to decentralise political and economic power. Very recently, it would seem that the protagonists of market forces (led by Professor Liberman of Kharkov University)

(38) Cited in *The Times*, London, January 14th, 1965.

(39) See the views of Academician Z. F. Chukhanov on the wastes involved in building hydro rather than thermal generating stations. They are cited in *Dimensions of Soviet Economic Power*, 1962, Joint Economic Committee, U.S. Congress, p. 702.

(40) See "Planning in Yugoslavia", by Branko Horvat, in *Development Plans and Programmes*, O.E.C.D., Paris, 1964.

have gained ground. After an experiment with a few factories, a decree of January 1965 has changed the system for 400 consumer goods factories. From April 1st these factories will respond to orders from retail outlets rather than from the central planning authorities, and they too can pass on orders to raw material suppliers. In this way consumer demand can make its impact much more directly than ever before.

The major adverse effect of the Soviet system of resource allocation has not been on production as measured statistically, but on consumer satisfactions. The consumer gets rather poor quality goods as a result of extreme standardisation, inadequate design and the emphasis on quantitative rather than qualitative production targets. He also suffers because of the tendency to regard service industries as unproductive. Soviet shops show little disposition to attract customers, to carry out market research, to select the goods consumers prefer, or to provide them with sophisticated services. They do not display their goods well, advertise, or provide packaging or delivery services, and their facilities for consumer credit are limited. There is evidence of some improvement. Queues are not particularly obvious nowadays, except those outside churches, and the increase in workers in distribution has been substantial.

The Soviet consumer is isolated from the outside world because of lack of foreign films, books or newspapers, but the stylistic isolation has been mitigated by the influence of foreign tourists and broadcasting which have affected tastes in some directions, such as clothing styles for men, hair styles for some women and tastes in pop music. In respect of the theatre, museums, libraries and circus, the Russian public gets a much better deal than that in the West. There are more of these facilities than in Western countries, they are cheaper and better; nevertheless the system of resource allocation adds unnecessarily to the drabness of Soviet consumption.

(ii) *Agriculture*

In most Western countries, agricultural productivity grew rapidly in the 1950s and the abundant supply of agricultural products made it possible for large numbers of people to move from agriculture to higher productivity occupations elsewhere. In the Soviet Union, agricultural productivity grew very much faster

in the 1950s than in earlier decades, but agricultural products remained in short supply and very little labour was released from agriculture. The U.S.S.R. devoted relatively more of her investment to agriculture than did Western countries. Russian agriculture in the 1950s also went through a phase unparalleled elsewhere, in that about a third was added to the total acreage of arable land. The Russian productivity achievement was therefore achieved at greater cost than in the West. There was a marked slackening in agricultural growth after 1958. Between 1952 and 1958 agricultural output rose 7.4 per cent a year, but from 1958 to 1962 it rose only 1.7 per cent a year and in 1963 it fell. The difference was partly due to weather, partly because the impact of earlier policy changes had worn off.

TABLE II

AGRICULTURAL INPUTS IN 1961-62

	Hectares of Arable Land per head of population	Consumption of Fertilisers - Kg. per Hectare of Arable Land	Tractors per 100 Hectares of Arable Land
Canada	2.25	10	1.3
France	0.46	122	3.7
Germany (F.R.)	0.15	304	11.8
Italy	0.31	57	2.0
Japan	0.06	270	0.2
U.K.	0.14	194	5.7
U.S.A.	0.99	45	2.5
U.S.S.R.	1.04	12	0.6

Source: F.A.O., *Production Yearbook*, 1963, Rome.

The absolute level of output per man is much lower in the U.S.S.R. than in Western Europe in spite of more abundant land. The lower level of productivity is only partly due to adverse climate. The stock of capital in agriculture is much smaller in the U.S.S.R. than in Western Europe — the supply of tractors is only about a tenth of that in the U.K. or a twentieth of that in Germany per unit of arable land. Inputs of fertiliser are even further behind those in Western Europe. But the major reason for the lag in Russian agriculture has been bad economic policy.

There have been five major problems hindering the productivity of Russian agriculture:

(a) the process of change from peasant ownership to collective farms was extremely costly and did lasting damage;

(b) the management units have been inefficient with excessively large collectives, quarter hectare private plots, and machine tractor stations which separated control of equipment from the farm enterprise;

(c) the use of centralised directives and absence of efficient market prices have been particularly inappropriate in agriculture;

(d) the peasantry has in fact been an exploited class. The effective taxation of peasants has been pushed to lengths which have been a disincentive to production;

(e) agricultural research and extension has been inefficient. The political desire for miracles has encouraged charlatans, and vast experiments have been undertaken without adequate preparation or progress in producing appropriate seeds, etc.

