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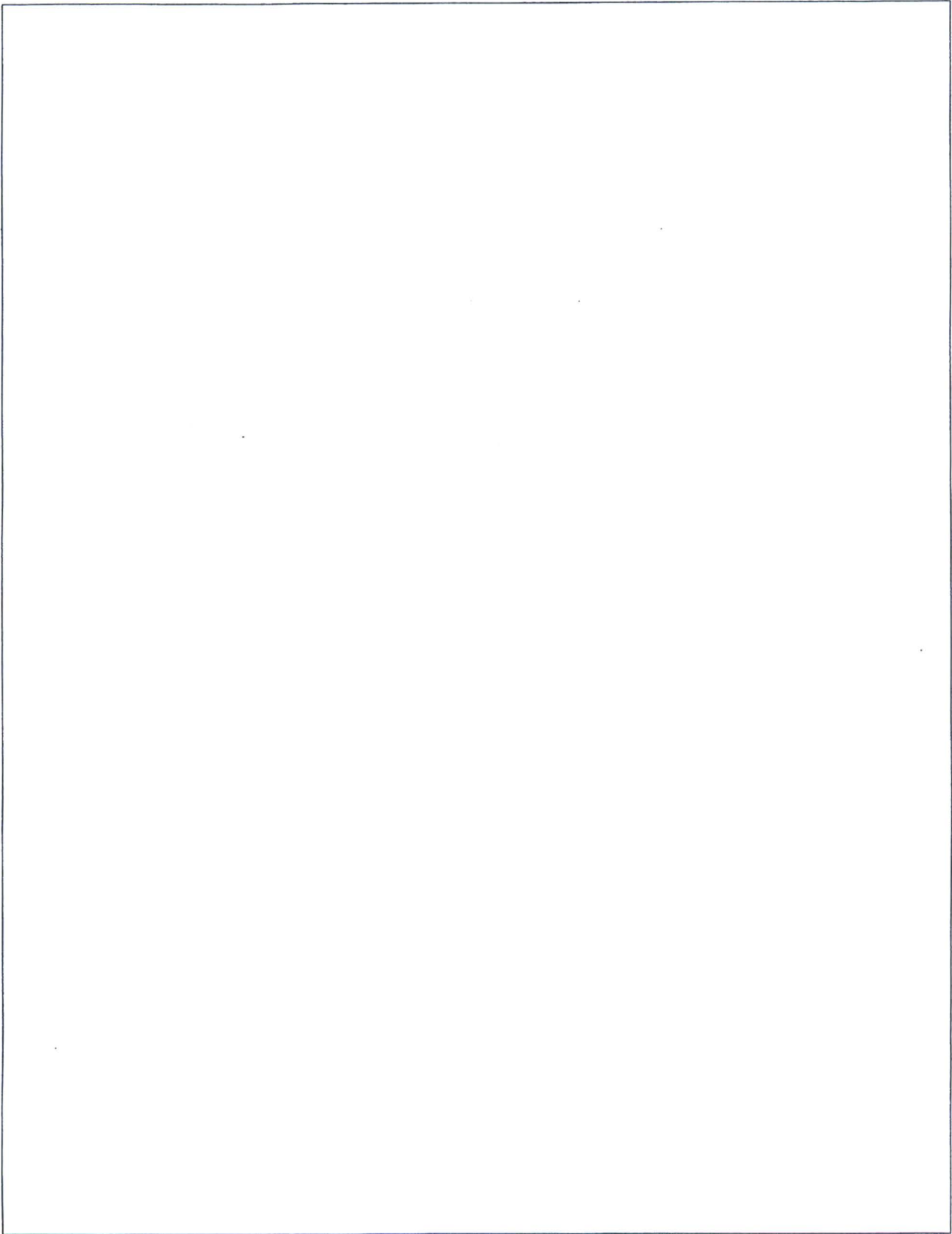
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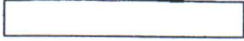
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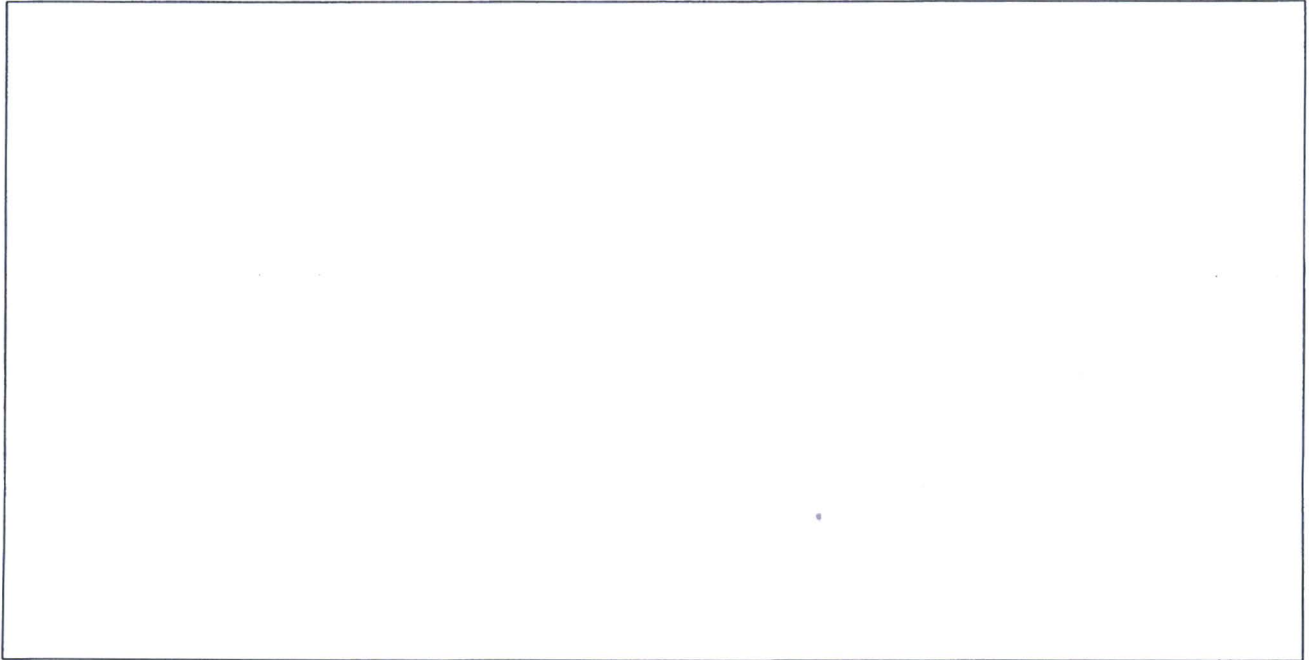
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**USSR: Trends in
Gross National Product**



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**USSR: Trends in
Gross National Product**

Summary

*Information available
as of 31 August 1987
was used in this report.*

The Soviet economy has made solid gains since 1960—with gross national product (GNP) more than doubling, excluding the effects of price changes—but its growth has slowed, especially in the last decade. Annual rates of increase in GNP averaged over 4 percent between 1960 and 1975 but fell to a little above 2 percent between 1975 and 1986. As Soviet economic growth slowed, moreover, the USSR lost ground in its efforts to overtake the United States in the production of goods and services. Soviet GNP rose from about 50 percent of the US level in 1960 to nearly 60 percent in 1975, but its relative position has slipped a little since then. The USSR's progress toward achieving Western standards of living also has stalled in the last decade; however, its buildup of military power has continued.

Allocation of Gains From Growth

The retardation in the growth of Soviet GNP has resulted in slower growth of allocations to all of its major uses: investment, defense, and consumption. Nonetheless, in keeping with longstanding Soviet priorities, investment—a key source of future output—grew faster than consumption in most years, and its share of GNP increased. Defense's share of GNP also rose, taking into account changes in prices—because decisions about spending are generally made on the basis of prices in effect at the time—as well as changes in quantities. Quantities of weapons grew rapidly during the 1960s, and after 1970 the prices of defense-related goods and services experienced more inflation than those of nondefense goods and services.

Although the USSR's GNP is much smaller than that of the United States, levels of defense spending in the two countries are on a rough par. Soviet investment is approximately 90 percent of the US level, while Soviet consumption is less than 40 percent of that in the United States, or about a third of US consumption per capita.

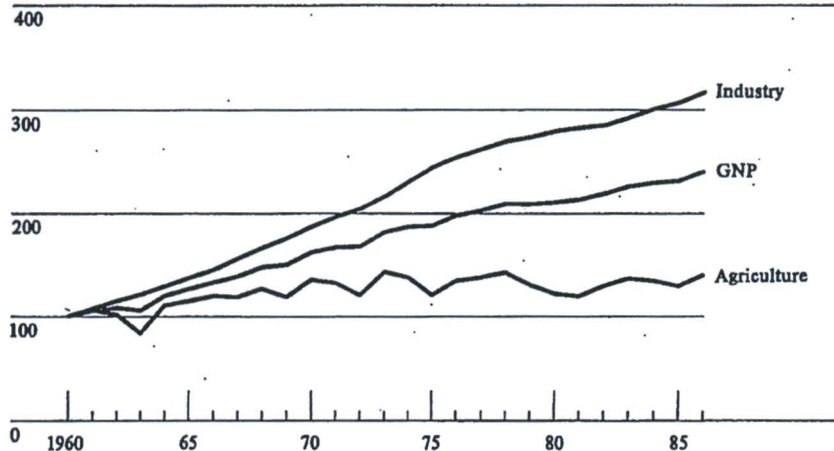
Reasons for Growth Slowdown

The slowdown in growth of Soviet GNP since the mid-1970s resulted from declining growth of the labor and capital used in the economy and from adverse trends in the productivity of these factors of production. Additions to the Soviet labor force declined steadily, and planners sharply cut the rates of increase in investment. The changed investment policy was part of an

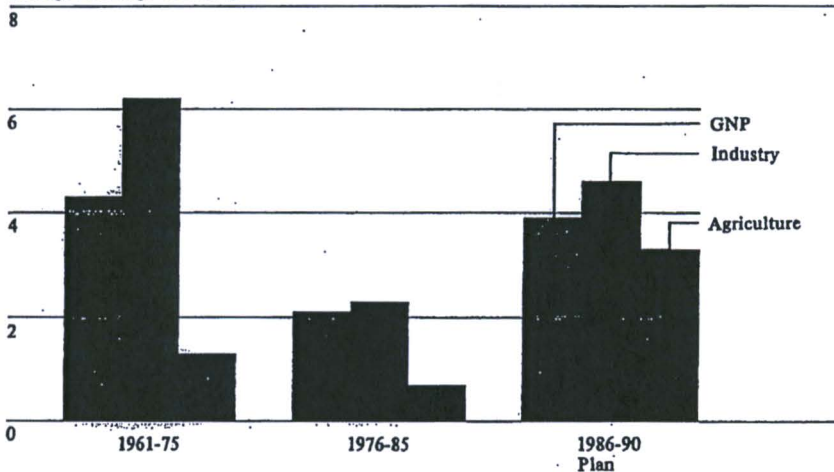
Figure 1
USSR: Trends in GNP and Industrial and Agricultural Output, 1960-90*

Index: 1960=100

Note scale change.



Average annual percentage growth



* Based on estimates of value added at 1982 factor cost.

all-out effort to make economic growth depend less on increases in inputs and more on gains in productivity. Nonetheless, combined productivity of labor and capital has fallen in most years since the early 1970s. [redacted]


Gradually diminishing returns on inputs to agriculture, oil production, and other extractive activities played a role in the worsening of productivity performance, but inadequate technological progress became an increasingly important factor in the last decade. Over the years, resources were allocated in large and rising amounts to the extraction of raw materials, where the potential for improvements in productivity was limited by the quality and the accessibility of deposits. Some benefits accrued—notably, hard currency earnings from oil exports—but returns fell far short of plan targets. In addition, agricultural productivity in terms of yield per unit of land and livestock stagnated at levels far below those observed in analogous growing areas of the world. [redacted]


After the mid-1970s, advances in technology were not rapid enough to offset the effect of diminishing returns in extraction. Slow innovation in machine building—largely attributable to the weakness of incentives to introduce new products and production processes—became a major problem and a focus of General Secretary Gorbachev's plans to revitalize economic growth. Another, less visible problem was the inadequate flow of services. Long neglected in planners' allocations of resources, services grew only slightly faster than GNP in the USSR, instead of leading growth in the rest of the economy as in the developed West. Decreasing gains from international borrowing of new technology, especially from the United States, probably also contributed to productivity problems in the Soviet economy. [redacted]

Plans for Growth

Gorbachev has proclaimed his determination to reverse the slowdown of economic growth in the USSR. Soviet plans for 1986-90 imply that GNP is to increase by an average annual rate of roughly 4 percent and industry by slightly more than 4.5 percent annually. Gorbachev's strategy to date has focused primarily on short-term improvements in "human factors" such as labor discipline and management. By the end of the 1986-90 period, however, he is counting largely on rapid increases in the quantity and



quality of machinery to modernize production technology. Technological advances are then to provide a basis for long-term growth—a far more challenging goal than short-term economic improvements. 

Gorbachev has some grounds for satisfaction with the progress of his program to date. Results in 1986 were encouraging, with GNP growing at about the target rate and industry at a slower but still improved pace of just over 3 percent. Agriculture's recovery from a poor harvest gave GNP a boost that is unlikely to be sustained, however, because the good showing in 1986 would have to be followed by a series of even better outcomes. Moreover, output growth rates planned for the remainder of the 1986-90 period would require faster increases in labor productivity than have been achieved since the late 1960s to early 1970s. 

USSR: Trends in Gross National Product

Introduction

Western scholars have found many reasons to think that the measurement of Russian national income is too important a task to leave to Russian statisticians.

Abram Bergson
The Real National Income of Soviet Russia Since 1928

Although the Soviet economy has made considerable progress over the past 25 years, its slackening growth—especially in the last decade—has drawn repeated expressions of concern from General Secretary Gorbachev. Economic growth slowed gradually during the 1960s and early 1970s, but the deceleration sharpened in the mid-1970s. The negative trends are reflected both in official Soviet statistics and in the CIA's independent estimates—used in this paper—of the USSR's gross national product.

To examine Soviet economic performance since 1960, this paper reviews trends in total GNP and its key components. It begins with a brief description of the nature of and rationale for these independent estimates of GNP. A summary of overall results follows, including a comparison of economic growth in the USSR and selected Western countries. Then the contributions of the major sectors of origin—particularly industry and agriculture—to trends in total GNP are discussed. The reasons for the widespread slowdown in economic growth since the mid-1970s are given special attention. Next follows a description of allocations of GNP to its major end-uses: investment, defense, and consumption. Finally, Soviet economic plans for 1986-90 are summarized.

Background on Estimates of Soviet GNP

For years there has been widespread skepticism about official Soviet statistics that has led Western researchers to make their own estimates of the USSR's

economic growth. The GNP estimates presented here seek to remedy some important shortcomings of official summary figures:

- Inclusion of a substantial degree of disguised inflation (that is, price increases affecting the economy but omitted from official price indexes) in measures that should represent growth excluding the effects of price changes.
- Valuation in established (official) prices, which do not accurately reflect the distribution of economic resources.
- Exclusion of depreciation and most services—aside from some, such as freight transportation, that contribute directly to output of material goods.
- Inadequate information about methods of estimation.

The estimates of Soviet GNP used in this paper reflect the results of a recent revision that moves the ruble price base for the estimates from 1970 to 1982. Except for the new prices used, the methods of estimation are mostly unchanged from those described in the CIA's benchmark (1982) study of GNP in 1970 prices (see inset).

These GNP estimates are presented in alternative kinds of prices to track several aspects of Soviet economic performance:

- Real economic growth—excluding the effects of price changes—is analyzed using estimates of GNP and its major components valued in constant prices. That is, quantities of output in a series of years are valued at prices of a single base year (1982).

¹Appendix A of this paper summarizes the methods of estimating Soviet GNP in 1982 prices and notes any changes from previous methods. Appendix B presents a brief comparison of estimates in the old and new price bases.

Development of Western Estimates of Soviet GNP

The CIA's estimates of Soviet GNP continue research pioneered by Abram Bergson in the 1940s and developed by him and his colleagues under the sponsorship of the RAND Corporation during the 1950s and 1960s.^a Bergson's initial work involved estimating GNP in current established prices and adjusting those estimates in an effort to correct some of the distortions of the Soviet pricing system. His term for the adjusted values—factor costs—indicates that they reflect the costs of the labor and capital resources used in the economy—the factors of production—better than established prices do. Subsequently, the RAND scholars estimated price indexes that were used to derive measures of GNP growth in constant prices. Bergson also has used these building-block studies of GNP as a basis for comparing levels of economic activity in the USSR and other countries and for analyzing productivity in the Soviet economy.

^a The RAND studies are summarized by Bergson in *The Real National Income of Soviet Russia Since 1928* (Cambridge, Mass.: Harvard University Press, 1961), pp. vii-ix, and by Abraham Becker in *Soviet National Income, 1958-1964* (Berkeley and Los Angeles: University of California Press, 1969), pp. 1, 578.

After the RAND Corporation's research on Soviet GNP concluded in the late 1960s, the CIA—where classified work on the subject began in the early 1950s—became the principal source of Western estimates. Recent CIA efforts have concentrated largely on constant-price measures of Soviet economic growth. Soviet GNP also is estimated in current prices for selected years.^b

Because of changes in the availability of data, the CIA's approach to estimating growth differs from that used by Bergson and his associates. The CIA relies primarily on sample data on changes in quantities of output weighted by base-year values instead of on changes in current values of output deflated by price indexes.

^b For the CIA's benchmark study of GNP in 1970 prices, see *Joint Economic Committee, Congress of the United States, USSR: Measures of Economic Growth and Development, 1950-80* (Washington: US Government Printing Office, 1982). That volume (pp. 11-12, 26) also discusses estimates of Soviet GNP by RAND Corporation and other researchers outside the CIA. GNP estimates in current prices are published in *CIA Research Aid A(ER) 75-76* (Unclassified), November 1975, USSR: *Gross National Product Accounts, 1970*, and in *DI Research Paper SOV 83-10037* (Unclassified), March 1983, *Soviet Gross National Product in Current Prices, 1960-80*.

- Priorities in allocating resources are reflected by estimates of the major GNP components in current prices, which are available for the new and old base years (1982, 1970, and 1960). Current price measures are appropriate to assess priorities because decisions about spending are generally made on the basis of prices in effect at the time.²

² Price changes implied by GNP estimates in prices of 1970 and 1982 can be calculated for the periods between the new and old base years. Throughout this paper, price indexes implied by GNP estimates are weighted by quantities of the new base year (1982). That is, each price index is calculated by dividing a current value of output in the new base year by the same quantity of output valued in prices of the old base year (1970).

- Levels of Soviet output are compared with those of the United States using estimates of each country's GNP valued first in domestic prices and then in prices of the other country.