The process by which the Soviet state achieved collectivisation involved very considerable brutality and suffering as well as severe damage to the capital stock and productivity of agriculture. The peasantry was hostile to collectivisation, destroyed farm buildings and equipment and slaughtered livestock on a tremendous scale. Livestock production in 1933 was less than half of that in 1928, and the 1928 level was not achieved again till 1953. As a result, a good deal of the investment in Russian agriculture up to the 1950s simply went to replace losses of draft power due to the slaughtering of the early collectivisation period. Similarly, inputs of fertilisers had to make good losses from animal manure. Much of the managerial talent in Russian agriculture was also liquidated with the kulaks. Peasant hostility to collectives has meant that management had often to be entrusted to party officials who did not always enjoy the confidence of the peasants, and who were not always good managers.

The system of agricultural organisation in Russia is highly unfavourable to productivity and is the major weakness of the Russian economic system. As a fundamental change in organisation is unlikely for political reasons, it seems likely that this will remain as a major factor retarding economic growth. In several types of

agriculture the most efficient production unit is relatively small. This is particularly true of dairy farming, and rearing of certain kinds of livestock. The giant sized Russian farms are probably quite efficient in certain crops, but even here they put a severe strain on managerial capacity. The productivity of the private plots is much higher than that of the collectives. These are about ¼ or ½ a hectare per family and in 1961 they occupied 3.2 per cent of the sown area. However, they produced 63 per cent of the potatoes, 46 percent of the vegetables, 41 per cent of the meat, 47 per cent of the milk and 87 per cent of the eggs (41).

It is much more difficult to run agriculture efficiently on the basis of centralised directives than is the case in industry. The pace of work varies greatly throughout the year, and techniques of production have to be responsive to local variations in soil and climate. It is therefore extremely difficult to subject this sector to factory production methods and disciplines or to centralised control. Nevertheless the process of consolidation of collective farms into bigger units was continued in the 1950s, when the number of farms was reduced by threequarters. It is easier to exercise central control if farming units are very big, but to run these large farms successfully it is necessary to have very large inputs of machinery and highly skilled management, which are very scarce resources.

Productive incentives were hampered by the fact that peasant incomes were depressed well below the level of urban workers. The State paid farmers low prices for compulsory deliveries, and taxed income from private plots heavily. The *trudoden* system of wage payment on collective farms by which the proceeds of the enterprise were allocated between farm members meant that rural incomes were very uncertain, were paid annually and largely in kind. The rewards for effort varied considerably from one farm to another according to their endowment in terms of soil and climate. There was no system of differential rents to correct for these variations, though some crude attempt to do this was made in fixing the delivery quotas. Capital goods purchased by collective farms were more expensive than those for state farms, and, until recently, farm workers were not entitled to social security benefits.

(41) See J. W. WILLETT, " The Recent Record in Agricultural Production ", *Dimensions of Soviet Economic Power, op. cit.*

As income was largely in kind, farmers had to engage in very wasteful marketing activities to raise cash. Their efforts to increase their income by developing their private plots were frustrated by severe controls as well as heavy taxes. Their tax burdens also tended to be arbitrary in their incidence. Apart from these factors which kept income low, peasants suffer because social and educational facilities are poor, shops and their merchandise, transport facilities and entertainment are inferior to those in the cities.

The original justification for squeezing the income of the farm population was to finance the increase in investment of the economy. At the present stage of development, it is no longer necessary for them to bear this burden. Even in the first five year plan period this policy was not justified in the extreme degree to which it was applied. The simultaneous attempt to squeeze the consumption of the farm population and to seize their property reduced the rate of growth of the economy because of its adverse effects on agricultural output. A smaller squeeze would have reduced output less, and would have reduced the need for tractors to replace slaughtered farm animals. Moreover a greater monetisation of farm income and a greater reliance on tax policy rather than compulsory deliveries would have mitigated some of the wastes of the clumsy system of payment in kind which has clogged agricultural production and markets.

The Soviet attitude to agricultural ownership and control was based on ideological principles which were pushed ruthlessly in spite of their obvious economic disadvantages. All communist countries have had trouble with agriculture, and some of them have retreated sharply from these policies, e.g. Yugoslavia and Poland. In Russia the system has now existed for such a long period that there would probably be economic losses in moving back completely to peasant proprietorship, and the commitment to collectivisation is in any case much greater ideologically than in other communist countries. The Soviet government is seeking to overcome these problems by developing agriculture in a highly mechanised way with large scale units as in the U.S.A. There has already been a substantial concentration of collective farms in larger units and a growing importance of state farms whose members are wage earners. Russia has better possibilities for extensive agriculture than other communist countries because of its enormous size relative to population. However, a highly capitalised agriculture is a wasteful

substitute for better economic incentives to the abundant supply of agricultural labour.

The agricultural situation improved greatly from 1953 to 1958 for several reasons. In the first place the relative incomes of the farm population were raised by the reduction of taxes in cash and kind on private activities, farm prices were raised, and in 1958 the complex multiple price system for deliveries at or beyond quota was abandoned in favour of a single price system with area variations. More recently social security has been extended to farmers. However, the basis of farm income is still somewhat arbitrary and uncertain, and restrictions still remain on the private activities of peasants. After 1958, the abolition of the M.T.S. imposed heavy financial burdens on farmers who had to purchase their equipment at a time when bad weather reduced income from crops.

There was a major increase in the farm area by the opening up of the virgin lands, particularly in Kazakhstan, so that the ploughed area increased by about 42 million hectares between 1954 and 1960. This had a considerable once-for-all effect in raising output, but has increased the impact of weather fluctuations on total agricultural output, has increased the problems of erosion and has posed a whole series of new technical problems.

There has been a considerable switch to maize production to provide feed for livestock. The area under corn rose from 4.3 million hectares in 1954 to 37 million in 1962. It was hoped that this would contribute greatly to productivity by using hybrid maize as developed in the United States. This programme has helped to raise output but it has been difficult to develop a type of corn well adapted to Russian conditions. In 1961 Kruschev started a campaign to plough up grass and fallow and grow corn, sugar beets, peas and field beans instead. This gave a short-run boost to output but was challenged by scientists because of the risk to soil fertility. Nevertheless Kruschev planned to plough up 41 million hectares (42).

The policies of increasing acreage and increasing farm incentives had a major effect in increasing farm output up to 1958. Since then progress has been very slow in spite of the relatively high rate of investment. The poor performance since 1958 was only partly

(42) See J. W. Willett, "The Recent Rceord in Agricultural Production", *Dimensions of Soviet Economic Power, op. cit.*

due to bad weather. It was also poor because the earlier policy changes were inadequate. The extension of the cultivated area had a once-for-all effect, the policy for increasing and stabilising farm income did not go far enough and the control apparatus remained too heavy handed.

As far as the future is concerned, it seems that agriculture will remain a major obstacle to faster Russian growth. The level of income and food production per head is lower than in Western Europe, so that the future demand for farm products will continue to be substantial — with an elasticity smaller than in the past, but higher than in Western Europe.

The organisational problems of agriculture are likely to remain a serious handicap. There is still pressure to increase the size of farms, to run the farm economy on the basis of centralised directives and to hamper production on the small private plots. In spite of the abolition of M.T.S., centralised direction was reinforced in 1961 and 1962. There is still a good deal of party interference with farm management. None of these tendencies seems likely to be radically changed.

In the longer run, the production problem for many crops will probably be eased if large amounts of fertilisers and farm machinery can be provided to highly capitalised state farms where workers are paid regular wages, and organised in fair sized towns with reasonable social amenities and shopping facilities. But improved livestock production will require more freedom and better marketing arrangements for private plots. The Soviet state will need to give collective farmers a higher and steadier income. In fact this seems quite feasible now that the savings ratio of the economy is so high and farmers are only a third of the total population.

V - Future Growth Potential

The major reasons why the Russian economy did better than most Western countries in the 1950s was that it had a higher rate of investment, it made a large scale effort to produce the new skills required for economic growth and it made some improvements in agricultural policy. There were some recovery elements in growth in the 1950s but these were not greater than in Western Europe, and the structural pattern of output change and

of investment was only a little more favourable to growth than developments in the West. Growth was also helped in the U.S.S.R. as in Western Europe by the reduction in the relative burden of defence, and the improved allocation of resources through trade. Because of the decline in the defence burden, and the fact that share of investment and government expenditure did not increase, the consumer was able to enjoy the fruits of economic progress on a scale unparalleled in Soviet history. The increase in labour input was smaller in the 1950s in the U.S.S.R. than in all major industrial Western countries in terms of man hours. The rate of productivity growth was not paralleled elsewhere. At the end of the 1950s and the beginning of the 1960s, Soviet growth slowed down because of difficulties in agriculture, deficiencies in the planning mechanism, and the reduction in working hours.

The future rate of growth will be affected by the inputs of new investment, labour, and the skills of labour. It will also be affected by the pattern of output, which in its turn will depend on the structure of demand (to a considerable extent this is simply a reflection of the government's preferences as to resource use). The effectiveness of these inputs will be affected by the constraints imposed by the quality of natural resources, the existing economic structure and level of development, and the rate of technological progress. Growth will be affected by institutional and administrative constraints on economic efficiency, and by relations with the outside world. We have tried to analyse the interplay of these forces in explaining past growth, and some of our views of the future have already been stated or are implicit in what has already been said.