Besides total GNP, estimates are available for major components, broken down by end use and by sector of origin. The end-use breakdown shows the distribution of output to final purchasers for uses such as consumption, investment, and defense.³ In the breakdown

³ Many products are sold from one enterprise to another—perhaps several times—before reaching consumers and other final purchasers. To count each product only once, GNP includes only final sales.

by sector of origin, income resulting from the production of final output is allocated among the sectors producing that output—for example, industry, agriculture, and services. []

To better approximate the value of resources used in production and allocated to end uses, the CIA adjusts its estimates of Soviet GNP from established prices to factor cost. The adjustment corrects for the following shortcomings of Soviet established prices:⁵

- Large excise taxes, levied at highly differentiated rates, mostly on consumer goods.
- Subsidies, mostly on food and services such as housing.
- Wide variations in profits, which do not reflect differences in the contribution of capital to production. []

The measures of Soviet GNP presented in this paper cover all state-administered economic activities and part of the "second economy" of private and illegal, or questionably legal, activities.⁶ Base-year GNP includes estimated values for the entire legal private economy in agriculture and housing and for all privately provided services. No distinction is made between the private services the Soviets classify as legal

⁵ Like the goods and services included in GNP, inputs to it must be counted only once. This rule admits primary inputs—labor, capital, and land—but excludes inputs of processed materials. The value of a sector's primary inputs is called "value added" to indicate that it originates only from inputs in addition to those purchased from other sectors. []

⁶ The factor cost adjustment is made by first subtracting excise taxes, subsidies, and profits from base-year (1982) values of the components of GNP in established prices. Returns on fixed and working capital—calculated at a uniform rate of 12 percent—are then added back to GNP. In principle, returns on agricultural land and other natural resources also should be estimated and added to GNP, but this is not done at present. Growth of total GNP—at factor cost as well as in established prices—is estimated as a weighted average of growth of the components, with component values in the base year serving as weights. []

⁷ A standard definition, description, and general analysis of the Soviet second economy are given by Gregory Grossman in "The 'Second Economy' in the USSR," *Problems of Communism* (September-October 1977): pp. 25-40. The contribution of the second economy to GNP is discussed in Gertrude E. Schroeder and Rush V. Greenslade, "On the Measurement of the Second Economy in the USSR," *ACES Bulletin* (Spring 1979): pp. 3-21. Also see appendix A of this paper for a further discussion of problems of including the second economy in GNP estimates. []

Table 1
USSR: Growth of GNP and NMP, 1961-85

	Average Annual Percentage Growth			Percentage Point Difference Between Adjusted GNP Growth and NMP Growth ^b
	GNP	Adjusted GNP ^a	NMP	
1961-65	4.8	5.0	6.5	1.5
1966-70	5.1	5.4	7.8	2.4
1971-75	3.0	3.3	5.7	2.4
1976-80	2.3	2.3	4.3	2.0
1981-85	1.9	1.8	3.6	1.8

^a To minimize the effects of different coverage on this comparison, estimates of GNP have been adjusted to exclude services that do not contribute directly to material output. The weights used to calculate growth of adjusted GNP are estimates of 1982 value added in established prices, rather than at factor cost.

^b After the 1960s, differences between adjusted GNP growth and NMP growth decrease with time. This result is consistent with the "index number effect," according to which rates of economic growth tend to be higher, the earlier the price base used in estimating them. NMP is measured using a series of linked price bases (1958, 1965, and 1973), all earlier than that for GNP. The exception in 1961-65 may be due to weaker connections between Soviet prices and costs in 1958 than in the later base years used for NMP.

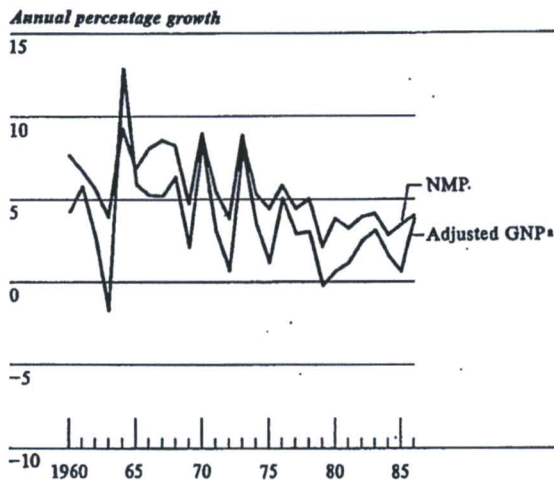
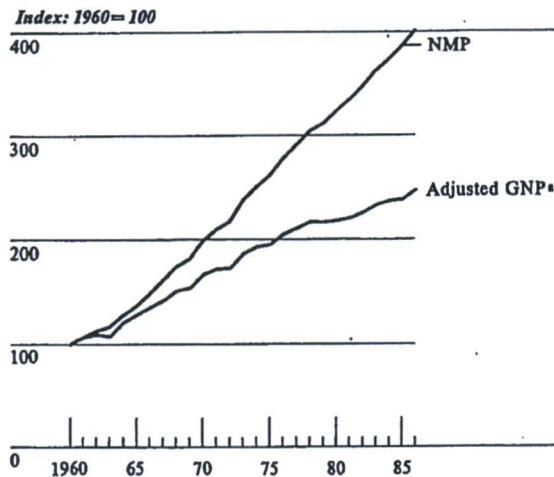
[] and those they consider illegal. For estimates of GNP growth, the data used to track changes in agriculture and housing include legal private activities along with state-administered ones. Because so little information is available on privately provided services, however, most of the data used to estimate services growth include only state activities. []

Comparison of GNP Estimates With Official Soviet Statistics

A comparison of growth of GNP and net material product (NMP)—the official Soviet measure closest to GNP—shows similar patterns over time, including the slowdown since the mid-1970s (see table 1 and figure 2).⁷ Rates of NMP growth are higher, however,

⁷ The term "net material product" is used by Western economists to flag the exclusion of depreciation (the "gross" component of GNP) and of services that do not contribute directly to material output. The Soviets call their measure "national income produced." []

Figure 2
USSR: Trends in GNP and NMP,
1960-86



* Coverage adjusted to match that of NMP by removing services that do not contribute directly to material output.

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primarily because inadequate adjustments for price changes result in a substantial degree of disguised inflation. Although the Soviets claim that NMP statistics are based on constant prices, new products often enter at prices that include inflated allowances for improvements in quality. In contrast, the CIA's GNP estimates avoid the disguised inflation problem whenever possible by using quantity data (mostly from Soviet sources) on output of individual products valued at prices of a fixed base year.*

Official Soviet statistics, therefore, imply lower rates of inflation than do GNP estimates. Like higher growth rates for NMP, these lower rates are a result of inflation in new product prices. Calculations comparing GNP estimates in 1960, 1970, and 1982 prices indicate that inflation averaged a little over 2 percent per year between 1970 and 1982, a rate similar to that between 1960 and 1970. In contrast, official NMP statistics imply that inflation averaged less than 0.5 percent per year between 1970 and 1982 and was negligible between 1960 and 1970.

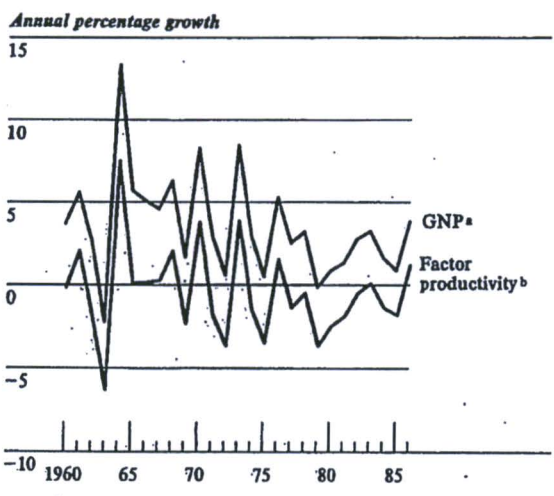
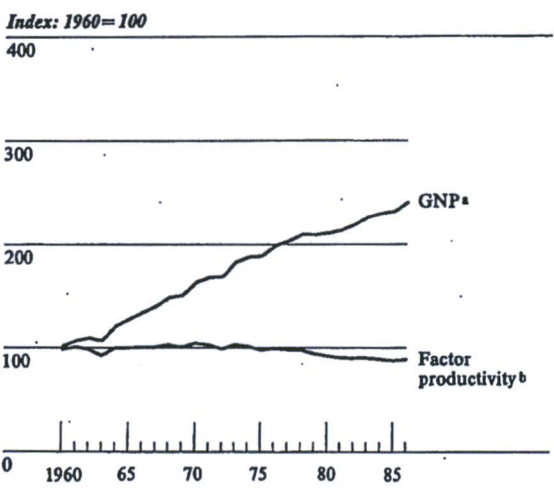
Trends in Total GNP and Productivity

Soviet GNP more than doubled between 1960 and 1986, with growth averaging 3.4 percent per year (see figure 3). Its total value at the end of the period was about 710 billion rubles at 1982 factor cost. Annual rates of increase fell, however, from an average of 4.3 percent before 1975 to 2.2 percent thereafter (see table 2, page 6).

Through the early 1970s, the slippage in economic growth was gradual, resulting largely from diminishing returns on inputs to agriculture and other activities based on extraction of the USSR's abundant natural resources. During the late 1960s, for example, the Soviets had few grounds for concern, as GNP climbed at a healthy average annual pace of 5.1 percent. The supply of inputs to the economy expanded at fairly steady rates, and annual gains in productivity of labor and capital combined (factor productivity) averaged 0.8 percent.

* The use of these quantity data, however, entails problems of another kind—incorporating changes in the quality and mix of output in the estimates. These problems are discussed briefly in appendix A.

Figure 3
USSR: Trends in GNP and Factor Productivity, 1960-86



^a Based on estimates of value added at 1982 factor cost.
^b Input indexes are based on hours worked by labor, capital stock in 1973 prices (official Soviet data), and value of land in 1982 prices. Inputs are combined using weights derived from shares of labor, capital, and land in 1982 value added at factor cost.

By the early 1970s, however, with additions to the working-age population declining and age-specific participation in the labor force already high, increases in labor inputs began to dwindle. In response to these trends, planners launched an all-out effort to shift the economy from extensive growth—that is, growth based on increases in inputs—to intensive growth—that is, growth based on improvements in productivity. Departing sharply from past practice, they allowed the rates of increase in investment, and consequently in the stock of plant and equipment (capital stock), to slow markedly in the mid-1970s. At the same time, planned rates of output growth were reduced in an attempt to let the economy's enterprise managers concentrate on improving the efficiency of input use.

Instead of accelerating, however, GNP growth fell to an average annual rate of 2.3 percent during the late 1970s. Factor productivity declined through 1985, except for a slight rise in 1983. The adverse economic trends since the mid-1970s are the primary focus of Gorbachev's urgent calls for a turnaround in growth. Although results for 1983-85 are better on average than those of the final Brezhnev years—and 1986 results show further improvement—a major economic revival remains a goal rather than an accomplishment.

The slowdown in the growth of GNP frustrated Moscow's efforts to overtake the United States in the production of goods and services. Soviet GNP has long been well below that of the United States. Until the mid-1970s, however, GNP was increasing faster in the USSR than in the United States. As a result, Soviet GNP rose from about 50 percent of the US level in 1960 to nearly 60 percent in 1975.¹ During

¹ These ratios represent the geometric mean of a comparison using US market prices (dollars) as weights and another comparison using Soviet established price weights (rubles). The base year for both the dollar and the ruble price weights is 1982. The results of dollar and ruble comparisons are quite different because relative prices differ markedly between the United States and the USSR, as does the structure of output. Each country's GNP appears smaller when weighted by its own prices because each produces relatively large quantities of goods that are relatively cheap in terms of its own resources. Comparisons in both sets of prices are valid, but the geometric mean provides a convenient single estimate of proportion.

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Table 2
USSR: Growth of GNP, Factor Inputs,
and Factor Productivity, 1961-86^a

Percent

	GNP	Factor Productivity	Factor Inputs			
			Combined	Labor	Capital	Land
Average annual growth						
1961-65	4.8	0.3	4.5	1.5	8.8	0.2
1966-70	5.1	0.8	4.2	2.0	7.4	0.0
1971-75	3.0	-1.3	4.3	1.7	8.0	0.1
1976-80	2.3	-1.2	3.6	1.2	6.9	-0.1
1981-85	1.9	-1.0	3.0	0.7	6.2	-0.2
Annual growth						
1981	1.3	-1.8	3.2	0.9	6.4	-0.1
1982	2.7	-0.4	3.2	1.0	6.3	-0.1
1983	3.2	0.1	3.0	0.7	6.3	0.1
1984	1.5	-1.3	2.9	0.5	6.3	-0.1
1985	0.8	-1.8	2.6	0.4	5.8	-0.7
1986 preliminary	3.8	1.2	2.5	0.4	5.5	-0.1

^a GNP growth is based on estimates of value added at 1982 factor cost. The growth of inputs is based on estimates of hours worked by labor, value of capital stock in 1973 prices (official Soviet data on value, including livestock, at beginning of output year), and value of land in 1982 prices (land broken down by type—unimproved,

irrigated, or drained—and by crop). Inputs are combined using weights derived from shares of labor (wages, social insurance, and other income), capital (depreciation and an imputed return), and land (rent) in 1982 value added at factor cost.

the same period, Soviet GNP growth was roughly similar to average growth in European countries belonging to the Organization for Economic Cooperation and Development (OECD) (see table 3).¹⁰

Growth in the United States and the European OECD countries slowed markedly after 1973, but the slowdown in Soviet growth was also sharp. Average annual rates of increase in GNP were smaller for the USSR than for the United States in the late 1970s

and early 1980s, and by 1985 Soviet GNP had slipped to about 55 percent of the US level. Compared with growth in the European OECD countries, Soviet rates of gain also were a bit slower in the late 1970s but were slightly faster in the early 1980s.

Like GNP growth, productivity growth in both the USSR and the West dropped off abruptly in the early-to-middle 1970s. Comparing Soviet and Western GNP is not an easy task, and data limitations

¹⁰ For all countries shown, estimates of real growth are weighted by values of output in domestic currencies. Base years for these weights are 1982 for the United States and the USSR and 1980 for the European OECD countries.

For the European OECD countries, growth rates apply to gross domestic product (GDP) rather than gross national product. Differences between the two measures reflect differences—usually small—in coverage of payments for labor and capital services. A country's GNP includes payments to its nationals for performing

such services, even outside its borders, while GDP includes payments for services performed within the country's borders, even by foreigners.

Strictly speaking, the current "GNP" measures for the USSR also reflect GDP because payments for labor and capital services exchanged with other countries have not been estimated. Given the Soviet Government's tight controls on incomes of this kind, however, differences between GNP and GDP are undoubtedly small.

Table 3
Comparison of GNP Growth in USSR and
West European Countries, 1961-85

Percent

	USSR	US ^a	European OECD (GDP) ^b				
			Total	Of Which:			
				FRG	France	Italy	UK
Average annual growth							
1961-65	4.8	4.6	4.9	4.8	5.8	5.2	3.2
1966-70	5.1	3.0	4.6	4.2	5.4	6.2	2.5
1971-75	3.0	2.2	3.0	2.1	4.0	2.4	2.2
1976-80	2.3	3.4	2.9	3.3	3.3	3.8	1.6
1981-85	1.9	2.4	1.4	1.3	1.1	0.9	1.9
Annual growth							
1981	1.3	1.9	0.0	0.2	0.5	0.2	-1.2
1982	2.7	-2.5	0.6	-0.6	1.8	-0.5	1.0
1983	3.2	3.6	1.6	1.5	0.7	-0.2	3.8
1984	1.5	6.4	2.4	2.7	1.5	2.8	2.2
1985	0.8	2.7	2.5	2.6	1.1	2.3	3.7

^a Calculated from GNP in 1982 prices, published in *Survey of Current Business*, September 1986.

^b Calculated from GDP in 1980 prices, published in OECD, *National Accounts, 1960-1985 (Main Aggregates, Volume I)*. Total GDP in the European OECD is calculated using official exchange rates to convert data for individual countries to US dollars.

make comparing Soviet and Western productivity more difficult still.¹¹ Nevertheless, the comparisons that can be made clearly show that the growth of Soviet factor productivity has been unimpressive relative to that of Western countries at similar levels of economic development (such as Italy). Moreover, productivity has accounted for a much smaller share of output growth in the USSR than in the West.

Abram Bergson's analysis of the adverse changes in Soviet productivity growth points to diminishing returns from borrowing Western technology and to

¹¹ Many studies of productivity are based on less inclusive output measures than GNP. Services often are excluded because estimates of their output depend on assumptions about productivity, and depreciation is sometimes excluded as well. See, for example, Edward F. Denison, "Accounting for Slower Economic Growth: An Update," *International Comparisons of Productivity and Causes of the Slowdown*, ed. John W. Kendrick (Cambridge, Mass.: American Enterprise Institute/Ballinger, 1984).

slowing replacement of obsolescent capital—due to slowing investment growth—as major influences.¹² John Kendrick has judged like influences as important in explaining the slowdown of productivity growth in the West.¹³ Growth of outlays for research and development—a major source of technological knowledge—declined in Western countries, especially in the United States, and opportunities for international transfers of technology were reduced. In addition, rates at which innovations spread through Western economies slowed as the average age of capital rose.

¹² See chapter, "Technological Progress," *The Soviet Economy: Toward the Year 2000*, ed. Abram Bergson and Herbert S. Levine (London: George Allen & Unwin, 1983) and chapters 6, 7, and 9 of Bergson's *Productivity and the Social System: The USSR and the West* (Cambridge, Mass.: Harvard University Press, 1978).

¹³ See chapter, "International Comparisons of Recent Productivity Trends," *Contemporary Economic Problems: Demand, Productivity, and Population*, ed. William Fellner (Washington: American Enterprise Institute for Public Policy Research, 1981).

Table 4
USSR: GNP Growth by Sector of Origin, 1961-86,
Average Annual Rates ^a

Percent

Sector of Origin	1961-65	1966-70	1971-75	1976-80	1981-85	1986 Preliminary
Total GNP	4.8	5.1	3.0	2.3	1.9	3.8
Industry	6.5	6.4	5.5	2.7	1.9	3.1
Construction	4.7	5.4	4.5	2.9	2.9	3.4
Agriculture	2.8	3.4	-2.3	0.2	1.2	8.5
Transportation	10.2	7.2	6.6	3.6	2.3	3.9
Communications	7.3	8.6	6.4	4.7	3.8	5.6
Trade	5.0	7.3	4.5	2.7	1.6	-0.2
Services ^b	4.4	4.3	3.5	2.7	2.2	2.0
Military personnel ^c	2.0	3.7	2.0	1.5	0.3	0.0

^a Based on estimates of value added at 1982 factor cost.

^b Includes consumer services (housing, utilities, repair and personal care, recreation, education, health), science (research and development), credit and insurance, and government administration

(general agricultural programs, forestry, state administration, culture, municipal services, civilian police).

^c Includes military wages, with conscript costs calculated using the minimum industrial wage.