The increase in employment in the 1950s was at an annual rate of 1.6 per cent. The population of working age is likely to increase a little faster in the next decade than in the last, so that one might expect the growth of labour supply to be as favourable to future growth as that of the 1950s. In the 1950s, working hours fell considerably from 48 to 41 per week, i.e. by about 15 per cent. A good part of the fall in working hours took place in 1960, toward the end of the year (43). It therefore had little impact on the growth of G.N.P. in the period 1950-60. Consequently the increase in output per man hour recorded in our Table 5 is very large for 1950-60, but somewhat misleading. The cost of such a large fall

(43) See Gertrude Schroder in *Dimensions of Sovietic Economic Power*, p. 158.

in working hours was not reflected in output until after 1960, and is probably a major reason for the slowdown in the early 1960s. Further reductions in working hours are likely to have an even bigger proportional impact on output. A good deal of wasted time was probably eliminated in the reduction to 41 hours, whereas this would not be the case if weekly hours were reduced, e.g. to 35 as was once stated to be the official aim for 1964-68. The facilities for enjoyment of leisure are somewhat limited in the U.S.S.R., and annual holidays are already rather long, so that it would seem irrational to sacrifice output gains for increases in leisure in the 1960s. It therefore seems unlikely that working hours will fall nearly as drastically in the 1960s as they did in the 1950s — a figure of 5 per cent seems more likely than 15 per cent of the 1950s. We might therefore expect total labour input to increase at something like 1.3 per cent a year over the next decade, as compared with around zero in the 1950s.

In the 1950s, Soviet output per man rose by 5.1 per cent a year, and output per man hour by 6.8 per cent. For the reasons given above, the output per man hour figure was influenced by special factors, and it would not seem reasonable to expect output per man hour to grow at much more than 5 per cent a year. This would mean a total G.N.P. growth of around 6.5 per cent a year.

However, it does not make sense simply to extrapolate past trends. We must see whether the factors likely to affect productivity will be different in the 1960s from those in the 1950s. This, of course, involves a judgement on many factors, some of which are imponderable, and others largely political.

It seems likely that the rate of non-residential investment will be at least as high in the 1960s as in the 1950s, though there are some grounds for thinking that the return on investment in the 1950s was a little more favourable than can be expected in future. The level of investment in Japan is higher than in the U.S.S.R., marginally so in the 1950s, but much higher in 1960-63 at about 40 per cent of G.N.P.. The high Japanese investment rate is a major factor in its high growth rate, and the U.S.S.R. may also try to devote a bigger share of its resources to investment. The profitability of a given degree of capital deepening depends on the level of productivity at which the economy is operating, and as the Japanese level is below that of the U.S.S.R., the Soviet possibilities may be more limited than those of Japan. A more serious constraint on the

profitability of a major increase in the investment rate is that it would put a considerable strain on the planning mechanism to make resources flexible enough for a higher rate of growth.

In housing and in transport the Soviet capital stock is much more tightly stretched than in Western countries. In the years before the 1950s the U.S.S.R. was able to neglect these two kinds of investment to the benefit of sectors more closely geared to the growth of output. In the case of housing, this policy was changed in the 1950s, and the proportion of investment going to housing was no different from that in Germany. There may be some further increase in the share of investment going to housing, but this seems unlikely to be of major proportions as the rate of construction is already high. In the case of transport, the investment effort of the U.S.S.R. in the 1950s was proportionately much lower than that of Western Europe. This lower investment was partly due to a more rational use of resources in the U.S.S.R. which has avoided some of the competitive waste of the West. However, it seems doubtful if the U.S.S.R. can continue to economise on transport to the same degree in future. Farm efficiency depends to a sizeable extent on improvements in farm-to-market roads, and the Soviet consumption standard has got to a level where there will be increasing pressure for the use of private automobiles. For this reason there may be some slight increase in the capital output ratio in future.

Another factor which may make for a slightly higher investment output ratio in future is the higher proportion of gross investment required for replacement. Until the mid-1950s equipment was not scrapped in the U.S.S.R. until it was physically worn out. It is now scrapped when obsolete. This change in practice had already started in the 1950s, so that it involves no great change from the present situation. It will, however, probably raise the burden of replacement somewhat as compared with the average for the 1950s.

As far as training is concerned the Russian effort can hardly expand at the same pace as in the past, if only because the present effort is so large. But the stock of people with economically useful skills will continue to increase rapidly as the people entering the labour force will be much better trained than the existing average. Human resources may be a bottleneck to growth in sectors like

distribution and farm management, but here again, a large effort can readily be mounted if skills prove to be the bottleneck.

The research activities of the U.S.S.R. are likely to be directed to similar purposes as in the past. Some reduction in military research would probably result in a higher concentration on space research, aeronautics and other fields at the frontiers of knowledge, which are likely to advance the technology of the world as a whole rather than the economic growth of the U.S.S.R. Applied research on new industrial problems of chemicals has already been undertaken on a large scale. Research on agriculture may have a higher pay-off in future if it is given greater freedom, and research on consumer demand should certainly have a high pay-off.

There is still considerable scope for productivity gains arising from structural change. Russian agriculture has a very low productivity, and improvements there could release a great deal of labour for higher productivity sectors. The scope is bigger than in Western countries, as 38 per cent of the Soviet labour force is still in agriculture as compared with an average of less than half this for Western Europe. Even if agriculture does not reduce its labour force much in absolute terms, its share of the labour force will continue to decline, and that of industry will increase. On the other hand, there may well be a bigger expansion in services in the 1960s than the 1950s. The level of productivity in services is much higher than in agriculture, but it is lower than in industry, so that a bigger proportionate switch to this sector will somewhat dampen the benefits of structural change.

We should now consider how productivity is likely to move within each sector. There is reason to believe than the U.S.S.R. should still continue to get the same kind of return on industrial investment as in the past. Like Western Europe it is still working well below the fringe of best practice technology, the rate of investment in this sector is likely to remain high, and the effort to improve technical skills will also be intense. The level of development in industry is more uneven than in Western Europe, and there are sectors such as chemicals, textiles, and footwear where there is scope for large improvement by copying the West. If it is decided to make automobiles available to Soviet consumers on a large scale, the scope for productivity gains should be particularly large in this industry and its subsidiaries.

The performance of Soviet agriculture in the 1950s was much better than in earlier years, but this involved a major investment effort and a very large extension of the area of cultivation. Agriculture is likely to remain the major problem sector and the extension of cultivation to marginal areas has brought new risks of substantial crop fluctuations. Future growth will probably be slower than in the early 1950s, but should be better than from 1958-63. In future, there will be no scope for massive increases in the area cultivated, and main reliance will have to be placed on better incentives to farmers, more investment and fertilisers. It seems unlikely that there will be any move away from collectivisation, but even a moderate increase in the size of private plots would have very favourable effects on productivity.

It is likely that consumer income will continue to rise rapidly and the Soviet consumer will put up increasing pressure for better goods and sales resistance to inferior ones. This pressure has already led to changes in official policy towards production of consumer goods. It also seems likely that an increasing proportion of Russian income will go on services. The distributive services have been neglected and need vast improvement — better display of goods, more space for trying out goods, more variety, market research, advertising, and consumer credit. Restaurants, cafés and bars need great expansion and there are vast needs for improved repair services. Service facilities for automobiles are almost non-existent and will need enormous expansion if car ownership starts on any scale. Pressure in these directions is bound to rise as Soviet consumers increase their incomes. Many of the consumer services which need expansion are of a type where the private entrepreneurship of the West gives it distinct organisational advantages over the rather bureaucratic and centralised Soviet system. Progress in providing these services will probably also be impeded by lingering official prejudices against "unproductive" activities and "luxury" consumption. However, there is no reason to believe that productivity growth within the service sector will be slower in future than in the past. It may well be faster, once it is realised that progress in these fields is necessary. A major reason for poor performance in these sectors is that almost no high level manpower or managerial talent has been put into meeting these needs. If policy is changed in this respect good results can be anticipated.

Further progress towards improved allocation of resources through international trade seems likely, and some better degree of multilateralisation of the payments system, but it is unlikely that the Soviet authorities will want to continue to make the large scale imports of food products which would obviously be in line with their comparative cost situation. They would probably regard such dependence as strategically risky, and as too public an acknowledgement of the failure of their agricultural policies. In any case the relative expansion of trade is unlikely to be any faster than in the 1950s so that any impact it has in helping growth should simply continue the influence already present then.

Finally, it seems that the Soviet authorities are trying to increase the efficiency of resource allocation by greater freedom to enterprises, and are moving towards a price system which reflects relative scarcities.

On balance, therefore, it seems likely that Soviet growth policies may prove sufficiently flexible to push the economy above the growth path of the early 1960s, though they may not bring it back to the growth rates of the 1950s.

Angus Maddison

Paris.