A recent study by William Baumol suggests that the USSR's unimpressive productivity record may result from characteristics of its system or policies—or both—that it shares with other centrally planned economies.¹⁴ Taking a century-long view of labor productivity (he analyzes this measure rather than factor productivity), Baumol argues that, for an industrialized economy, the lower its starting level of labor productivity, the higher its long-run productivity growth is likely to be. As a result, international differences in productivity growth lead to convergence toward the productivity levels of the leaders. Baumol attributes this productivity convergence largely to spillovers of innovation—and, to a lesser extent, of investment—from the leading countries to others. He finds that since 1950, however, labor productivity in centrally planned economies has converged more slowly, and to a generally lower level, than in free market economies.

¹⁴ William J. Baumol, "Productivity Growth, Convergence, and Welfare: What the Long-Run Data Show," *American Economic Review* (December 1986): pp. 1,072-1,085

Trends by Major Sector of Origin

Like the growth of total GNP, growth in all major sectors of the Soviet economy has slowed over the last 25 years (see table 4). After 15 years of expansion at gradually declining rates, industry experienced a sharp fall in growth after 1975. This drop, combined with a reduced rate of increase in transport services, played a key role in the slide of GNP growth in the past decade. No other major sector of the economy moved forward to pick up the slack. Growth in agriculture lagged that in the rest of the economy, especially during the 1970s. The service sector did not boost GNP growth in the USSR nearly as much as it did in Western countries—although rates of increase in services fell less markedly than in the other major sectors.

In industry, which has grown faster than GNP for most of the post-1960 period, the growth slowdown paralleled that in the economy as a whole. The

gradual slippage of industrial growth before the mid-1970s resulted largely from diminishing returns in the extractive branches. To cope with continually rising costs, planners allocated resources in large and increasing amounts to oil and other raw materials, but returns on these resources diminished as the most accessible deposits were used up. After the mid-1970s, growth in branches with greater opportunities for technological advances—especially machinery—not only failed to offset declining growth in extractive industries but even dropped. Under these circumstances, the urgency of Gorbachev's call for increases in the quantity and quality of machinery output is easy to understand.

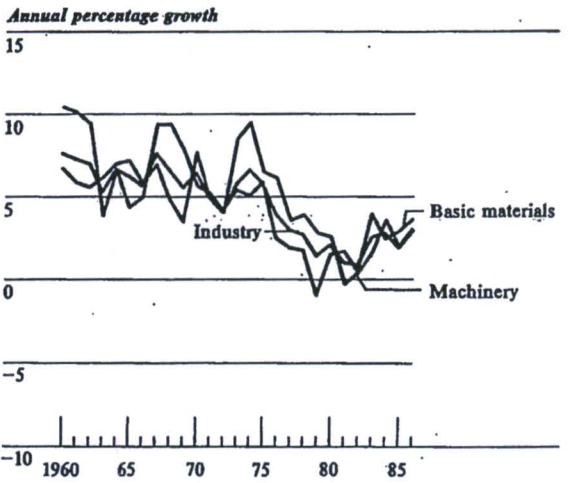
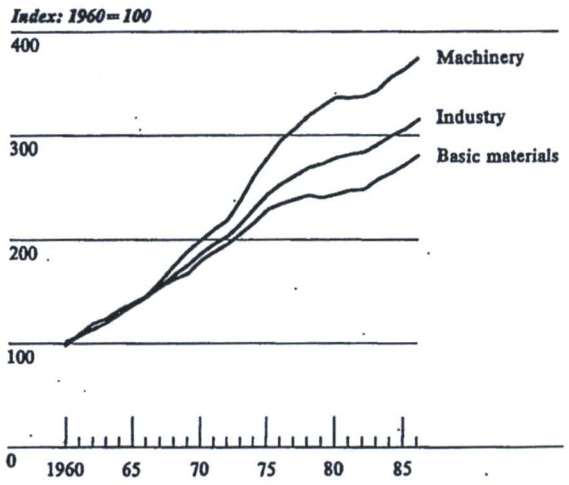
Despite receiving a substantial share of investment—nearly a fifth—agriculture has been a drag on long-term increases in GNP and the major source of short-term fluctuations in GNP. In Western countries, GNP growth has benefited from the transfer of resources out of agriculture into sectors with better growth potential, but such shifts have been relatively slow in the USSR.¹⁵

Industry

Soviet industry tripled its output between 1960 and 1986 (see figure 4). Average annual rates of increase fell from 6.2 percent between 1960 and 1975 to 2.4 percent after 1975 but have improved somewhat since 1982. Part of the slowdown of industrial growth was explained by declining growth of labor and capital inputs, but adverse changes in productivity also played a part (see table 5). When industrial growth slumped in the mid-1970s, the rising trend in factor productivity was reversed. The rate of productivity decline eased in 1983-85, however, and preliminary results indicate that productivity nearly stabilized in 1986.

Slowdown of Growth, 1976-82. The slowdown of Soviet industrial growth in the last decade was too pronounced to be explained solely by long-term

Figure 4
USSR: Trends in Industrial Production, 1960-86*



* Based on estimates of value-added at 1982 factor cost.

¹⁵ See Bergson chapter, "Technological Progress," pp. 44-47.

Table 5
USSR: Growth of Industrial Output, Factor Inputs,
and Factor Productivity, 1961-86 ^a

Percent

	Industrial Output	Factor Productivity	Factor Inputs		
			Combined	Labor	Capital
Average annual growth					
1961-65	6.5	-1.0	7.6	2.9	11.4
1966-70	6.4	0.2	6.2	3.1	8.8
1971-75	5.5	0.0	5.5	1.5	8.7
1976-80	2.7	-2.1	4.9	1.4	7.7
1981-85	1.9	-2.1	4.1	0.6	7.0
Annual growth					
1981	1.1	-3.3	4.6	0.7	7.8
1982	0.9	-3.2	4.2	0.8	7.0
1983	2.6	-1.4	4.0	0.4	6.9
1984	2.9	-1.0	4.0	0.5	6.8
1985	2.0	-1.8	3.9	0.4	6.6
1986 preliminary	3.1	-0.4	3.5	0.4	6.1

^a Growth of industrial output is based on estimates of value added at 1982 factor cost. Input growth is based on estimates of hours worked by labor and value of capital stock in 1973 prices (official Soviet data for beginning of output year). Inputs are combined

using weights derived from shares of labor (wages, social insurance, and other income) and capital (depreciation and an imputed return) in 1982 value added at factor cost.

tendencies like diminishing returns in the extraction of natural resources. Other important influences were:¹⁶

- Bottlenecks resulting from problems in production and transportation of basic materials like steel and cement.
- Aggravation of these bottlenecks by severe winters in 1979 and 1982.
- Difficulties in introducing new machinery products and technologies.
- A sharp cutback in growth of investment allocated to industry, including civilian machine building.

Reduced growth of basic materials (ferrous and non-ferrous metals, chemicals, wood products, and construction materials) set the pattern for the deceleration of industrial growth in 1976-78 and the further

deterioration in 1979-82 (see table 6). These materials are used throughout industry, so irregularities in their supply interfere with production downstream. Their growth faltered in 1976 and worsened markedly in 1979, when production of ferrous metals, chemicals, wood products, and construction materials declined in absolute terms. Longstanding neglect of investment in developing sources of raw materials for these branches was part of the problem. Severe winters and weather-related problems in transportation—especially by rail—also disrupted production in 1979 and 1982.

While bottlenecks in supplies of basic materials were developing, rates of increase of machinery output tapered off quite steadily through 1981-82. The timing of the slowdown was similar for civilian and

Table 6
USSR: Industrial Growth by Sector, 1971-86,
Average Annual Rates ^a

Percent

	1971-75	1976-78	1979-82	1983-85	1986 Preliminary
Total industry	5.5	3.3	1.4	2.5	3.1
Basic materials	5.0	2.0	0.6	3.0	3.5
Ferrous metals	4.2	2.0	-0.6	2.2	2.8
Nonferrous metals	5.7	1.4	1.1	3.0	3.0
Chemicals	8.3	4.1	2.2	4.5	3.8
Wood, pulp, and paper	2.5	-0.3	0.1	2.6	4.5
Construction materials	5.1	2.3	0.2	2.3	3.2
Energy	6.0	4.4	2.5	2.3	3.8
Fuel	5.4	4.0	2.0	0.9	3.9
Electric power	7.0	5.0	3.2	4.1	3.6
Machinery	6.8	4.6	1.4	2.4	3.0
Consumer nondurables	3.4	1.9	1.7	1.7	1.7
Light industry	2.6	2.9	1.2	2.2	1.5
Food industry	4.1	1.1	2.2	1.3	2.0

^a Based on estimates of value added at 1982 factor cost.

[Redacted]

military machinery, although growth was somewhat higher for the civilian component. Gorbachev's recent criticisms of machine building suggest that chronic problems with the introduction of new products and the mastering of new manufacturing technologies became more severe during the 1970s. Moreover, CIA estimates indicate that output of military machinery failed to increase in the early 1980s.¹⁷ As a result, growth of total machinery was slightly lower than growth of total industry in 1981-85—the first time since 1960 that this had occurred for more than a few years.

A sharp cutback in the growth rate of investment in industry also played a major part in the slowdown of industrial growth. In the mid-1970s, when Soviet planners launched their all-out effort to shift the

[Redacted]

economy from extensive to intensive growth, they did not spare industry from reductions in planned investment growth. Industrial investment during 1976-80, for example, increased at an average rate of 3.4 percent annually, down from 6.7 percent during 1971-75 (see table 7). Growth of investment in machinery also fell abruptly, although it remained a bit faster than growth of total industrial investment. Investment in civilian machine-building ministries was particularly hard hit. After a few years, rates of increase of capital stock also faltered, as reduced investment growth affected additions to capacity.

Meanwhile, old capital was left in service longer—a tactic that helped to keep up the growth of capital stock at the cost of diverting efforts from new production to repair of aging plant and equipment.

Upturn in Growth, 1983-86. Soviet industrial growth in 1983-85 turned up from the depressed rate of 1979-82 but remained somewhat below the 1976-78

Table 7
USSR: Growth of Investment by Sector, 1961-85,
Average Annual Rates ^a

Percent

	1961-65	1966-70	1971-75	1976-80	1981-85
Total investment	6.2	7.6	6.8	3.3	3.5
Industry	6.8	6.7	6.7	3.4	4.2
Basic materials	5.6	5.3	6.1	0.6	0.8
Energy	8.5	4.4	6.1	7.0	8.0
Machinery	8.7	13.7	9.4	4.0	4.0
Consumer nondurables	4.2	7.0	4.8	2.1	2.1
Construction	4.1	15.3	7.7	4.5	0.4
Agriculture	11.7	8.6	10.3	2.7	1.1
Transportation and communications	6.7	7.2	9.7	4.8	3.9
Housing	0.4	6.9	4.0	1.9	5.9
Other	7.6	7.8	4.0	3.4	3.2

^a Based on official Soviet data on value of investment in 1984 prices. GNP estimates of investment—which are available only for the total, not by receiving sector—are roughly similar to official data in timing of changes in growth rates. Rates of investment

growth based on GNP estimates are usually lower than those based on official Soviet data, however, because independent estimates of growth of the construction component tend to be lower than official figures.

pace. In 1986 industry made further gains and grew at its fastest rate in a decade. A variety of small improvements have contributed to the post-1982 upturn. Output of basic materials rebounded in 1983, thanks in part to mild weather following the difficult winter of 1982. Introductions of new production capacity, combined with renovations of existing plant, eased some of the constraints on production of these materials. In the rest of industry, too, a moderate upturn of investment growth in 1981-83 helped increase production capacity. Moreover, transportation of goods to industrial users recovered under a new Minister of Railways, appointed by Andropov, and growth of machinery output accelerated. With this minirecovery, industry's ability to cope with setbacks apparently has improved since 1982. Despite another severe winter that disrupted production in early 1985, growth for that year was not far off the pace of 1983-84.

Industrial Prices. Comparisons of estimates of industry's contribution to GNP in 1970 and 1982 prices imply that inflation in industry averaged a little more than 2 percent annually between those years. This inflation was largely due to the increasing difficulty of extracting raw materials—especially fuels and ferrous metals—which pushed up prices substantially faster in those branches. Thus, difficulties in the extractive branches created inflationary pressures even as they contributed to the slowdown in growth of real output.

Inflation in machinery prices does not provide as much insight into the problems of machinery production as rising costs do for the extraction of raw materials. Deficiencies in the rules for pricing new products, however, have played a major role in the

chronic problems of poor quality of machinery to which Gorbachev is calling attention (see inset). Soviet pricing rules do not adequately distinguish between major improvements, which often entail risks for producers, and minor changes in specifications, for which risks are few. For the vast majority of products, prices are set administratively and, once set, are very difficult to raise. But, if a product with a set price is modified, its producer can submit that the "new, improved" product warrants a higher price. Because major changes can require new methods of production and jeopardize fulfillment of output plans, producers typically prefer minor alterations. In a market economy, producers' preferences would be tempered by opportunities for purchasers to switch suppliers if a modified product is not worth its new, higher price. Such opportunities are rare in the USSR, however, and purchasers who pay inflated prices often can pass the inflation along to their own customers [redacted]

Agriculture

Agriculture's contribution to Soviet GNP increased by about 40 percent between 1960 and 1986, but most of the gains were achieved before 1970. Since then, advances in some years have been followed by setbacks in others. On balance, agriculture exerted a substantial drag on GNP growth in the 1970s and early 1980s (see figure 5).¹⁴ [redacted]

Because weather exerts a far stronger influence on agricultural production than on output in other economic sectors, growth rates of total GNP have often widely diverged from the more stable rates of GNP excluding agriculture. For example, while industrial growth improved in 1983 and sustained a faster pace in the following years, agriculture gained in 1983 (as well as in 1982) but then fell back before rebounding in 1986. As a result, GNP growth rose markedly in 1983, slipped to depressed rates in 1984-85, and increased strongly again in 1986. [redacted]

¹⁴ Agriculture's contribution to GNP is measured as value added by the primary inputs (labor, capital, and land) used in farm production. Another measure of agricultural activity is net output, which includes inputs purchased from other sectors (such as fertilizer) as well as value added. Both measures exclude output produced and used on farms (such as feed for livestock) [redacted]

Problems of Pricing New Products

Soviet rules for pricing new products permit prices higher than those for similar goods already in production only if improved specifications benefit the customers for these products. The price increase allowed for a new product is based on projections of the product's "economic effect." This effect is estimated from formulas including factors such as increases in productive capacity and reductions in user costs. According to a deputy chairman of the Soviet State Price Committee, however, problems arise in the application of these rules:^a

The practice of price formation shows that, instead of creating technology [that benefits both producers and users], enterprises not infrequently attempt to strengthen their own economic position at the expense of raising prices too high.

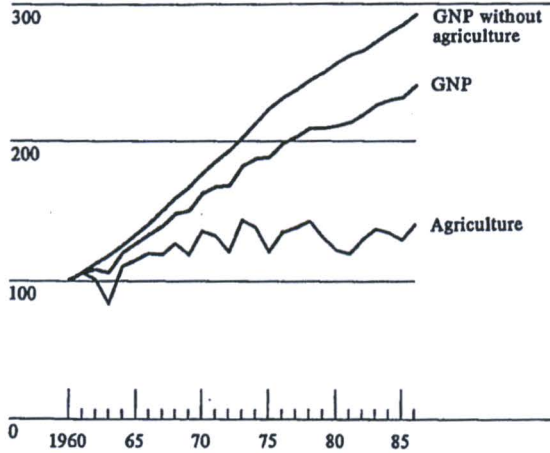
Checks show that some enterprises, after obtaining an incentive markup [in the price of a new product] with the user's agreement on the [product's economic] effect, stop worrying about the quality of output and produce equipment for which actual characteristics are significantly inferior to those stipulated in the normative-technical documentation.

In accordance with the regulations on deliveries of output for use in production, when the customer points out errors, the producer is obliged to eliminate the defects of equipment at his own expense and to pay a fine of an established amount. The customer can return rejected equipment for a refund of the entire sum paid (prices and markups). But users of machine-building output use the rights granted to them weakly in control over prices and the quality of new technology. [redacted]

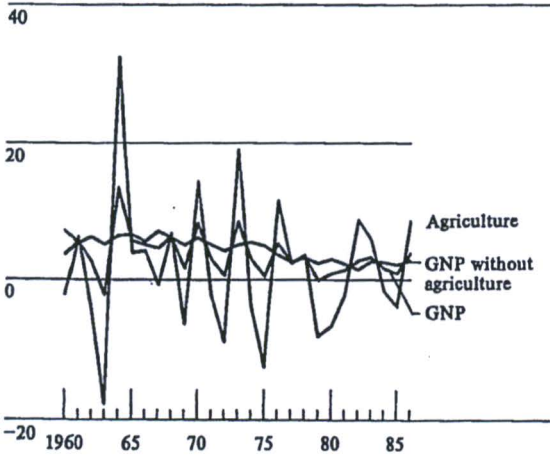
^a L. Rozenova, "Prices and the Quality of Technology," *Ekonomicheskaya gazeta* (No. 7, 1987): p. 17. [redacted]

Figure 5
USSR: Trends in Agriculture and
GNP, 1960-86*

Index: 1960=100



Annual percentage growth



* Based on estimates of value added at 1982 factor cost.

Problems of the 1970s. Although the 1971-80 period included some years of extremely unfavorable weather, Soviet leaders themselves acknowledge that problems other than weather contributed substantially to low growth and poor returns on investment. The following difficulties played a major part in the adverse trends in agriculture:¹⁹

- Productivity declined as downtime of agricultural machinery rose and growth in livestock herds outstripped growth in feed availability. Because wage payments have been largely guaranteed since the mid-1960s—regardless of output—farmers had little incentive to minimize the effects of poor weather and other problems.
- Delivery of industrial inputs to agriculture and processing of farm output became more difficult to synchronize as the size and interdependence of the economy increased. This led collective and state farms to devote a growing share of their own resources to activities such as equipment repair and fertilizer application, which specialized organizations should have provided.
- Despite a large and—until the mid-1970s—rising share of investment in agriculture, allocations of investment were inappropriate. Construction of livestock facilities was overemphasized, while the share of investment allocated to rural housing was cut. As a result, primitive rural living conditions have encouraged younger, skilled workers to migrate to cities. The share of investment going to industries supporting agriculture also was reduced, and this has hindered progress toward improving the quality and assortment of industrial inputs such as farm equipment.

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Table 8
USSR: Growth of Agricultural Output and Purchased Inputs,
1961-86, Average Annual Rates ^a

Percent

	1961-70	1971-75	1976-80	1981-85	1986 Preliminary
Net farm output ^b	3.6	-0.6	0.8	2.1	7.3
Crops	3.5	-1.5	0.9	1.2	9.4
Livestock	3.8	0.5	0.7	2.9	5.2
Purchased inputs ^c	6.5	6.2	2.5	4.4	4.5
Value added in agriculture ^d	3.1	-2.3	0.2	1.2	8.5

^a Based on estimates of net output and purchased inputs in 1982 prices.