TABLE I - 1

POPULATION GROWTH 1870-1960

Annual average compound rate of growth adjusted to exclude the impact of territorial changes

	1870-1913	1913-50 b	1950-60
France	0.2	0.0	0.9
Germany	1.1	0.8	1.1
Italy	0.7	0.7	0.6
Japan	1.0 a	1.3	1.2
U.K.	0.9	0.4	0.4
U.S.	2.1	1.2	1.7
U.S.S.R.	1.5	0.3	1.8

a 1878-1913.

b The low rates here are due to some extent to war losses. This is particularly true for the U.S.S.R. For 1920-39, its population growth was 1.2 per cent a year.

Source: A. MADDISON, *Op. cit.* for Western countries. European Russia 1870-1913 Kuznets, *Op. cit.*, U.S.S.R. 1913-60 *Narodnoe Khoziastvo C.C.C.R. v. 1962 g.*, pp. 7-8. Japan, *Historical Statistics of Japanese Economy*, Bank of Japan, 1962.

TABLE I - 2

INDICATORS OF SOVIET CONSUMPTION PER CAPITA

	1928	1937	1950	1958
1. Per capita private consumption (1937 prices)	103	100	114	191
2. Per capita consumption of communal services (1937 factor cost)	29	100	131	154
3. Per capita consumption and communal services	91	100	116	185
4. Urban housing space, square metres per capita	5.8	4.6	5.0	5.5

Source: JANET G. CHAPMAN, pp. 238-39 of the chapter "Consumption" in *Economic Trends in the Soviet Union*, edited by A. Bergson and S. Kuznets, Harvard, 1963.

TABLE I - 3

INDICATORS OF RUSSIAN GROWTH BY SECTOR

	1870-1913	1913-28	1928-50	1950-62
Soviet Official Indicators				
1. Industrial Production	6.4 a	1.9	11.1	11.3
2. of which light industry		1.2	7.3	9.7
3. of which heavy industry		3.0	14.0	12.2
4. Agricultural Output		1.4	0.6	4.3
5. Freight & Passenger Transport		0.2	8.1	9.5
6. Non Residential Investment			14.4	12.6 b
Western Estimates				
7. Industrial Production	5.3	0.1	6.3	9.3 b
8. Agricultural Output		1.0	0.1	5.8 c

a 1887-1913.
b 1950-1961.
c 1950-1959.

Source: *Narodnoe Khoziastvo*, *Op. cit.*, pp. 117, 226 and 379, respectively, and *Kapitalnoe Stroitelstvo v C.C.C.R.*, *Moscow*, 1961, p. 39-40. Row 7, 1870-1950, WARREN NUTTER, *The Growth of Industrial Production in the Soviet Union*, N.B.E.R., 1962; 1950-1961 *Dimensions of Soviet Economic Power*, p. 125. Row 8, D. G. JOHNSON, "Agricultural Production" in Kuznets and Bergson, *Op. cit.*, p. 210.

TABLE I - 4

GROWTH OF INDUSTRY AND AGRICULTURE IN THE U.S.S.R. AND THE WEST

	Industrial Production			Agricultural Output
	1913-28	1928-50	1950-62	1952-62
France	1.7	0.3	6.3	3.4
Germany	0.9	1.0	8.1	2.4
Italy	2.9	1.7	9.1	2.5
Japan	8.4 a	0.4 a	15.5	2.7
U.K.	0.6	3.1	2.8	2.9
U.S.	3.7	3.6	3.9	1.1
U.S.S.R.	1.9	11.1	11.3	5.1

a Manufacturing only to 1930.

Source: Industrial Production; Western countries from O.E.E.C., *Industrial Statistics 1900-59*, p. 9, and O.E.C.D., *Industrial Statistics, 1900-62*, p. 4; Japan from *Historical Statistics of Japanese Economy*, p. 12, and O.E.C.D., *General Statistics*, May 1964, p. 83; U.S.S.R. from *Narodnoe Khoziastvo*, p. 117. Agricultural output, O.E.C.D., *General Statistics*, May 1964, Table III; O.E.C.D., *Economic Survey of Japan*, July 1964, Statistical Annex Table I; *Narodnoe Khoziastvo*, p. 226.

TABLE I - 5

STRUCTURE OF EMPLOYMENT 1960

Percentages

	Agriculture Forestry and Fishing	Industry (Including Construction)	Other	Total
France	21.6	37.7	40.7	100.0
Germany	14.3	48.0	37.7	100.0
Italy	30.6	37.7	31.7	100.0
Japan a	32.8	29.1 a	38.0 a	100.0
U.K.	4.3	47.6	48.1	100.0
U.S.	9.0	32.0	59.0	100.0
U.S.S.R.	38.2	27.7	37.1	100.0

Source: European countries and U.S. from O.E.C.D. *Manpower Statistics 1950-62;* Japan, *Historical Statistics of Japanese Economy*, Bank of Japan 1962, p. 41; U.S.S.R. from *Dimensions of Soviet Economic Power*, Joint Economic Committee, U.S. Congress 1962, pp. 43, 615, 620, 649.

TABLE I - 6

STRUCTURE OF G.D.P. AT FACTOR COST IN 1960

Percentages

France	9.7	48.1	42.2	100.0
Germany	6.3	53.1	40.6	100.0
Italy	17.1	43.6	39.3	100.0
Japan a	15.4	37.7 a	46.9	100.0
U.K.	4.1	48.8	47.1	100.0
U.S.	4.4	37.5	58.1	100.0
U.S.S.R.	17.0	51.6	31.4	100.0

Source: European countries and U.S. *Statistics of National Accounts 1955-62*, O.E.C.D.; Japan from O.E.C.D. *Economic Survey of Japan*, 1964; U.S.S.R. from Table I - 10.

TABLE I - 7

PRODUCTIVITY LEVELS BY SECTOR OF THE ECONOMY IN 1960

Output per Man in Sector as Percent of National Average Output per Man.

France	44.9	127.6	103.7	100.0
Germany	44.1	110.6	107.7	100.0
Italy	55.9	115.6	124.0	100.0
Japan a	47.0	129.6 a	123.4 a	100.0
U.K.	95.3	102.5	97.9	100.0
U.S.	48.9	117.2	98.5	100.0
U.S.S.R.	44.5	186.3	92.1	100.0

a Electricity, gas and water included with services.

Source: Derived from the two preceding tables.

CHANGE IN EMPLOYMENT BY SECTOR 1950-60 TABLE I - 8

	In Sector Percentage Change				Per cent of Total Change			
	Agriculture	Industry	Other	Total	Agriculture	Industry	Other	Total
France	−25.1	9.5	23.3	3.8	−198.4	80.7	218.0	100.0
Germany	−28.0	39.3	44.4	24.4	− 28.3	69.2	59.1	100.0
Italy	−14.2	51.9	35.0	18.9	− 31.8	80.4	51.3	100.0
U.K.	−15.8	9.1	6.0	6.3	− 13.7	71.0	42.8	100.0
U.S. a	−22.4	10.0	25.3	14.0	− 21.1	23.9	97.2	100.0
U.S.S.R.	− 1.8	52.3	21.5	17.4	− 4.6	64.0	40.6	100.0

CHANGE IN OUTPUT BY SECTOR 1950-60 TABLE I - 9

	In Sector Percentage Change				Per cent of Total Change			
	Agriculture	Industry	Other	Total	Agriculture	Industry	Other	Total
France	31.1	66.9	53.3	56.8	6.8	54.1	39.1	100.0
Germany	33.4	144.0	87.4	108.5	3.2	62.7	34.1	100.0
Italy	27.8	147.9	55.9	80.2	9.5	64.1	26.4	100.0
U.K.	25.9	35.1	22.4	28.5	4.6	57.3	38.1	100.0
U.S. a	12.4	38.4	40.4	37.8	2.1	38.9	59.1	100.0
U.S.S.R.	51.6	161.0	50.9	93.1	12.0	66.0	22.0	100.0

a 1960 figure for U.S. includes Hawaii and Alaska.

Sources: For Western countries, employment from O.E.C.D. *Manpower Statistics* adjusted for France and Italy from national sources for 1950, and output from *Statistics of National Accounts 1950-61*, O.E.C.D. U.S.S.R., employment from *Dimensions of Soviet Economic Power*. An index of Soviet agricultural output (net of interfarm inputs) is given by J. W. WILLETT, *Dimensions*, p. 98. This was adjusted for changes in current non-farm inputs using the figures given by D. G. JOHNSON "Agricultural Production", in A. BERGSON and S. KUZNETS, *Economic Trends in the Soviet Union*, p. 216. Industrial output excluding construction from *Dimensions*, p. 120. Construction output from *Annual Economic Indicators for the U.S.S.R.*, Joint Economic Committee, U.S. Congress, 1964, p. 93. Other: this estimate is a residual derived from the figures on agricultural, industrial and construction output and the G.N.P. figure of S. H. COHN, *Dimensions*, p. 75. The sector weights are those given in our table I - 10.

SECTORAL DISTRIBUTION OF NATIONAL PRODUCT, U.S.S.R. 1960 ON SOVIET AND WESTERN CONCEPTS TABLE I - 10

	Soviet National Product Concept	Western National Product Concept
Agriculture	20.5	17.0
Industry	52.2	43.3
Construction	10.0	8.3
Transport and Communication	5.3	4.4
Other	12.0	27.0
Total	100.0	100.0

Source: Sectoral distribution of national income on Soviet concepts derived from *Narodnoe Khoziastwo*, p. 482. This concept excludes certain service industries. In column 2 we have included these services in the "Other" sector with the help of figures on employment and the assumption that the productivity level in these services was the same as the national average.