^b Includes inputs purchased from sectors outside agriculture but excludes output produced and used on farms (such as feed for livestock).

^c Includes agricultural chemicals, fuels and power, machinery repair, and various feed ingredients.

^d Derived by subtracting purchased inputs from net farm output.

[Redacted]

Moreover, Soviet authors have complained about immense losses of agricultural products between the farms and the food-processing industries. The farm-to-market road network has been grossly inadequate, the average length of haul for farm products has increased, and procurement and transportation organizations have lacked sufficient incentives to prevent damage and spoilage.²⁰ [Redacted]

There are parallels between the problems in agriculture and the slowdown of industrial growth. Bottlenecks in production and transportation of inputs during the 1970s were culprits in both cases, and, although investment in agriculture increased faster than in industry, in both cases allocations often failed to reach producers who most needed additions to capacity to sustain output growth [Redacted]

Recovery in the 1980s. Agricultural performance picked up after the introduction of the 1982 Food Program, largely because of a recovery in output of livestock products (see table 8). Increased feed availability—from expanded forage crops and large grain imports—milder winter weather, and improved feeding practices contributed to the improvement. Until 1986, food crop production was a disappointment, however, partly because of drier, less favorable

[Redacted]

weather conditions. Average annual output of grain, sugar beets, potatoes, and oilseeds during 1981-85 was below 1976-80 average levels. [Redacted]

Increased purchases by agriculture from other sectors accounted for some of the post-1982 gains in farm output. The use of processed feeds rose markedly, and the rapid rise in the application of chemical fertilizers and pesticides probably kept crop production from turning out worse than it did. [Redacted]

Resource Costs in Agriculture. The share of Soviet economic resources devoted to agriculture is very large by Western standards, and resource commitments to the agricultural sector continue to rise. About a fifth of the labor force and the same share of capital stock (excluding housing and other services) are engaged in the sector. In the United States, comparable shares are less than a twentieth. [Redacted]

Calculations based on agriculture's contribution to GNP in 1970 and 1982 prices imply that prices in agriculture—reflecting the cost of these resources—increased at an average rate of about 3 percent annually between 1970 and 1982. This rate exceeded the inflation rate in all branches of industry except fuels and ferrous metals, where extraction costs were rising rapidly. [Redacted]

Other Major Sectors

After industry and agriculture, the next largest share of GNP by sector of origin is provided by services—including consumer services (such as housing and education), government administration, and science (research and development). The share of Soviet resources allocated to the service sector has long been relatively small by international standards, possibly in part because the Marxian definition of “productive” economic activity includes only direct contributions to the output of material goods. In turn, the growth of services in the USSR has been much slower relative to GNP growth than in Western countries.²¹

Nevertheless, the Soviet service sector grew at almost the same rate as total GNP between 1960 and 1986—slower before 1970 and slightly faster afterward (see table 4). Rates of increase for services slackened gradually over time but did not fall as markedly as growth in the rest of the economy. Within the service sector, rates of increase for science and for repair and personal care usually have been among the fastest. Education and health services, on the other hand, have grown quite slowly. Housing space also has risen at generally sluggish rates, but availability of utilities has improved markedly.

Aided by a rising share of investment, both transportation and communications grew faster than total GNP during the 1960s and 1970s. Rates of increase have slowed since 1960 in both sectors, but the slowdown was much sharper for transportation than for communications. As a result, transportation’s lead on GNP growth has narrowed in the 1980s.

An important source of the transport bottlenecks referred to earlier was inadequate investment in expansion and technical improvement of the rail network. Mistakes made in allocating investment included an overemphasis on the building of new lines and double-tracking of existing ones and a neglect of

²¹ For a discussion of the service sector, see the paper by Gertrude E. Schroeder, “USSR: Toward the Service Economy at a Snail’s Pace,” *Gorbachev’s Economic Plans*, Joint Economic Committee, Congress of the United States (Washington: US Government Printing Office, forthcoming in 1987).

yard capacities and terminals. In addition, production of rolling stock was inadequate. Despite continuing strains on capacity, however, railroad performance improved markedly after the appointment of a new rail minister in 1983. Under his stewardship, the use of longer, heavier trains became more common, and this reduced congestion on crowded lines and eased the flow of supplies to industrial producers.

Trade and construction, the other major sectors of origin, are discussed in the following section on end uses of GNP. The trade sector includes a large retail network, and its patterns of growth are roughly similar to those for consumption of goods. The construction sector is a major component of investment.

Trends in Major End Uses

As GNP growth slowed in the USSR, so did growth of allocations to all major claimants: investment, defense, and consumption. Planners’ priorities for these end uses as reflected in their shares of GNP at current factor cost have not changed much since 1960.²² Although real growth of investment fluctuated more from year to year than did consumption growth, investment increased more rapidly than consumption in all five-year plan periods except 1966-70. As a result, investment’s share of GNP rose slightly, while consumption’s share fell a little. The share of defense spending in GNP at current factor cost also rose slightly, partly because real growth of weapons procurement was rapid during the 1960s and partly because after 1970 costs of military output increased faster than those of civilian production.

Soviet planners traditionally have given lower priority to consumption than to investment and defense; the sources of future output growth and military power,

²² Shares for this illustration of priorities are calculated from current values of GNP because changes in both prices and quantities affect decisions about spending. Factor cost values are used because established prices do not give an accurate picture of the costs of economic resources.

respectively. These priorities are illustrated by sharp differences between the USSR and the United States in patterns and levels of resource allocation (see figure 6):

- Consumption is given a substantially smaller share of GNP in the USSR than in the United States, while investment takes up a larger share and defense a much larger share.²³
- Soviet consumption is much smaller relative to US consumption than is Soviet investment relative to US investment. Levels of defense spending are roughly equal in the two countries.²⁴

Investment

Investment in the USSR was three and a half times as large in 1986 as in 1960 (see figure 7). After 1975, however, planners took a new approach (discussed in the "Industry" section) and deemphasized investment.²⁵ Annual rates of increase slowed as a result—from an average of 5.7 percent through 1975 to 4.0 percent afterward. Gorbachev has said that this deemphasis was a mistake, however, and in 1986 investment grew by about 6 percent in support of his program to modernize the USSR's industrial base.

The machinery component of new investment grew consistently faster than new construction, both before and after investment growth slowed (see table 9). Nevertheless, growth of machinery investment declined markedly when rates of increase in domestic output fell in the mid-1970s. Machinery imports, however, cushioned the impact on investment of shortfalls in domestic production.

²³ These shares are based on current domestic values of GNP in 1985 at factor cost for the USSR and in market prices for the United States. Estimates by category of end use are adjusted to make coverage comparable between the two countries.

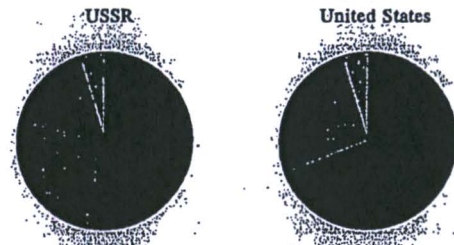
²⁴ Except for defense, these relative levels represent the geometric mean of a comparison using US prices (dollars) as weights and another comparison using Soviet price weights (rubles). The comparison of defense spending is based only on US price weights because ruble prices are very difficult to estimate for US defense activities—especially weapons production.

²⁵ For a discussion of investment policy, see Robert Leggett, "Investment Policy in the 12th Five-Year Plan," *Gorbachev's Economic Plans*, Joint Economic Committee.

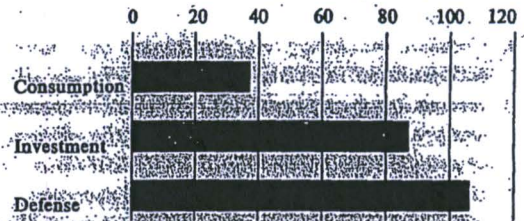
Figure 6
USSR-United States: Comparison
of End Uses of GNP, 1985

■ Consumption ■ Investment
■ Defense ■ Other

*End Use Shares of Total GNP**



Relative Size of End Uses
(USSR as Percent of United States^b)



^a Based on current domestic values of GNP at factor cost for the USSR and in market prices for the United States.

^b Based on the geometric mean of a comparison using dollar price weights and another comparison using ruble price weights—except for defense, which is based only on dollar price weights.

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For years Soviet leaders have been exhorting the construction sector to reduce the time required to put new capacity into service. During the early 1980s some progress was made in reducing the chronic backlog of unfinished construction projects, but the sector's performance continues to be lackluster.

As growth of new investment fell during the late 1970s, growth of capital repair slowed as well, but less markedly. Rates of increase in capital repair, as a result, exceeded those for new investment (excluding livestock). These trends are reflected in Soviet press reports and journal articles bemoaning the large and expanding volume of repair needed to keep aging plant and equipment in operation:

Today expenditures on capital repair of machinery and equipment are 2-3 times the initial value. They are effective only if they do not exceed 25 percent of the value In 1984, 35 billion rubles and almost a fifth of ferrous metals were spent on repair of productive capital stocks. A fourth of the country's stock of machine tools and 6 million workers are employed in repair shops.²⁶

Obsolete machinery and equipment that have accumulated in existing capital stocks are diverting labor and material resources in greater and greater amounts and reducing the efficiency of production. According to statistical data, in 1973-82 the share of metal-cutting machine tools and forging-pressing equipment more than 20 years old increased. In industry, fixed productive capital in service more than 20 years rose from 8 to 18 percent.²⁷

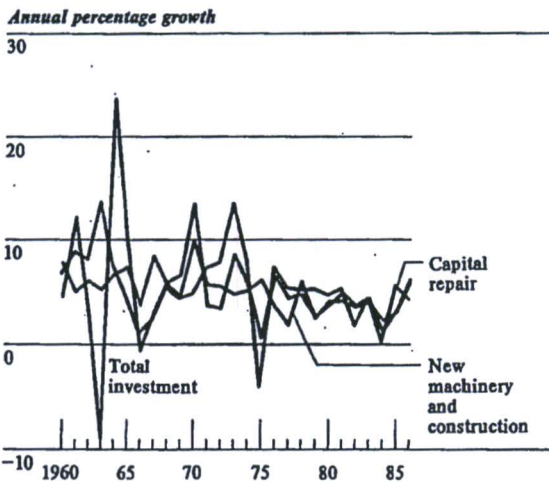
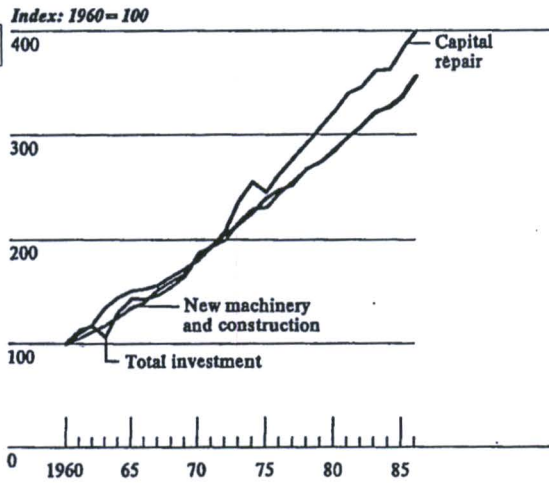
Defense

By 1985 the level of Soviet defense spending in constant ruble prices was over two and a half times as high as in 1960. As general economic growth slowed,

²⁶ E. A. Voznesenskiy and S. A. Mukhin, "Ways of Accelerating the Renewal of Fixed Capital," *Finansy SSSR* (No. 7, 1986): p. 16.

²⁷ A. Malygin, "Renewal of Fixed Productive Capital," *Planovoye khozyaystvo* (No. 7, 1985): p. 31.

Figure 7
USSR: Trends in Investment, 1960-86*



* Based on estimates at 1982 factor cost.

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Table 9
USSR: Growth of Investment by Category, 1961-85,
Average Annual Rates ^a

Percent

	1961-65	1966-70	1971-75	1976-80	1981-85
Total investment	7.3	5.5	4.3	4.3	3.4
New fixed investment	7.0	5.9	3.8	3.9	3.4
New machinery and equipment	10.4	7.6	8.7	6.5	4.6
New construction and other activities	4.7	6.0	4.0	2.0	2.6
Net additions to livestock	25.2	-0.8	... ^b	... ^b	... ^b
Capital repair	8.5	3.6	6.4	5.6	3.5

^a Based on estimates of end use at 1982 factor cost. Preliminary 1986 estimates of these end uses are not shown because they are subject to greater error than preliminary estimates by sector of origin.

^b Average annual growth cannot be calculated because the estimated value at the beginning or the end of the period is negative. The effects of changes in livestock are included, however, in estimates of

growth of new fixed investment and total investment. As a result, these larger categories of investment show an abrupt slowdown of growth in 1971-75, when poor harvests led to distress slaughtering of livestock. (In contrast, official Soviet investment statistics, which exclude livestock, do not show markedly slower growth until 1976-80.)



however, so did growth of defense spending—from an average of about 5 percent per year between 1965 and 1974 to less than 2 percent annually thereafter. This slowdown primarily reflected the leveling off in procurement of weapons (currently about half of all expenditures on defense) during the late 1970s and early 1980s. Nonetheless, the high level of spending on procurement that had been attained provided the military with large quantities of hardware for strategic and conventional forces. Expenditures on other categories of defense continued to increase after 1975. Research and development increased at an average annual rate of 4 to 5 percent, operations and maintenance at about 2 to 3 percent, and personnel and construction at roughly 1 to 2 percent.

Although Soviet military power rose steadily, competition between military and civilian claims on resources intensified as growth slowed across the economy. Direct spending on defense took up a slightly larger share of GNP at current factor cost in 1982

than in 1970. In addition, rising shares of key industrial outputs went to defense—including indirect requirements of supporting industries as well as direct military uses.²⁴ Defense absorbed a little more than 40 percent of machinery output in 1982—up slightly from the 1970 share—and nearly 40 percent of metal output—up sharply from about 30 percent in 1970.



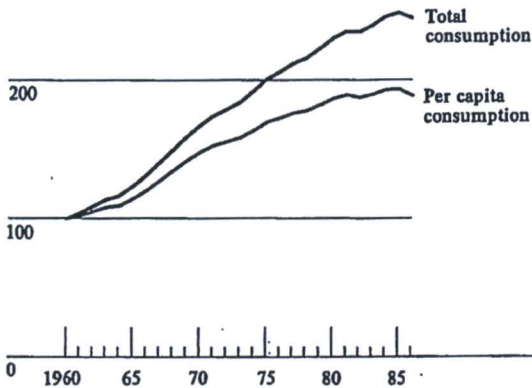
Consumption

The Soviet population's consumption of goods and services in 1986 was two and a half times as great as in 1960, and consumption per capita almost doubled (see figure 8). Growth of consumption slowed along with GNP growth after 1970, however. Annual rates of increase in total consumption slipped from an average of 4.7 percent between 1960 and 1975 to

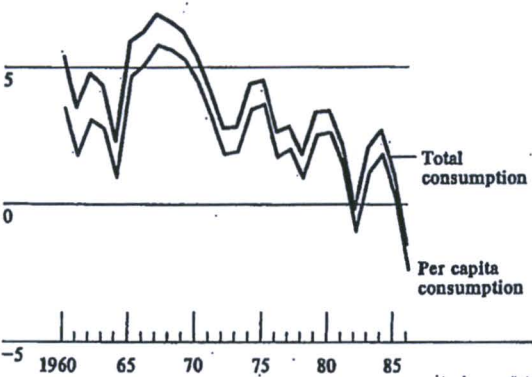


Figure 8
USSR: Trends in Consumption,
1960-86*

Index: 1960 = 100
300



Annual percentage growth
10



* Based on estimates in 1982 established prices.

[Redacted]

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1.9 percent after 1975, while the corresponding rates for per capita consumption were 3.6 percent and 1.0 percent.² [Redacted]

Trends by Category of Goods and Services. Consumption of goods other than food grew faster than food consumption, as is typical in countries with rising standards of living (see table 10). Rates of gain for consumer durables—such as automobiles, appliances, and furniture—exceeded those for soft goods, such as clothing, shoes, soap, and books. [Redacted]

Consumption of food also rose, and the share of animal products in food consumption increased after 1965. Despite these improvements, growth of food consumption continued to be depressed a year or two after a poor harvest. Some of the fastest gains, moreover, were in consumption of alcoholic beverages. Gorbachev's antialcohol campaign turned this source of growth into a drag on consumption in 1985-86, and the drag will continue until factories finish converting their production lines from alcohol to other beverages. [Redacted]

Consumption of services increased somewhat faster than consumption of goods during most of the period since 1960.³ Personal transportation and communications, repair and personal care, and utilities grew the most rapidly. Growth was slower for housing, education, and health services. [Redacted]

² This section is based on estimates of consumption in established prices—because they reflect what consumers pay—rather than the factor cost estimates used in most of the paper. Soviet established prices are clearly inferior to the market prices used to measure consumer welfare in Western economies. Still, they are preferable to factor costs for indicating how many goods and services consumers can purchase with their incomes.

Growth rates of total consumption have been somewhat lower at factor cost than in established prices (until the last few years) because of differences in the weights of various categories of consumption. Several kinds of goods for which consumption has grown rapidly (beverages, soft goods, and durables) have smaller weights at factor cost, and housing, which has grown slowly, has a much larger weight at factor cost. [Redacted]

[Redacted]

Table 10
USSR: Growth of Consumption by Category, 1961-85,
Average Annual Rates *

Percent

	1961-65	1966-70	1971-75	1976-80	1981-85
Total consumption	4.2	6.3	3.8	2.8	1.6
Food	3.5	5.6	2.8	1.8	0.3
Animal products	1.7	5.9	3.2	1.4	1.8
Processed foods	5.8	4.2	2.7	3.5	1.2
Basic foods	1.6	2.0	0.6	1.0	1.7
Beverages	7.3	8.5	3.6	2.2	-2.5
Soft goods	3.7	8.3	3.7	3.7	2.2
Durables	5.5	10.6	10.7	6.3	3.9
Services	6.2	5.2	3.9	2.9	2.4
Housing	4.0	3.1	2.6	2.2	2.6
Utilities	9.4	6.5	6.3	4.7	4.2
Personal transportation	10.6	9.3	7.3	3.1	2.6
Personal communications	7.3	8.6	6.4	4.7	3.8
Repair and personal care	6.6	7.5	5.4	5.0	4.0
Recreation	5.2	3.7	5.1	2.1	1.9
Education	6.8	4.1	2.4	2.3	1.5
Health	3.8	4.4	2.4	1.8	1.5

* Based on estimates of end use in 1982 established prices. Preliminary 1986 estimates of these end uses are not shown because they are subject to greater error than preliminary estimates by sector of origin. Services provided at no charge to users are valued at the cost of the labor and materials used to produce them.

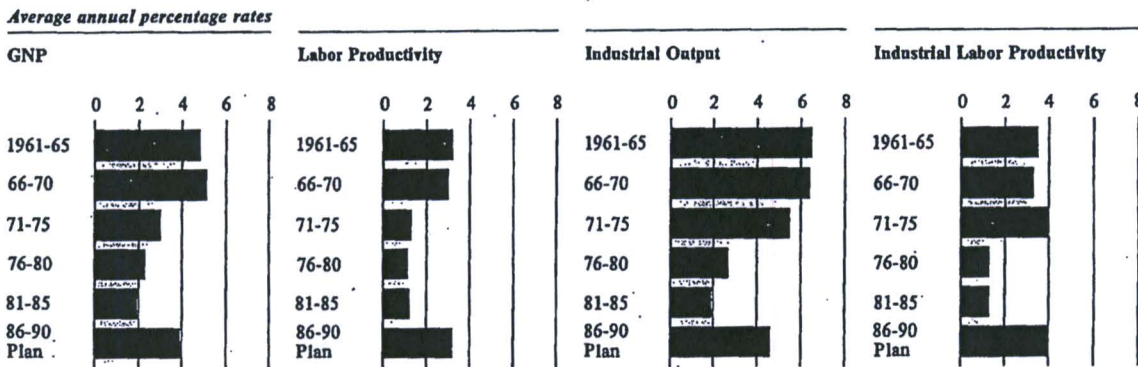
Comparison With Other Countries. International comparisons of consumption per capita show that the USSR ranks well below the United States and Western Europe, and even below some of its East European allies. Soviet consumption differs in composition and quality from that in countries at higher, and even comparable, levels of economic development.¹¹ Food and clothing make up a larger share of total Soviet

consumption than in countries with similar levels of GNP per capita. Shares of housing and related services, health care, and personal transportation and communications, on the other hand, are smaller in the USSR.

Although quantitative comparisons of per capita consumption across countries provide reasonably good indicators of material well-being, differences in the quality of goods and services are difficult to measure. The comparisons include some adjustments for such

¹¹ See Gertrude E. Schroeder's chapter, "Consumption," *The Soviet Economy: Toward the Year 2000*, ed. Abram Bergson and Herbert S. Levine, and her study with Imogene Edwards, *Consumption in the USSR: An International Comparison*, prepared for the Joint Economic Committee of Congress (Washington: US Government Printing Office, 1981).

Figure 9
USSR: Growth of Output and Labor Productivity, 1961-90



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differences, but full adjustments for the chronic poor quality and limited variety of Soviet goods would reduce measured consumption in the USSR. Moreover, adjustments for inefficiencies in the Soviet system of distributing goods and services, if they were feasible, would result in a further reduction. Imbalances between supply and demand are chronic, affecting first one product, then another. Some services are rationed—housing is a notable example—and the retail trade network is not designed for the convenience of customers. The illegal and questionably legal activities of the second economy fill in many of the gaps in the official distribution system. Many Soviets, however, find the resulting redistribution of incomes from producers to “arrangers” politically and socially undesirable.

Plans for 1986-90

Gorbachev has made an acceleration of Soviet economic growth a top priority. Plans for 1986-90 imply that increases in GNP are to average roughly 4 percent per year, with industry growing at slightly

more than 4.5 percent annually.³² The rates of increase in labor productivity needed to reach these growth targets, however, have not been sustained longer than a year or two since the late 1960s to early 1970s (see figure 9).

In 1986, GNP grew at about the rate planned for 1986-90—its best showing in a decade. But agriculture’s recovery from a poor harvest provided a boost that is unlikely to be sustained, because good results

³² GNP growth implied by Soviet plans for 1986-90 is calculated as a weighted average of available official growth rates for industry, agriculture, and other major sectors of origin. The weights are 1985 values of GNP (at 1982 factor cost) in those sectors. Sectoral growth targets are used without adjustment because Soviet plans do not appear to be subject to the disguised inflation that affects official summary statistics on past growth. See

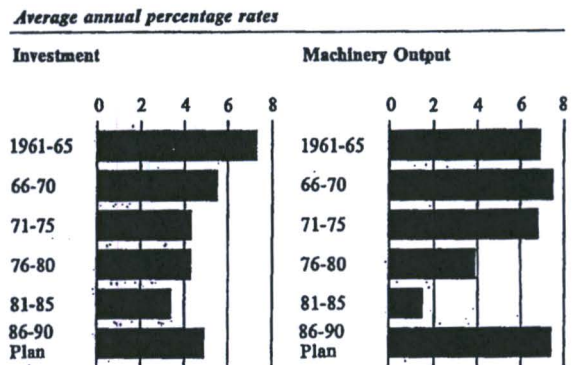
James H. Noren and F. Douglas Whitehouse, “Soviet Industry in the 1971-75 Plan,” *Soviet Economic Prospects for the Seventies*, Joint Economic Committee, Congress of the United States (Washington: US Government Printing Office, 1973), pp. 206-245.

would have to be followed by even better results. Industrial growth was short of target, moreover, although improved at just over 3 percent. Gorbachev can claim some success in 1986 for his aggressive efforts to accelerate output growth by raising the contribution of "human factors" to productivity. His reinvigoration of Andropov's campaign to tighten labor discipline and his own attack on alcohol abuse appear to have increased both time spent on the job and output per hour worked. In addition, changes in organization and management—including firings at high levels—probably have removed some bureaucratic obstacles to growth. As measures are taken to reduce sources of slack in production, however, the potential for further gains from such reductions erodes [redacted]

Although a program for "radical reform" of the Soviet economic system was approved in June, any major improvements in growth are unlikely to be realized until after 1990. During 1986-90, therefore, Gorbachev is hoping to build a lasting base for economic growth by using new machinery to modernize technology and raise productivity, especially in industry. Plans call for investment to increase at an average annual rate of nearly 5 percent—up from 3.4 percent in 1981-85. Machinery output—a major source of investment resources—is to grow by almost 7.5 percent per year, a rate not achieved since the early 1970s (see figure 10). [redacted]

By the middle of 1986, Gorbachev was frequently expressing his impatience for signs of rapid increases in both the quantity and the quality of machinery output. Results from late 1986 and early 1987, however, indicated that Soviet machine builders were finding it difficult to pursue his ambitious targets for quantity and quality simultaneously. Many improvements in quality require the introduction of new designs and new production processes, but slow retooling of production lines began drawing official criticism in the latter months of 1986. At the beginning of

Figure 10
USSR: Growth of Investment and Machinery Output, 1961-90



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1987, moreover, a new system of quality control was introduced at 1,500 industrial enterprises. Initial rejection rates were especially high for machinery. [redacted]

Even if GNP growth reaches its plan-implied target for 1986-90, investment plans are so ambitious that rapid increases in consumption must be deferred. Nonetheless, Gorbachev should be able to supplement his discipline and antialcohol campaigns with some improvements in living standards. Shortfalls in planned GNP growth would reduce consumers' gains, however, and substantial shortfalls could lead to cutbacks in planned investment growth. As a result of substantial investment in defense industries before Gorbachev became General Secretary, almost all of the production capacity required to support force modernization into the early 1990s is already in place.

Appendix A

Estimates of Soviet GNP in 1982 Prices

This appendix presents an overview of the CIA's estimates of Soviet gross national product (GNP) in 1982 prices—summarizing the methods of estimation and assessing the degree of confidence in the results. Except for the ruble price base, which has been moved from 1970 to 1982, the methods of estimation are mostly unchanged from those described in the CIA's benchmark study of Soviet GNP in 1970 prices.¹³ The basic outlines of the methods are reviewed below, and changes from earlier procedures are pointed out. The quality of the evidence on which the estimates of GNP in 1982 prices are based is compared with that for the previous estimates in 1970 prices. Finally, some key methodological problems of estimating Soviet GNP are noted.

Methods of Estimation

The CIA's methods of estimating Soviet GNP involve two main stages: (1) developing a comprehensive set of estimates for the base year, and (2) calculating growth from data on changes in major GNP components. The key steps in estimating Soviet GNP are as follows:

Base Year	Growth
Complete coverage	Sample coverage
Precise definitions of measures	Proxies for base-year measures

For the base-year estimates, coverage of economic activity is as complete as possible, and the measures used correspond as closely as possible to the definitions and concepts used in GNP estimates for Western countries. Data for the growth estimates are not as complete as data for the base year, however, because it is feasible to track changes in output only for samples of products. Moreover, precisely defined

¹³ See Joint Economic Committee, *USSR: Measures*, (v).

measures of many GNP components are made only for the base year, so that proxies must be used to estimate growth. Estimates of industrial growth, for example, are based on changes in output including processed inputs rather than on value added, which is used in estimating industry's contribution to base-year GNP (see the next section).

Estimates of Base-Year GNP

Besides total GNP, base-year estimates are made for components broken down by end use and by sector of origin. The former breakdown shows the distribution of output to final purchasers for uses such as consumption, investment, and defense. Following Western accounting procedures, output is counted only once, when it is sold to final purchasers. Otherwise, products sold from one enterprise to another would be counted several times—for example, as iron ore, rolled steel, and automobile chassis—before reaching final consumers, in this example, as automobiles.

In the breakdown of GNP by sector of origin, income resulting from the production of final output is allocated among sectors such as industry, agriculture, and services. This income consists of value added by primary factors of production like labor and capital. In order to avoid counting products more than once, it excludes the value of processed inputs sold between enterprises.

Base-year estimates of GNP are made initially in Soviet established (official) prices. These prices have several shortcomings that prevent them from reflecting the allocation of economic resources accurately:

- Substantial turnover (excise) taxes are levied on selected products, mainly consumer goods such as automobiles, clothing, and alcohol.

- Subsidies keep prices artificially low for basic consumer needs like bread, meat and dairy products, and housing.
- Reported profits are distributed unevenly among sectors and set at arbitrary rates during the process of price formation, making profits an unreliable indicator of the contribution of capital to production.

Therefore, in an attempt to approximate better the value of resources used in production and allocated to end uses, the CIA applies concepts and procedures pioneered by Abram Bergson to adjust its estimates of Soviet GNP from established prices to factor cost.⁴ On the sector-of-origin side of GNP, where the adjustment begins, the goal is to make value added in each major sector reflect that sector's use of labor and capital resources. Wages in established prices are accepted without adjustment because they are believed to measure returns to labor reasonably well. Data on enterprises' depreciation payments also are accepted, largely because little other information is available to measure wear and tear on the stocks of plant and equipment. But the rest of value added in established prices—turnover taxes, subsidies, and profits—is not a good measure of returns on capital. These elements are subtracted from base-year estimates of value added in established prices, and returns on fixed and working capital—calculated at a uniform rate of 12 percent—are added back. In principle, returns on agricultural land and other natural resources also should be estimated and added to GNP. The CIA is examining the feasibility of developing such estimates.

Next, the effects of the factor cost adjustment on GNP estimates by sector of origin are traced through the production process to the end-use side of GNP. Turnover taxes and subsidies that fall directly on

⁴ See Bergson's *Soviet National Income and Product in 1937* (New York: Columbia University Press, 1953), chapters 3 and 4; Bergson and Hans Heymann, Jr.'s *Soviet National Income and Product, 1940-48* (New York: Columbia University Press, 1954), chapter 3; and Bergson's *The Real Income of Soviet Russia Since 1928* (Cambridge, Mass.: Harvard University Press, 1961), chapters 3, 8, and 9.

Basis for Calculating Soviet GNP Growth

Base-Year Value, by Sector	X	Index of Growth, by Sector	=	Given Year's Value, by Sector
Sector 1		Sector 1		Sector 1
Sector 2		Sector 2		Sector 2
Sector 3		Sector 3		Sector 3
+ ... Sector N		+ ... Sector N		+ ... Sector N
GNP				GNP

specific end uses—such as taxes on alcoholic beverages and subsidies on housing—are removed from those uses. The remaining effects of substituting factor costs for established prices in estimates of value added by sector of origin are calculated with the aid of an input-output table for the base year (1982). For each sector, the table shows linkages from value added by primary inputs to gross output—including processed as well as primary inputs—and then to end uses of gross output. These linkages make it possible to determine not only the direct effects of changes in estimates of value added in, say, metallurgy, but also the indirect effects of such changes on output of machinery and other sectors using metals as inputs.

Estimates of GNP Growth

Base-year estimates of Soviet GNP—both at factor cost and in established prices—are used as weights for estimates of GNP growth. First, growth is estimated for the major components of GNP. In principle, growth of total GNP then can be calculated as a weighted average of growth of the components either by sector of origin or by end use. In practice, however, growth of total GNP is determined by growth estimates for the sectors of origin, which generally give more reliable results (see inset). The end-use side of GNP includes several components for which growth is particularly difficult to estimate: capital repair, exports net of imports, and inventory change. Because of these difficulties, estimates of the growth of the

residual category of GNP by end use (outlays not elsewhere classified) would be highly uncertain in any case. Growth of this "end-use residual," therefore, includes any changes in the statistical discrepancy between sector-of-origin and end-use estimates [redacted]

Changes in Procedures for Estimates

Although the basic methods used to estimate Soviet GNP in 1982 prices are the same as those used for GNP in 1970 prices, specific procedures for making several parts of the estimates have changed. The first of these changes is that the factor cost adjustment of estimates for the new base year follows a revised procedure. In addition, estimates of growth for the following sectors of origin are based on new procedures or information, or both:

- Military machinery.
- Repair and personal care.
- Recreation.

The current estimates of GNP in 1982 prices depend only on the new base year and procedures, so they are internally consistent. Because of the procedural changes, however, these estimates are not fully comparable with earlier estimates of GNP in 1970 prices. [redacted]

The key change in the *factor cost adjustment* is in calculating the returns on capital that are added to GNP after turnover taxes, subsidies, and profits are removed. For base-year estimates of GNP in 1970, the total value of returns on capital was assumed equal to the sum of the elements removed from GNP. In estimating GNP for 1982, however, returns on capital are assumed to be 12 percent of the value of the stock of fixed and working capital, with fixed capital estimated net of depreciation.³³ In contrast, the assumed value of returns on capital in the 1970

³³ The assumed rate of return is that set by Soviet planners for deciding among alternative investment projects. See Gosplan SSSR, *Metodicheskiye ukazaniya k razrabotke gosudarstvennykh planov ekonomicheskogo i sotsial'nogo razvitiya SSSR* (Moscow: Ekonomika, 1980), p. 441.

³⁴ In removing depreciation from values of fixed capital stock, it is assumed that wear and tear constituted the same share of 1982 values including depreciation as at the time of the last complete revaluation and inventory of capital in 1972. Shares of wear and tear are published for the economy as a whole and for selected major sectors in *Tsentral'noye statisticheskoye upravleniye pri Sovete Ministrov SSSR, Narodnoye khozyaystvo SSSR v 1972 g.* (Moscow: Statistika, 1973), p. 63. (U)

estimates amounted to 24 percent of the value of capital stock net of depreciation (or 18 percent of the stock including depreciation) [redacted]

Valuing capital net of depreciation also involves a change from estimates of 1970 GNP at factor cost. Previously, returns on capital were distributed among the sectors of origin in proportion to sectoral capital stocks including depreciation. Because some sectors have older stocks than other sectors, however, the assumption that the rate of return on capital is uniform for all sectors is not strictly valid if depreciation is included. In the current factor cost adjustment, therefore, the distribution of returns on capital is proportional to stocks excluding depreciation. [redacted]

Growth of *military machinery output* in 1982 prices, like its growth in 1970 prices, is calculated by valuing changing quantities of weapons at prices of the fixed base year. In contrast with the base-year prices for 1970, which were moved along "learning curves" reflecting improvements in the efficiency of input use as the scale of output expanded, however, the base-year prices for 1982 are held constant over time. This change in procedure improves the comparability between prices of military and civilian goods. Although the new prices are set by referring to learning curves that reflect 1982 production technology, estimates of the growth of military machinery now reflect changes in output only, rather than in input use as well. [redacted]

The *repair and personal care* sector includes both state-administered and privately provided services such as laundry, dry cleaning, barber and beauty shops, and repair of household appliances, automobiles, and housing. Very little information is available on the private component of the sector, and the information that is available is subject to ambiguities in both coverage and valuation. Because of the lack of data, growth of these private services in 1982 prices is assumed constant at 1 percent per year on a per capita basis. This assumption replaces a set of scattered and probably inconsistent observations for a few years, on which growth estimates in 1970 prices were based. Growth of state services in prices of both 1982

and 1970 is based on official Soviet data on the services' value in prices that the Soviets claim to be constant. [redacted]

Estimates of the growth of *recreation* services in 1982 prices are based on new information, including a revised sample of services provided by that sector. For the resorts and leisure component of recreation, estimates of growth in 1982 prices are combined, instead of being made separately, as in 1970 prices. Moreover, the sample of services used to estimate growth for the new, combined category adds data on the number of persons using rest bases and tourist hotels to earlier data on persons using sanatoriums, resorts, and rest homes. Data on hotel use (with employment in hotels serving as a proxy for the number of persons accommodated) have been dropped from the sample. Growth of the entertainment component of recreation is estimated, as before, from data on paid attendance at movies and theaters. [redacted]

Confidence in Estimates

The degree of confidence that can be placed in the CIA's estimates of Soviet GNP depends, to an important extent, on the results of moving the price base from 1970 to 1982. In general, the quality of the evidence for the new estimates in 1982 prices is considered to be satisfactory, although probably not as good as that for the estimates in 1970 prices. Regardless of the price base used, moreover, GNP estimates are subject to uncertainties arising from general methodological problems. Research on some of these problems is under way—inside and outside the CIA—but in most cases, no easy solutions are available. [redacted]

Move to 1982 Price Base

Shifting the price base for Soviet GNP requires a new set of base-year estimates for the major GNP components—by sector of origin and by end use—both in established prices and at factor cost. In addition, weights need to be estimated in further detail for the individual products and groups of products used to track GNP growth. The confidence attached to these estimates of major components and more detailed

weights varies with the kinds of information on which they are based. [redacted]

Estimates of the major components of 1982 GNP in established prices are thought to be fairly reliable. Many are based directly on data published in official Soviet statistical sources. Information on some of the components—especially privately provided services and budgetary incomes—is more difficult to find. Often it must be pieced together from Soviet monographs and journal articles. [redacted]

Although the factor cost adjustment yields better estimates of the costs of economic resources than Soviet established prices do, some of the procedures used for the 1982 adjustment are based on considerably less information than those for 1970. Data for the adjustment of 1982 GNP by sector of origin are similar in quality to 1970 data. The adjustment of end-use estimates for 1982, however, is based on a less detailed input-output table—which is derived from much less information—than the table used for the 1970 adjustment. [redacted]

Detailed weights for estimates of GNP growth in 1982 prices appear satisfactory for the most part, but less so than for 1970. Most of the official handbooks listing prices for 1970 (and years close to it) are not available for 1982 prices. The vast majority of the 1982 prices used for individual products come from Soviet monographs and journal articles; price information is especially sparse for chemicals and processed foods. [redacted]

Weights used in estimating growth of certain groups of products also must be derived for 1982—within branches of industry (for example, precision instruments and automobiles within machine building) for GNP by sector of origin, and within consumption (for example, meat and milk products within food consumption) for GNP by end use. Information on which to base the 1982 weights within industry is clearly inferior to that for 1970 because it comes from a less detailed input-output table. Data for the subcategories of consumption, however, are fairly good—drawn largely from official Soviet statistical sources. [redacted]