TABLE I - 11

TOTAL GROSS DOMESTIC INVESTMENT
AS A PROPORTION OF G.N.P. AT CURRENT PRICES

Average of ratios of years cited.

	1900-13	1914-49	1950-60	1961-63
Austria			22.2	26.0
Belgium			16.5	20.2
Denmark	15.0	12.6 a	18.1	21.3
France			19.1	20.9
Germany		14.3 b	24.0	26.4
Italy	15.4	13.5	20.8	24.4
Netherlands			24.2	25.9
Norway	12.7	15.4 c	26.4	30.5
Sweden	12.3	15.5	21.3	23.7
Switzerland				29.9
U.K.	7.7	7.6	15.4	17.0
Canada	25.5	16.0 d	24.8	22.2
U.S.	20.6	14.7	19.1	16.7
Japan	10.3	17.3 e	29.3	40.1

a 1921-49.
b 1925-37.
c 1914-38.
d 1926-49.
e excludes 1945.

Source: 1900-60, from A. MADDISON, *Economic Growth in the West*, for all countries except Japan. 1960-63, O.E.C.D. National Accounts Division. Japan, 1900-38, from KAZUSHI OHKAWA & HENRY ROSOVSKY, "Economic Fluctuations in Prewar Japan", *Hitotsubashi Journal of Economics*, Vol. 3, No. 1, October 1962, 1939-50, *Historical Statistics of Japanese Economy*, Bank of Japan, 1962, 1951-63, O.E.C.D. *Economic Survey of Japan*, 1964.

TABLE I - 12

GROSS INVESTMENT OUTPUT RATIOS a

	1900-13	1913-50	1950-60
Belgium			5.7
Denmark	4.1	5.0 b	5.5
France			4.3
Germany		4.1 c	3.2
Italy	5.7	10.4	3.5
Netherlands			5.0
Norway	4.9	5.3 d	7.5
Sweden	3.3	7.0	6.5
U.K.	6.4	4.6	5.9
Canada	4.6	4.6 e	6.4
U.S.	5.2	5.1	5.8
Japan	3.2	7.2	3.2

a Average ratio of total gross domestic investment to G.N.P. at current prices divided by rate of growth of output in real terms.
b 1921-50.
c 1925-37.
d 1913-38.
e 1926-50.

Source: As for Table I - 11.

TABLE I - 13

EDUCATION ENROLMENT IN U.S.S.R. AND THE WEST

	School Enrolment as Percent of Population Aged 5-19	Higher Education Enrolment as Percent of Population Aged 20-24	New (a) Graduates 000s	Of which (a) Graduates in Science & Medicine 000s
France	75.4 (1961)	8.3 (1959)	25	16
Germany	74.8 (1961)	5.3 (1960)	42	23
Italy	58.1 (1960-61)	4.1 (1959)	22	9
Japan	74.3 (1961)	9.1 (1961)	154	38
U.K.	72.4 (1962)	5.8 (1959)	70	33
U.S.	82.1 (1961)	29.8 (1960)	491	140
U.S.S.R.	69.9 (1961)	11.5 (1960)	342	146

(a) Figures refer to 1960, except for the U.S.S.R. where they are for 1960-61.

Source: *U.N. Demographic Yearbook*, *U.N. Statistical Yearbook*, and *U.N.E.S.C.O. Statistical Yearbook 1963*.

TABLE I - 14

COMPARATIVE STATISTICS OF HEALTH PERSONNEL,
FACILITIES AND STANDARDS 1959-1961

	INHABITANTS					Infant Mortality f	Life Expectation
	per Doctor	per Dentist	per Pharmacist	per Nurse & Midwife	per hospital bed		
France	1,003	3,006	2,376	485	110	26	71
Germany	723	1,722	2,472	328 a	100	32	69
Italy	747	3,294	1,615	676 b	110	40	68
Japan	930	2,866	1,583	393	120	29	68
U.K.	930	3,870 e	2,485	187 a	110	22	71
U.S.	780	2,000	1,531	183 c	110	25	70
U.S.S.R.	578	4,821	2,217	189 d	130	32	68

a Includes student nurses.
b Working in hospitals.
c Including orderlies.
d Including feldschers (auxiliary doctors).
e Governmental services only.
f Number of deaths below one year of age per 1000 live births.

Source: W.H.O. *Statistics of Health Personnel and Hospital Establishments*, 1962. *Demographic Yearbook*, U.N., 1962.