General Problems of Estimation

Problems of selecting and refining methods of estimation are common to all countries that compile GNP statistics and similar summary measures of economic activity. For Western efforts to estimate Soviet GNP, many of the problems are exacerbated by the USSR's traditional reluctance to divulge information about its economy. Despite the recent release of some additional information under Gorbachev's policy of *glasnost* (openness), far fewer economic statistics are available for the USSR than for Western countries. [redacted]

Contribution of Second Economy to GNP. The "second economy" in the USSR includes a variety of private and illegal or questionably legal activities, some of which contribute to GNP while others do not. Its full scope—according to Gregory Grossman's standard definition—is broad:

*As some scholars define it, the second economy comprises all production and exchange activity that fulfills at least one of the two following tests: (a) being directly for private gain; (b) being in some significant respect in knowing contravention of existing law.*³⁴ [redacted]

Two kinds of problems arise in measuring the second economy's contribution to Soviet GNP: determining which of its activities should be included and estimating the value of those activities. In principle, Soviet GNP should cover the full range of economic activities measured in GNP statistics for Western countries. This standard calls for the inclusion of all legal private production and also of activities that are illegal or tightly restricted in the USSR but not in the West. Before the recent revisions of Soviet laws governing private activities, for example, carpentry and watch repair were legal—provided that individuals performing the services registered with the state, paid taxes, and used no stolen materials—while taxi services were illegal. In addition, GNP should include any increases in output available to final purchasers as a result of the diversion of state resources—such as the construction of private housing using materials stolen from state enterprises [redacted]

Soviet GNP should exclude, as Western statistics do, activities that would be considered crimes in any country. These exclusions would cover:

*Theft from individuals for personal use or sale, prostitution, murder or mayhem for hire, bribery of public officials to obtain personal favors (e.g., admission to a university), and embezzlement of state funds.*³⁷ [redacted]

Activities that do not add to legal production of goods and services for final use should be excluded from GNP. For example, black-market transactions in goods purchased from state retail stores for resale at sharply increased prices should not be counted. Retail sales—valued at prices established by the government—are already included, and any services provided by black marketeers in selling goods at more convenient times and places would be illegal in the United States as well as in the USSR.³⁸ It is often difficult, however, to draw a line between "illegitimate" resale of goods in short supply at exaggerated prices and diversion of state resources to "legitimate" private uses that add to GNP [redacted]

The CIA's estimates of Soviet GNP in the base year (1982) include many activities of the second economy, but problems of acquiring the necessary data prevent full coverage of such activities. The Soviet statistical system is oriented primarily toward measuring production of goods in the state-administered economy. To the extent that they are based on official Soviet

³⁷ Schroeder and Greenslade, loc. cit., p. 5 [redacted]

³⁸ See George Jaszi, "The Conceptual Basis of the Accounts: A Re-examination," in Conference on Research in Income and Wealth, *A Critique of the United States Income and Product Accounts*, Studies in Income and Wealth, vol. 22 (Princeton: Princeton University Press, 1958), p. 143.

In explaining the exclusion of illegal activities from US measures of GNP, Edward Denison specifies that "The value of products that are illegal, at least in the uses to which they are put, is to be excluded." He adds, however, that "Legal products are to be included even if their producers evade taxes, or ignore the minimum wage, the Sherman Act, and other legislation, or are illegal immigrants, gangsters, or escaped convicts." See his article, "Is U.S. Growth Understated Because of the Underground Economy? Employment Ratios Suggest Not," *Review of Income and Wealth* (March 1982), pp. 1-16 [redacted]

³⁴ See Grossman's article on the second economy, p. 25. (u)

statistics, the CIA's estimates of GNP have similar uncertainties in measurement of privately provided goods, and especially services. Research [redacted] is under way, however, that may improve measurement of the second economy's contribution to base-year Soviet GNP." [redacted]

Legal private production in agriculture and housing is included in the official Soviet statistics used to estimate the contribution of these sectors to base-year GNP. Some undercounting of this production in GNP estimates is possible if there are gaps in the official data, but the magnitude of any undercounting probably is small. Most illegal private production, however, is not captured in the CIA's estimates of Soviet GNP. The largest item in this category probably is home-distilled liquor, but, because its production is illegal in the West, as well as in the USSR, it should not be included in GNP estimates. [redacted]

Base-year estimates of GNP also include a wide variety of privately provided services, without distinction as to which are classified as legal or illegal by the Soviets. Estimates for the repair and personal services component are based on information from Soviet monographs and press and journal articles. Although the coverage of the Soviet data is not described clearly, it probably corresponds reasonably well to that of the GNP component. The contribution of some other private services to GNP is undercounted. Estimates of privately provided health and education services are based on very little information, and a lack of data prevents estimates of private transportation services (such as taxi services provided in private automobiles). [redacted]

GNP estimates for the base year include some private activities involving the diversion of state resources but exclude others. Private housing built with materials stolen from state enterprises, for instance, is included in GNP estimates to whatever (unknown) extent it is

"The results of this research are being published in a series titled *Berkeley-Duke Occasional Papers on the Second Economy in the USSR*. [redacted]

covered in official Soviet investment statistics. Most illegal production—using stolen as well as purchased materials—of consumer goods probably is not counted in GNP. Such production is included if it is sold through state retail outlets and counted in their sales, but most of it is probably sold privately. [redacted]

The lack of data on the second economy probably has a greater impact on estimates of Soviet GNP than it has on the GNP estimates of Western countries. The scope of the second economy (excluding criminal activities) probably is broader in the USSR—where it partially fills the gaps and remedies the shortages left by state-administered activities—than it is in the West. As difficult as it is to measure the contribution of the second economy to Soviet GNP for a single year, moreover, obtaining reliable estimates of the growth of these activities is impossible, given the information available. Problems of measuring the second economy's contribution to GNP are not unique to the USSR. In the United States, for example, a variety of small-scale services, such as repair of consumer goods, are undercounted in GNP when the providers of these services do not report their incomes to the Internal Revenue Service. [redacted]

Contribution of Foreign Trade to GNP. The CIA is reexamining its estimates of the base-year contribution of foreign trade to Soviet GNP. Base-year GNP estimates in established prices currently include exports and imports valued in world prices and converted to domestic currency at official exchange rates. The effects of valuing exports in domestic prices instead are being analyzed. [redacted]

Strictly speaking, the current "GNP" estimates measure gross domestic product (GDP) rather than gross national product, but the feasibility of developing estimates of GNP proper is being studied. Differences between GNP and GDP reflect differences in the coverage of payments for labor and capital services exchanged between countries, or "net factor incomes from abroad." Because the Soviet Government places

tight controls on all incomes of this kind, however, differences between GNP and GDP are undoubtedly small.⁴⁰ [redacted]

In addition to its reexamination of estimates of foreign trade for the base year, the CIA is working on an alternative measure of the impact of trade on overall Soviet economic growth. The US Bureau of Economic Analysis estimates growth of the volume of goods and services over which the country has "command" as a result of its current production. Growth of command differs from growth of the usual, production-based measure of GNP when the relationship between export prices and import prices changes.⁴¹ Rough estimates of growth of command are being tested for the USSR. [redacted]

Sources of Overestimation and Underestimation of GNP Growth. Growth of some components of Soviet GNP probably is understated by the CIA's estimates, while growth of others most likely is overstated. Similar problems of estimation are faced by statistical agencies in all countries. In the Soviet case, the direction of error for a particular component of GNP depends primarily on the data in the sample used to estimate the component's growth. These data are of two kinds:

- Data on quantities of output in physical units—such as tons, items, or square meters—which are multiplied by prices of the base year (1982) to obtain values. Sources for the quantity data consist of official Soviet statistical publications, supplemented by analyst estimates.
- Data on values of output in "constant" prices established by the Soviet Government, which are taken directly from official Soviet sources. Most of

the products covered by these data—such as computers and furniture—are so numerous and varied that estimates of output in physical units are not feasible. [redacted]

Both kinds of data have shortcomings. Most quantity data do not reflect the full extent of improvements in product mix and quality—including the introduction of new products as an extreme case—that accompany economic growth. The root of the problem is that measures in physical units show trends in output accurately only for narrow categories of similar products. Quantity data detailed enough that only similar products are combined, but still comprehensive enough that coverage is adequate, are seldom available. [redacted]

Unlike quantity data, value data do reflect improvements in product mix and quality, including the introduction of new products. Soviet value data, however, are reported in prices described in official sources as constant but criticized by almost all Western specialists—and a number of Soviet researchers—for including a substantial degree of disguised inflation: Producers benefit financially from making minor alterations in familiar products and using the "improvements" as an excuse for raising prices. Even products incorporating genuine improvements are valued at prices set to cover the high initial costs of the early stages of production. Producers not only charge their customers higher prices for the new products, but they also use new, higher constant prices in reporting their output to the planning and statistical authorities. [redacted]

On balance, improvements in the mix and quality of products probably are understated a little in the CIA's estimates of the growth of Soviet GNP. Overestimation and underestimation appear to balance fairly evenly for most of the major sectors of origin. Within industry, it is likely that some overstatement of the growth in machinery output, where samples are based largely on value data, roughly offsets the understatement of growth in other industries—primarily chemicals and, to a lesser extent, construction materials—where samples are based mostly on quantity data. [redacted]

⁴⁰ To estimate GNP for the USSR, payments to Soviet nationals (and the government) of wages and salaries earned abroad and of returns on capital invested abroad must be added to GDP. Similarly, payments to foreign nationals of wages, salaries, and returns on capital earned inside the USSR's borders must be subtracted.

⁴¹ For an explanation of the command measure of US GNP and a comparison with the production-based measure, see Edward F. Denison, "International Transactions in Measures of the Nation's Production," *Survey of Current Business* (May 1981): pp. 17-28 [redacted]

Growth of the service sector of Soviet GNP probably is understated, but not by much. The procedures used to estimate the growth of housing and of government administration and related services are the main sources of understatement. Housing growth is estimated by using data on changes in living space—which do not reflect improvements in quality—as a proxy for changes in value added. For a number of other services—education, health, credit and insurance, and government administration—growth of labor inputs is used as a proxy for growth of value added. This procedure assumes that labor productivity has been constant. Although labor productivity probably has risen, little information is available for estimating the rate of increase. [redacted]

Most Western countries also use growth of labor inputs as a proxy for growth of value added in some government services. In estimating Soviet GNP growth, however, the CIA uses this proxy more frequently than Western countries do, because fewer alternative data are available. Moreover, data on the labor component of government and related services in the USSR are often less detailed than for the West, so that fewer improvements in the mix of skills of the work force are reflected. Despite these data problems, the CIA is exploring possible methods of improving its treatment of rising quality and productivity in the service sector. [redacted]

Several recent articles in the Soviet and Western press have called attention to sources of likely overstatement in official Soviet statistics on economic growth. The Soviet articles have been concerned mainly with disguised inflation in official statistics on the value of output—especially in the machinery and construction

sectors—in supposedly constant prices.⁴² Although *glasnost* has given this problem increased visibility, Western economists and some Soviet researchers have been aware of disguised inflation for years. As discussed above, the CIA's estimates of Soviet economic growth make extensive use of quantity data in an effort to minimize the problem's impact. [redacted]

The Western articles on Soviet statistics have focused mainly on the likelihood of an unusually large overstatement of official summary measures of growth in 1985 and 1986.⁴³ CIA analysts also believe that these official figures are more overstated than usual. The CIA's independent estimates of Soviet GNP growth, which are based on more detailed data, are not affected by recent difficulties with the official summary statistics. [redacted]

⁴² See V. Selyunin and G. Khanin, "Cunning Figures," *Novyy mir* (No. 2, 1987): pp. 181-201, and A. Sergeev, "The Prestige of the Honest Ruble," *Sovetskaya Rossiya* (18 March 1987). [redacted]

⁴³ See Jan Vanous, "Soviet Economic Performance in 1986: Modest Improvement Clouded by the Release of Key Aggregate Economic Indicators Conflicting With Each Other," *PlanEcon Report* (4 February 1987); and "The Dark Side of 'Glasnost': Unbelievable National Income Statistics in the Gorbachev Era," *PlanEcon Report* (13 February 1987). Also see Philip Hanson, "Puzzles in the 1985 Statistics," *Radio Liberty Research Bulletin*, RL 439/86 (20 November 1986); and "The Plan Fulfillment Report for 1986: A Sideways Look at the Statistics," *Radio Liberty Research Bulletin*, RL 76/87 (26 February 1987). [redacted]

Appendix B

Impact of Revision on Estimates of Soviet GNP

The shift to a new price base affects estimates of Soviet GNP and its growth rates in three major ways when compared with previous estimates:

- Values of output are higher because prices in general increased between 1970 and 1982.
- Rates of real growth—excluding price effects—are lower for GNP and most key components. This result is to be expected when prices of a more recent year are used to calculate growth rates (the “index number effect”—see inset). In converting estimates of US GNP from 1972 prices to 1982 prices, the Department of Commerce obtained similar results.
- Shares of key components of GNP are different because the components experienced diverse rates of change in real growth and prices. []

With both prices and real output rising, Soviet GNP increased by nearly 90 percent between 1970 and 1982, to a level of about 720 billion rubles (in established prices). Prices accounted for over a third of this increase, implying a rate of inflation of a little more than 2 percent per year. In contrast, official Soviet statistics for measures similar to GNP imply an inflation rate of less than 0.5 percent per year during that period. Most Western specialists believe that these official statistics seriously understate the extent of price increases and therefore overstate Soviet economic growth []

Annual growth rates of Soviet GNP in real terms as measured in 1982 prices are with few exceptions lower than previously estimated rates measured in 1970 prices (see table 11). Shifting the price base has reduced annual rates of increase by a few tenths of a

The “Index Number Effect”

To see why measured economic growth is likely to be lower, the more recent the price base used in the calculation, consider an example. Suppose we want to estimate the real growth in output of precision instruments, a group of products ranging from clocks to automation equipment to computers. Depending on the base year chosen, the change in relative prices of individual products in this group will differ because of differences in technology, scale of production, and input costs. The prices of the new and fastest growing products—like computers—tend to fall relative to other prices because of more rapid gains from advances in technology and economies of scale. Therefore, the fastest growing products will have smaller weights—and less impact on average growth of the group—in a later base year than they would in an earlier base year. []

Table 11 Percent
USSR: Comparison of GNP Growth in 1970 and 1982 Prices *

	1970 Prices	1982 Prices
1966-70	5.5	5.1
1971-75	3.7	3.0
1976-80	2.7	2.3
1981-85	2.1	1.9
1981	1.5	1.3
1982	2.4	2.7
1983	3.2	3.2
1984	2.0	1.5
1985	1.3	0.8

* Based on estimates of value added at factor cost.

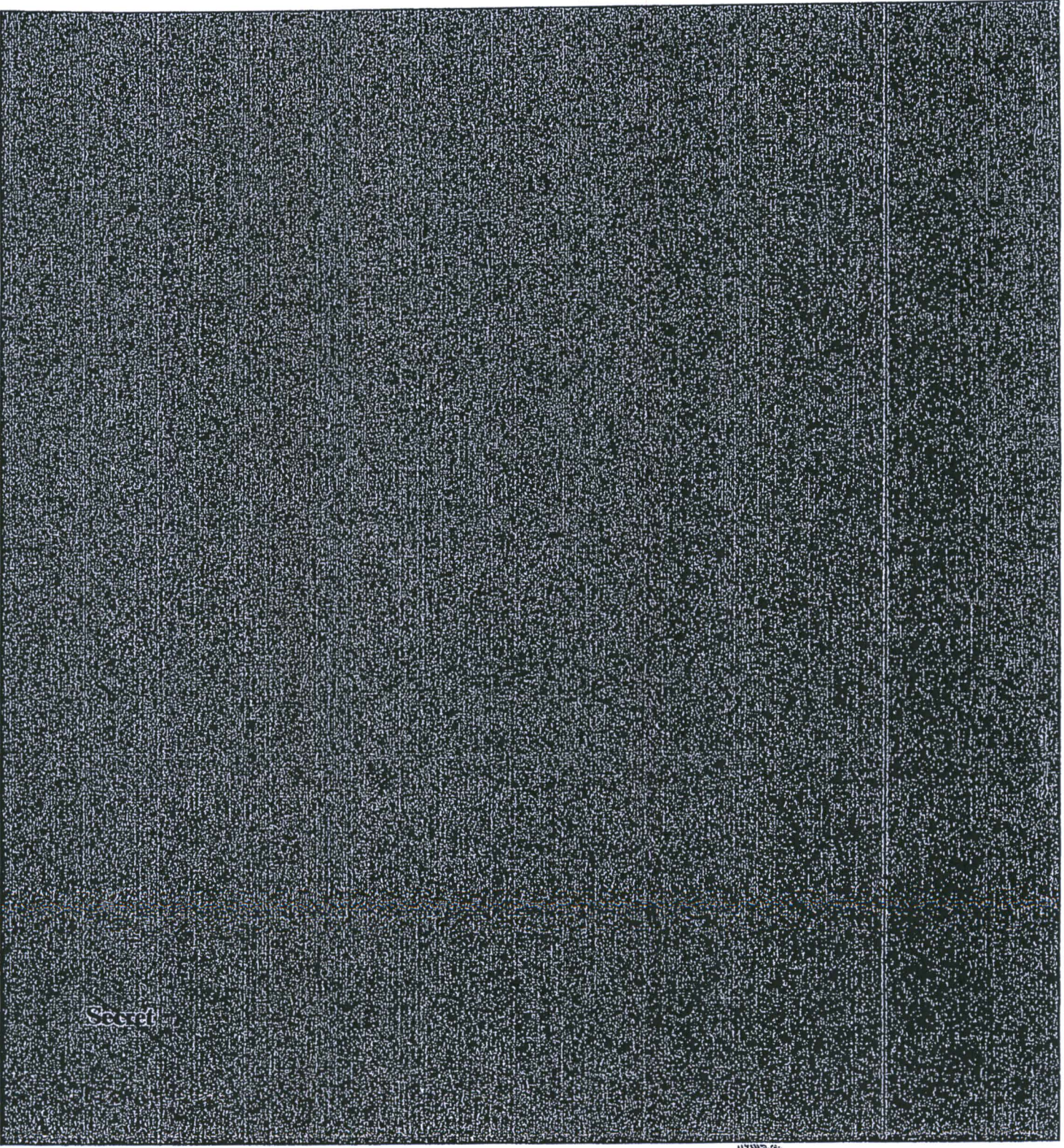
[]

percentage point in the 1980s. The differences between rates are a little larger in earlier years—half a percentage point or more in the 1970s. [redacted]

The shift to a new price base has significantly affected the relative shares of total GNP coming from the two largest producing sectors—industry and agriculture. The share of industry is smaller when measured in 1982 prices because average wages in industry increased much less between 1970 and 1982 than average incomes in agriculture and because the capital-output ratio increased more rapidly in agriculture than in industry. The shares of the trade and service sectors have dropped somewhat, while the shares of the remaining sectors are little affected by the change in the price base. [redacted]

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Soviet Economic Strategy Through the Year 2000: The Role of CEMA Programs (C)

Defense Intelligence Estimates Memorandum



Defense Intelligence Agency

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BY RW NARA DATE 10/15/12

DDE-1900-136-87
October 1987

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**Soviet Economic Strategy Through the Year 2000:
The Role of CEMA Programs (C)**

(U) This Defense Intelligence Estimates Memorandum has been coordinated within the Defense Intelligence Agency.

(S/NF) The estimate addresses the major Council For Mutual Economic Assistance (CEMA) programs through the year 2000 from both the East European and Soviet perspectives. It assesses the problems CEMA will have in developing and implementing joint programs, what the Soviets are seeking to achieve with the latest programs, and the results likely to be realized. The estimate treats the implications for the North Atlantic Treaty Organization. Information as of the middle of May 1987 was considered in the preparation of this estimate.

(U) Comments or questions concerning this paper are welcome and should be directed to Mrs. Deborah D. Logsdon, Directorate for Estimates, phone 373-2581, secure 981-2095.

APPROVED BY:



HENRY F. DREWFS, JR.
Brigadier General, USA
Assistant Deputy Director
for Estimates

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Soviet Economic Strategy Through the Year 2000: The Role of CEMA Programs (C)

Defense Intelligence Estimates Memorandum

DDE-1900-136-87

Information Cutoff Date: May 1987

This is a Department of Defense Intelligence Document
Prepared by the Soviet/East Europe Division,
Directorate for Estimates
Defense Intelligence Agency

Prepared by:


FOIA(b) (3)

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KEY JUDGMENTS

(C) The Soviets under Gorbachev will continue to push for greater integration and cooperation within the Council for Mutual Economic Assistance (CEMA) because of its key role in the Soviet economic strategy. This strategy, designed to develop and produce the high-technology machinery and equipment required to modernize the Soviet economy and produce the more advanced weapons systems planned for the 1990s, is directly reflected in the CEMA programs.

(C) Conflicting East European and Soviet objectives will make economic cooperation more difficult. Most Soviet allies recognize that Moscow uses CEMA to gain greater leverage over their economies.

(C) We anticipate some success for both the Soviet economic strategy and the CEMA programs, which will be adequate to support the Soviet and East European economies and to provide the necessary requirements for defense. CEMA will still lag behind the West in development and application of advanced technologies.

(C) If the Soviets are more successful in reaching their objectives, the results could be quite significant:

- The Warsaw Pact would be strengthened in its ability to support projected defense expenditures.
- The Soviet Union would benefit from the best of CEMA's technologies, products, and the key Western technologies that are obtained within CEMA, and will more openly control and monitor such acquisitions.
- Soviet and East European efforts to acquire Western technology through both legal and illegal means will increase.
- The East Europeans could well lose some domestic economic control, and Soviet influence over East European political affairs, including foreign policy, could increase.

(C) Most importantly, a more cohesive, tighter controlled CEMA organization would pose a more formidable threat to NATO and provide a better coordinated economic effort to support Warsaw Pact military goals.

Soviet Economic Strategy Through the Year 2000: The Role of CEMA Programs (C)

The CEMA Situation

(C) The Soviets under Gorbachev will continue to push for greater integration and cooperation within the Council for Mutual Economic Assistance (CEMA).¹ While there has been considerable talk and some effort by the Soviets to further integrate the economies of the CEMA countries, the East Europeans have exhibited little enthusiasm and even less action. They realize that any process involving further subordination of national economic interests to jointly made decisions will be dominated by the Soviet Union.

(C) While the Soviets will have to give some consideration to other CEMA problems, their attention will be focused on the issue of integration because of its potential benefit for the Soviet economy. Gorbachev's ambitious economic revitalization program will strain the already taut Soviet economic system. Although the Soviets are likely to realize some success in improving economic performance, they probably will fall short of reaching all of their goals. If initial successes are not sustained, there will be considerable pressure to retreat from some of these goals. Gorbachev may attempt to relieve some of this pressure by drawing more on East European and Western sources of consumer goods and machinery. Although the Soviets understand the limits of the CEMA contribution to large-scale Soviet modernization, they would prefer to rely more heavily on CEMA to help relieve the pressure in order to control expenditures of hard currency. This is the primary reason Gorbachev is pushing with renewed vigor to obtain results from the joint CEMA programs.

Soviet Economic Strategy

(U) The Soviet drive for expanded CEMA integration plays an important role in the Soviet economic strategy. In the early 1970s, the

Soviets realized they needed to change their economic growth strategy from extensive to intensive development.² The Gorbachev leadership appears determined to implement the process of intensification after decades of mere talk. Soviet determination stems from the need to accelerate general economic growth in order to proceed with long-term military modernization, without increasing the overall share of economic resources devoted to such programs. Most important, without a major renovation of the country's industrial base, the Soviets probably realize that they would fall farther behind technologically in some areas vital to the military, and Soviet forces would face increased difficulties in meeting the planned military requirements of the late 1990s and beyond.

(U) To meet these requirements, the economic program Gorbachev has laid out focuses on increasing efficiency. Almost all of the planned growth is slated to come from productivity gains and from energy and raw material savings, not from large increases in labor or material inputs. Gorbachev is relying in the short term on what he refers to as the "human factor" — strengthened party discipline, improved worker attitudes, and the weeding out of ineffective managers. In the longer term, Gorbachev's plan is to continue to make major gains through organizational changes, reform initiatives, and, most important, an extremely ambitious industrial modernization program that represents the core of his economic strategy. The economic program in total is extremely ambitious and will not be easy to achieve.

(U) To get his program off the ground, Gorbachev is counting on uncovering "hidden reserves" that will give an initial increase in productivity. The "human factor," as well as the efficient use of resources, is key to this concept. The incentive system to achieve these objectives consists of a combination of rewards

¹(U) Although CEMA includes Mongolia, Cuba, Vietnam, the Soviet Union, Poland, East Germany, Czechoslovakia, Hungary, Bulgaria, and Romania, this estimate will be concerned only with the European members.

²(U) Extensive growth is achieved through the application of ever-increasing supplies of labor and materials. An intensive development strategy, however, requires more efficient and productive use of constant or smaller amounts of inputs.

and disciplinary measures. The Soviets have achieved some success from these efforts, which they hope to sustain through follow-on measures that take longer to produce tangible results. To further his program, Gorbachev has made several organizational changes. The most important with respect to CEMA is the creation of supraministerial bodies, such as the Bureau of Machinebuilding, and the new inter-industry scientific-technical complexes (MNTKs).

(C) The key to the longer-term effort is Gorbachev's industrial modernization program. The ultimate goal of this program is to replace or retool the existing capital stock, thereby significantly upgrading the technological level of Soviet industry. Key high-technology civilian industries, identified by the military as necessary for development and production of advanced weaponry, will be stressed. This entire effort will require the acceleration of progress in the S&T sector, with particular emphasis on applied research.

Incorporating Soviet Requirements Within CEMA

(U) The Gorbachev leadership has given special attention to the integration of CEMA programs into the Soviet economic strategy. Both the Soviet party program and the 12th Five-

Year Plan (1986-90) stress in detail the role of multilateral and bilateral CEMA programs in meeting the USSR's economic goals.

(S/NF) The new Soviet Bureau of Machinebuilding, as one of its specific duties, has been charged with developing further cooperation within CEMA to hasten the development and introduction of critical industrial technologies. The MNTKs also have been assigned a leading role in strengthening CEMA economic integration and have the primary responsibility for implementation of the most comprehensive CEMA program — "CEMA 2000." One MNTK has already been designated as the lead agency for the intra-CEMA firm "Interrobot." The MNTKs will focus on areas where breakthroughs would benefit the entire Soviet industrial sphere. As a result, they could have a significant effect on critical technologies in which the Soviets are currently weakest and a direct impact on defense production. Some of the new complexes include defense R&D and production facilities, indicating that defense industries will be actively involved as both developers and users of the new technologies.

(C) In addition to programs and organizations, the Soviets have placed individuals with extensive experience in intra-bloc affairs and implementation of CEMA programs in key government and Party positions. Their responsi-

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(C) Boris Aristov, Minister of Foreign Trade, served as Soviet ambassador to Poland during the height of the crisis and has firsthand knowledge of East European economic problems and their potential impact on political stability and military capabilities of the Warsaw Pact members.

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(S/NF) Konstatin Katushev, head of the State Committee for Foreign Economic Relations, had been the head of the Central Committee Bloc Relations Department. In his current post, he has met with Czech and Romanian foreign trade ministers to discuss economic cooperation.

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(U) Nikolay Ryzhkov, Chairman of the Council of Ministers and a full Politburo member, gained considerable experience in trade matters during his service as Deputy Gosplan Chairman, heading the Gosplan Commission handling major CEMA projects. He now oversees the entire Soviet government apparatus and the implementation of Soviet economic strategy.

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(C) Nikolay Talyzin, Chairman of Gosplan and Candidate Politburo Member, was in charge of Soviet relations with CEMA countries, both bilaterally and through the CEMA organization, for 5 years. This included coordination of plans and studying ways to improve management and planning systems within CEMA. Many observers attribute the rise of Talyzin to the need for greater energy and expertise in achieving exactly the type of integration required for implementation of the CEMA programs.

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(U) Aleksey Antonov, the head of the new Bureau of Machinebuilding, and Deputy Chairman of the Council of Ministers, holds a similar role in the CEMA machinebuilding committee.

Major CEMA Programs

(U) Multilateral accords in CEMA generally represent the summation of agreements worked out on a bilateral basis between the USSR and the other CEMA countries. These bilateral accords are tailored to fit the Soviet relationship with each country and reflect the fact that CEMA serves more as a coordinating body for Soviet-East European economic ties, rather than as a true multilateral organization. In each case, the USSR is the dominant partner.

bilities will include oversight of the current CEMA programs and their integration into the Soviet economic strategy.

(C) In addition to these individuals, the Soviets have assigned high-ranking members of the Academy of Sciences to oversee implementation of the CEMA 2000 program. The participation with CEMA countries in this program will most likely be controlled by the Soviets through the MNTKs, each of which has an institute of the Academy of Sciences involved in its organization.

(U) There are two primary programs based on multilateral agreements now in effect, the "Long-term Comprehensive Measures for Cooperation in the Sphere of Energy, Fuel, and Raw Materials for the Period Through 1990 and Beyond" and the "CEMA 2000" program. The first of these two programs undertaken by CEMA covers energy and raw materials. It has at least three additional programs³ associated with it, as well as many bilateral agreements. This multilateral program is based on the Soviet agreement to continue to supply fuel and raw materials at present levels in return for more and better quality East European goods, greater conservation efforts on the part of the

³(U) The "Program For Joint Electrical Power Development up to the Year 2000," the "Complex Program of Cooperation in Transport for 1991-2000," and the "Program for Construction of Nuclear Power Plants to the Year 2000."

East Europeans, and increased East European investment in Soviet extractive and processing industries, particularly the Yamburg gas pipeline and the Krivoy Rog iron ore complex.

(C) This program is also intended to complement the Soviet short-term productivity campaign. The USSR is able to obtain food and consumer goods in exchange for the raw material and energy supplies provided to East Europe. This increases the availability of goods that can be used as incentives to increase So-

viet worker productivity. Since the program also encourages increased conservation of energy and raw materials by the East Europeans, it thereby reduces the amount of resources required from the Soviet Union. It is an important part of the overall Soviet effort to obtain more from its East European partners, while providing less in return.

(U) The Soviets view the "Comprehensive Program for the Scientific and Technical Progress of the CEMA Member Countries up to the Year 2000," known as CEMA 2000, as the most important CEMA program. This program is designed to use Soviet and East European capital to develop advanced technologies and eventually produce new equipment in five major areas. The five areas for development reflect

Cema 2000 (U)

Five Major Areas of Cooperation (U)

Advanced Electronics

- Super Computers/Personal Computers
- New Information Systems
- Artificial Intelligence
- Unified Standards
- New Satellite and Optical Fiber Communication Links

Automation

- Flexible Manufacturing Systems
- Computer-Assisted Design/Computer-Assisted Manufacturing (CAD/CAM)
- Robot Technology

Nuclear Energy

- Improve Existing Reactor Technology
- Design Fast Neutron Reactors
- Joint Work on Thermonuclear Energy Programs

Advanced Materials

- Composites
- Ceramics
- Polymers

Biotechnology

- Develop Production of Artificial Proteins
- New Medicines
- Genetic Engineering

Agreements Supporting "CEMA 2000" (U)

Advanced Electronics

- General Electronics Agreement (1982)
- Plan for Unified Standards for 1986-90 (Sept 1985)
- Plan for the Development and Production of a Unified Fiber-optic & Information Communication System (Dec 1985)

Automation

- Plan for Flexible Manufacturing Systems (Jun 1985)
- Plan for CAD/CAM (Dec 1985)
- "Interrobot" Multilateral Enterprise to Coordinate Research & Production of Robots (Dec 1985)

Nuclear Energy

- Plan to Upgrade Reactor Technology and Develop New Reactor Designs (May 1986)

- Bilateral Agreements With All CEMA Countries Through the Year 2000 (Romania covers only 1986-90)

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the same industrial requirements addressed in the Soviet industrial modernization program. The program will emphasize direct contacts between related enterprises and institutes throughout CEMA, and will seek to facilitate cooperation at lower levels, a factor that was missing from earlier agreements calling for integration. In addition, CEMA 2000 will continue to emphasize bilateral agreements and five-year plan coordination.

(C) The fact that part of the CEMA 2000 program will not be made public gives credence to speculation about defense implications of the project. We believe that CEMA 2000 is a key part of the Soviet economic strategy that supports defense requirements, since much of the technology being developed and produced has direct military applications. CEMA 2000 seeks to galvanize CEMA's scientific and technological potential to close the gap with the West.

Program Implementation

(U) Despite the Soviet desire to have the CEMA programs directly support the Soviet economic strategy and ultimately the Soviet defense effort, this will be difficult to achieve. CEMA's poor record on integration has led many Western observers to view with deep skepticism these new moves to further intra-bloc economic integration and cooperation. Most observers agree that the maintenance of CEMA cohesion during the first, or "extensive," phase of economic development in all the Communist countries was handled with greater ease than is the case with the current requirements of intensive development. Initially, CEMA cohesion was maintained because the East European countries needed the raw materials and fuels that the Soviet system was well suited to supply. Since the deposits of most raw materials and fuels were located in the USSR, "extensive" development within CEMA was a process that enhanced Soviet central control within the bloc and equipped Moscow with its very potent energy supply weapon.

(C) Moving into the second, or "intensive," development stage will be more difficult. The

USSR does not have the advanced technology needed for itself or to supply the other CEMA countries in a determined pursuit of intensification. The Soviets can no longer postpone the process of intensification if the modernization program is to succeed, but at the same time they cannot allow the process to get out of hand. The Soviets are worried about increased East-West trade relations needed to acquire technology from the West. Such contacts place CEMA countries in a vulnerable position with regard to Western trade sanctions and credit restrictions and allow the East European countries room to deviate toward the West. The Soviet and East European need for advanced technologies from the West is likely to come into direct conflict with the goal of increasing intra-CEMA trade and limiting Western trade.

(C/NF) The Soviets appear to be planning to rely on their resources and technology coupled with those of CEMA to carry the modernization effort, with Western technology playing a supporting role. Some of the East Europeans, particularly the Hungarians, feel that meaningful economic growth and technological development can only come primarily from trade with the West. Many would find it difficult to replace the high level of quality goods currently sought from the West with "equivalent" products from CEMA countries. The need to acquire Western technology for their own industrial modernization plans makes them anxious to keep open the option of expanding economic ties to the West.

(C/NF) The more the Soviets insist on diverting trade from the West to CEMA, the more difficult it becomes for the East Europeans to reenter Western markets. The difficult hard-currency debt situations that Poland, Romania, and Hungary are attempting to manage are complicated by Soviet pressure for increased economic cooperation and integration and demands for better quality goods. If Soviet demands are too strenuous, the East Europeans will be unable to pay off their outstanding hard-currency debt.

(U) To the extent the Soviets are successful in pressing the East Europeans to reverse the

large trade balance deficits they incurred with the USSR in past years, the East Europeans will not have to export as much to the Soviets to make up the deficits. In addition, lower world oil prices will affect CEMA oil prices for the first time this year, since CEMA prices are based on a lagged, 5-year moving average of world prices. Oil and other energy products are the primary Soviet exports to Eastern Europe. A decline in energy prices will lower the value of Soviet exports and could result eventually in large Soviet deficits, if trade is carried out as planned under the long-term agreements. In addition to these difficulties, pressing the bloc allies to increase exports to the USSR works against other Soviet goals such as increasing East European defense spending.

(C) The East Europeans are uncertain about how far they will have to go to meet Moscow's demands. Difficulties in their own economies and resource constraints probably will make them reluctant to dramatically increase their participation in further CEMA projects, since they are already faced with large outlays for joint resource development projects in the Soviet Union. The Soviets will have to determine how far they can push the East European countries to help modernize the Soviet economy and meet military requirements without creating additional economic difficulties that could lead to political problems and threaten stability in Eastern Europe.

(S/NF) The East Europeans will remain concerned about increased Soviet control of their economic policies through CEMA programs. There is an uneasiness about the proposed cross-border links at the enterprise level, since theoretically it will allow the Soviet Union to draw on East European industrial expertise and incorporate Western technology made available to them while providing little in return. Such contacts could also allow the Soviets to partially circumvent national control of the enterprises in the countries where they are located. An incessant complaint on the part of East Europeans has been the reluctance of the Soviets to share technology with their CEMA partners. East-Germany is particularly concerned about what benefits they would receive,

since they feel they have far more technological know-how to offer than they will ever be able to gain. The effectiveness of such links will depend on their further development and implementation, which the CEMA countries are as yet unenthusiastic in pursuing.

(S/NF) Furthermore, East Europeans are wary of new commitments that may bring only long-term and uncertain benefits. Full participation in the programs, especially CEMA 2000, will mean they have to allocate more funds than planned in the five-year plans for scientific research and development at the expense of other areas in the budget. Poland, for example, has already indicated the CEMA 2000 program will require a 30 percent increase in its R&D budget already drafted for 1986-90.

(C) Managing these conflicting objectives will make economic cooperation within the bloc more difficult. This is one of the major challenges confronting the Soviet leadership and will determine to a large extent how successful the Soviets are in realizing gains from the CEMA programs. Nevertheless, the rapid manner in which the CEMA 2000 program was finalized indicates that Gorbachev's accession to power ended the drift in the pursuit of CEMA objectives. The Soviet Union may now be in a better position to achieve some results.

(C) The increase in Soviet pressure for cooperation comes at a time when the East Europeans are less able to meet outside demands, but are finding themselves more dependent on the USSR and, therefore, more susceptible to Moscow's pressure. Large debt liabilities to the West and the inability of the East Europeans to improve their own economic situations have reduced their access to Western credit. Hard currency shortages have forced them to turn to the USSR for goods and equipment they would rather buy from the West. The Soviets also will be able to use their supplies of raw materials and energy, on which Eastern Europe remains heavily dependent, to extract further cooperation. The Soviets are threatening that failure to meet their demands or the terms of the agreements will result in reductions in supplies of both energy and raw materials. It is

not clear, however, to what extent the Soviets would follow through on such threats.

(C/NF) Soviet tolerance for inefficiencies in the East European economies at Soviet expense appears to be diminishing, and the Soviets have indicated that they will not allow East European economic weaknesses to stand in the way of Soviet modernization. The more decisive and energetic Soviet leadership under Gorbachev appears committed to reducing Soviet subsidies to Eastern Europe and increasing both the quantity and quality of East European exports to the USSR. In fact, many of the new agreements the Soviets have signed with the individual CEMA countries demonstrate that Soviet interest in developing the economies of Eastern Europe is directly related to the products which the investment will yield, and are no longer written in terms that would result in indirect subsidization of the East European country. The CEMA countries would like at least to maintain the level of assistance they now receive from the Soviet Union and, as a result, probably will be more disposed to accommodate the Soviets than in the past.

(C/NF) In addition to the "stick" approach, the Soviets are holding out some "carrots" to the East Europeans. There are some aspects of the programs that appeal to the East Europeans because of their own industrial modernization goals, particularly since trade with the West will remain constrained for some time, and they will be forced to turn to the Soviets to obtain equipment and technology. Some East Europeans, particularly the Poles, consider the threat of technological obsolescence to be as serious as the security threat posed by the NATO alliance. They contend that only some form of external injection can save the countries' economies. Although some of them hope, perhaps in vain, to receive Western assistance, others, such as Poland and Bulgaria, see the CEMA program as the only alternative means to ensure progress in research and development of new technologies in leading industries.

(C/NF) The current Soviet endorsement of diversity within the bloc is also perceived as favorable by some CEMA members, but its con-

tinued tolerance is being tied to significant East European movement on programs that support Gorbachev's economic goals and the requirement for closer cooperation among CEMA economies. The importance of these programs to the viability of the CEMA economic base is not lost on the East Europeans, and they realize that their ability to diversify within the confines of the alliance will depend a great deal on their ability to cooperate with the Soviet Union on key issues such as the CEMA programs and support to the Soviet modernization program.

(C/NF) Officially, each of the East European responses to the Soviet drive for implementation of CEMA programs has been positive. They vary in intensity from the hearty endorsement by Poland to the bare recognition given by Romania. In effect, each country's response has been guarded and tempered by its own problems and interests. All the East Europeans have reason to work against some aspects of the CEMA programs' objectives even while they exploit others. This factor and the East Europeans' skill in manipulating the CEMA machinery to their own advantage undoubtedly are understood by the Soviet leadership, which, nevertheless, will press on with the CEMA programs.

Prospects For Success

(C) The Soviets expect that, overall, their new economic strategy will be a cumulative and self-reinforcing process to provide even greater dividends in coming years. If successful, it will return the economy to a faster upward growth path and provide the economic base, resources, and technologies required for the development and production of future generations of Soviet weapons. The tough and vigorous drive under Gorbachev to implement the Soviet economic strategy is, at this time, important enough to the Soviets for them to force the East Europeans to come to some accommodation on participation in CEMA programs essential to the Soviet economic strategy. We anticipate some success for both the Soviet economic strategy and the CEMA programs, but the degree of success is as yet indeterminate.

(C) Perhaps the fundamental, underlying limitations on CEMA integration will be the lack of a meaningful price system, effective market incentives, and ultimately a convertible currency. Such systemic reforms, instituted in the Soviet Union, would have to be extended to the other CEMA countries, and the institutional structure of CEMA would have to be changed in order to create an economic environment conducive to technological innovation and qualitative improvements in Soviet-East European industrial cooperation and trade.

(C) Furthermore, much will depend upon the progress of Gorbachev's domestic economic program and on the economic health of Eastern Europe. The economic situation in Eastern Europe does not look promising for the remainder of the decade and probably into the 1990s. Significant progress in improving the quality and technological level of CEMA trade and cooperative ventures probably will not be realized until well into the 1990s.

(C) Soviet plans and East European reactions are still coalescing, and over the next year it will become easier to judge the degree of success the Soviets will realize in co-opting the East Europeans into their economic strategy. The Soviet emphasis on implementation of CEMA programs indicates they have correctly diagnosed some of the flaws in earlier CEMA programs. This, together with the possibility that the East Europeans will have to be more active participants, holds out the definite possibility that these initiatives may yield better results than in the past. Initially for the Soviet Union, successful realization of some of the CEMA programs will probably provide significant benefits: acquisition of the best of CEMA's technologies and products; the procurement of key Western technologies obtained by the East Europeans; and the capability to more openly control and monitor such acquisitions. Nevertheless, the continued Soviet pursuit of immediate gains could lead to substantial costs to the Soviets in the long run, if the East European economies are unable to sustain the level of effort being demanded by the Soviets.

(C) In any case, regardless of the extent of their success, the CEMA countries still will continue to lag behind the West in the development and application of advanced technologies. Since the Soviets do not have much of the advanced technology that will be required to modernize their economy, and acquisitions of Western goods for all CEMA countries will be limited to key items, any success realized will depend to a considerable extent on the ability of CEMA countries to increase their respective industrial productivity and technological development levels. As a result, it will be very difficult for the CEMA countries to close the technological gap with the West, and therefore, they will be unable to develop and produce high technology items on a scale with the West. Nevertheless, the CEMA programs probably will reduce, though not eliminate, Eastern dependence on Western technology.

Implications For NATO

(C) The Soviet economic strategy and the CEMA integration effort are primarily military-economic programs that have significant strategic implications for NATO. Soviet success, even on a limited basis, will result in a more cohesive and efficient CEMA organization that will provide a better coordinated economic effort to support Soviet and Warsaw Pact military goals. General improvement in the overall Soviet economy, especially the technological upgrading of the industrial base, will facilitate the USSR's ability to pursue and meet force modernization goals planned through the year 2000 and beyond. A militarily stronger Soviet Union will be a more formidable opponent, not only on the battlefield, but also in the international political arena. Improved military capabilities will continue to afford the USSR the ability to rely on military power to extend its global, geopolitical influence at the expense of the United States and the rest of NATO.

(C) The Soviet effort to further CEMA cooperation and integration also will affect Western political and economic relations with the East Europeans. The Soviets will likely pur-

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sue a two-track policy that seeks to limit certain East European dealings with the West, while encouraging contacts they deem beneficial. The Soviets will still have to rely on Western technology to achieve some of their modernization goals. Thus, we can expect stepped-up efforts by both the Soviets and the East Europeans to acquire certain Western technology through legal and illegal means. On

the other hand, increased East European participation in CEMA could likely lead to greater Soviet influence not only over the bloc's internal political affairs, but also over East European foreign policies. This could make it even more difficult for the West to influence the East Europeans and further limit its bilateral relations with them and its ability to exploit intra-bloc tensions.

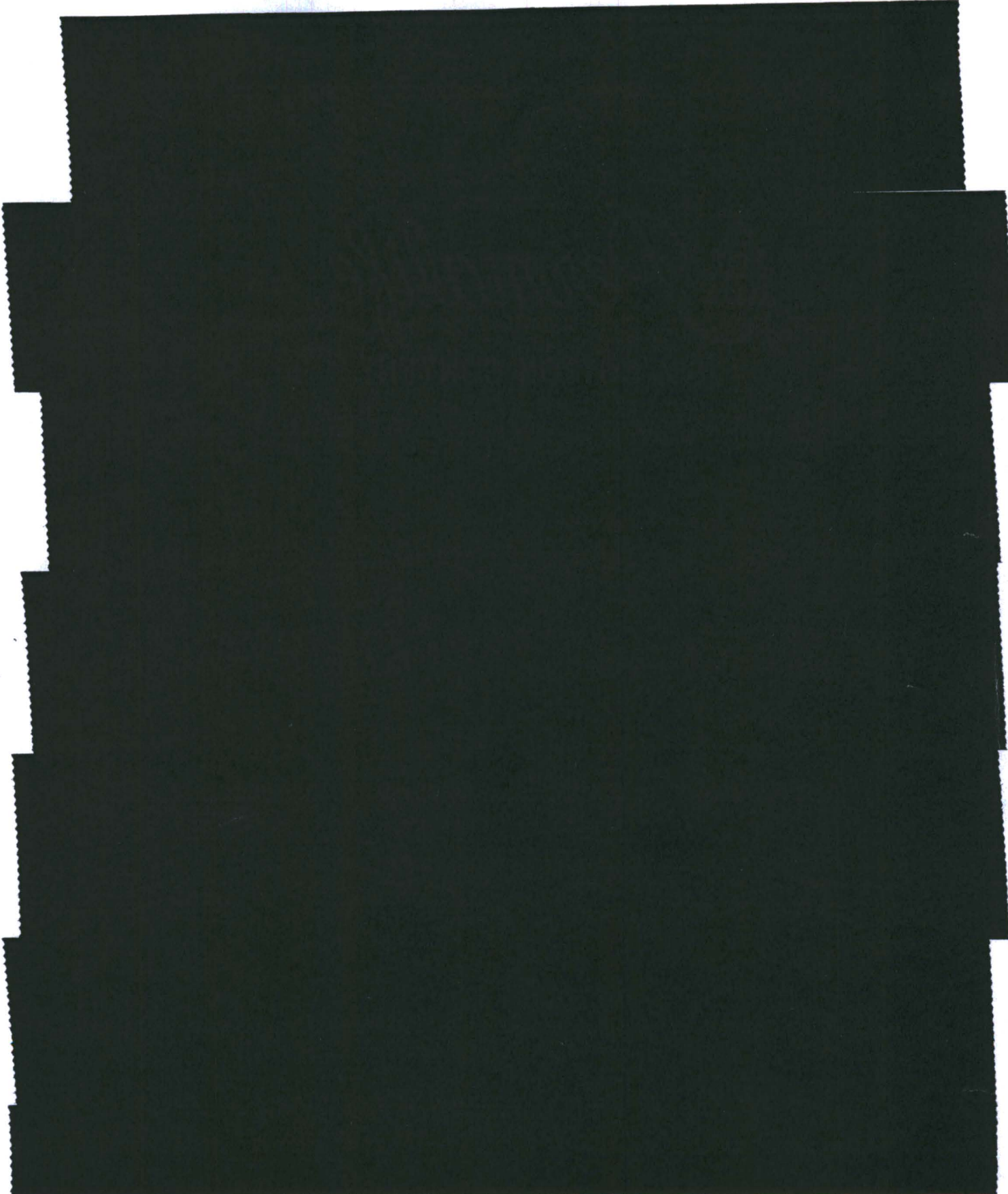
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Defense Research Comment

Gorbachev: Soviet Economic Modernization and the Military

This unclassified paper was presented to the Subcommittee on National Security Economics of the Joint Economic Committee of the US Congress on 14 September 1987 by the Defense Intelligence Agency. The paper will be part of the public record on hearings held to look at the changes taking place in the Soviet economy, particularly in light of the June 1987 plenum, during which profound changes to the Soviet Union's economic system were approved and others proposed. The impact of these changes on the military is of significant concern.

While the June plenum sets the stage for economic and technological change, all evidence points to continuity in the Soviet Union's military policy. At the same time, changes are taking place in the military, as throughout the economy, aimed at increasing effectiveness, reducing waste, and improving performance. Should General Secretary Mikhail Gorbachev be successful in bringing about needed improvements, the United States may well face an economically and militarily stronger Soviet Union in the 21st century.

The Military and the Economy

There is a fundamental Marxist/Leninist dictum that has taken on renewed meaning under Gorbachev, which says that military strength depends on the strength of the economy. When Gorbachev came to power, he was obviously intent on revitalizing the economy and more importantly on bringing the Soviet Union to the forefront of technological development. He recognized that only in so doing will the Soviet system be able to keep abreast of Western military technology and maintain its power and prestige. Thus, the major challenge of the Communist Party is to revitalize the faltering economy to assure future expansion of its military capabilities. The party may well consider the June 1987 plenum a pivotal point in Soviet economic history, at which the stage was set for changes to bring about the successful transfor-

mation of the Soviet Union into a 21st century economic power.

Even as the June plenum appears to be the harbinger of change, Gorbachev also represents continuity in the most fundamental elements of the Soviet Union. The Soviet political and economic systems continue to foster the growth of military power.

The pre-Gorbachev Soviet Union

Gorbachev has raised the consciousness of the Soviet people and the world to the nation's economic problems. But these problems are not new. They go back at least to the early days of Leonid Brezhnev, when there was a realization that the long-neglected industrial base had to be modernized if future military security were to be assured.

The military industrial sector, long recognized as the most effective sector in the economy, has been repeatedly called on since the early 1980s to assist the civil sector, primarily by increasing its output of consumer goods. These calls have largely been ignored; however, there were transfers of key military industrial managers to civil industry and government positions.

Despite economic problems, as reflected in the Soviet Union's lowest growth rates since World War II, weapons production in the 1980s continued at extremely high levels, highlighted by introduction of the nation's most sophisticated and capable weaponry. Military research and development showed no signs of slackening.

In the armed forces, overall trends continued. Even though the annual production rates for some weaponry slowed, the forces were generally able to continue both modernizing their weaponry and expanding their weapons inventories. Concomitant with some selective expansions in force structures, key Soviet war-fighting programs, such as command and control and deep underground facilities programs for war survivability and sustainability, continued to expand.

Under Gorbachev

"...it is now that we are at a crossroad. The way the situation develops further will depend literally on what decisions are made in the next 2 or 3 years. Because defense is a load on the economy, apart from all else because it diverts enormous resources that could be redirected, and it is well known where, we have plenty of problems...."

(Mikhail S. Gorbachev, February 1987)

Gorbachev clearly realized the need for profound and dramatic change if the trends in economic performance were to be fundamentally altered. Since coming to power, he has been developing a long-term program for modernizing the technological base of industry and restoring more rapid rates of economic growth. There

was also recognition that the past pace of military expansion clearly detracted from the long-run economic potential of both the civil and military sectors.

The program calls for priorities to key hi-tech sectors of industry (computers, electronics, machine tools, etc.), which are essential to spur economic growth and in the long term will directly benefit the military. In fact, these hi-tech sectors are the same ones the military has urged be given the highest economic priority. Gorbachev's plans call for dramatic changes in the way the economy will operate — much more autonomy for enterprises, fewer day-to-day responsibilities for the central administrative bodies, and ultimately a largely demand-driven economy. The program also reflects a new cadres policy, which puts a premium on managers' ability to perform, rather than simply using party loyalty as a prime criterion.

It is essential to keep in mind that this is a long-term effort — at least 10-15 years, if not a generation — that will require innumerable short-term adjustments, many of which would initially be disruptive and confusing. So one cannot look at short-run results as indicators of the long run.

Gorbachev's modernization program will continue to have some impact on the military industrial sector. Military industry continues to be entreated to do more for the civil economy; in particular, improving the quality of civilian output, operating more efficiently, with less waste of energy and materials, and thereby producing more without increasing the amount of inputs. There have been isolated instances of more cooperation with civil industry, but there is no evidence of military plants or production lines being converted to civil use. Some managers continue to be transferred to the civil sector. In addition, a number of personnel changes have occurred since Gorbachev took over. These include the Central Committee secretary for military industry; and the head of the Military Industrial Commission (VPK). Also, half of the ministers in the all-important machinery-producing ministries have been re-

placed. These changes mirror those throughout the entire Soviet system.

Not surprisingly, there has been substantially less impact on the military, as overall military policy remains unchanged. There is continued party supremacy over the military. The military, as in the past, is the implementer, not the maker, of military policy. The military continues to get what it needs.

Military programs in the last few years have also seen a continuation of past trends, with force structures selectively expanding and equipment levels in some units increasing. Overall, military capabilities are increasing, sustainability is improving, and military research and development programs are continuing at the same growth rates and with roughly the same numbers of programs as in earlier decades.

There have been some changes, which are consistent with what is occurring throughout the Soviet Union. Greater emphasis is being put on accountability, conservation of resources, and improving effectiveness, particularly in combat readiness and training. Many in the military probably did not consider *perestroika* in the armed forces seriously. But the Cessna/Red Square incident was a timely opportunity for Gorbachev, who used it to advantage. By replacing the Defense Minister with a strong supporter of *perestroika*, Gorbachev gave a very clear signal to the military that restructuring is indeed to be taken seriously.

A number of other significant changes in military personnel have occurred. Including the new Defense Minister, 9 members of the 16-member high command are new.

The Future

Gorbachev's view of the future places the military as uppermost in the long run.

"...we would welcome any opportunity to switch resources and forces from defense into civilian sectors, into increasing people's pros-

perity. But we will never sacrifice security interests...."

(Mikhail S. Gorbachev, September 1986)

"...you can rest assured when it comes to defense. That is point number one, and point number two as well."

(Mikhail S. Gorbachev, February 1987)

The constancy of the Soviet Union's national security objectives strongly suggests that Gorbachev will take all necessary steps to assure the nation's military capabilities. The ambitious goals of the modernization program, however, may cause competition in the near term for selected scarce resources, such as computers, advanced electronics, and top scientific talent. This could be intense, inasmuch as these are the resources needed both for economic growth and for development of advanced weaponry.

Arms control agreements could give Gorbachev some breathing room without sacrificing relative military capabilities, so he could funnel more resources to the civil economy and perhaps ease the need to expand the military budget at a higher rate. He could choose to stretch out some procurement programs or reduce lower priority military programs or activities. *Perestroika* as applied to the military may involve changes in some practices which would serve to reduce outlays, such as possible alternatives in force structure or changes in training or manning levels and increased pressures to conserve resources.

All these changes would not impact negatively in the short run on military capabilities, readiness, and sustainability. In fact, if *perestroika* were at all successful in its stated goals of increasing combat readiness, improving training and strengthening of discipline and order, the result could be a more effective military. If Gorbachev is successful in boosting economic growth rates, the military's share of the resource pie is likely to remain at present levels — around 15 to 17 percent of GNP. However, if the disruptive nature of the economic

adjustments prevents growth from accelerating, the military's share could increase. In any case, the military is not likely to suffer any diminution in capabilities.

Despite the reservations many of the military elite reportedly have about some of Gorbachev's plans, the military, under the new leadership of Defense Minister Dmitriy Yazov, will continue to support the modernization drive. The military realizes that the technologically sophisticated requirements for future generations of weapon systems can only be provided reliably by a strong economy with a modern industrial base.

Conclusion

DIA does not believe that Mikhail Gorbachev has launched his modernization program

and is proposing radical change in the Soviet Union's economic system for altruistic reasons. His program is aimed at assuring the long-term security of the nation. And that goal will be pursued vigorously, although with some difficulty, should the modernization program not succeed. Should Gorbachev's program be successful, the United States will be facing a substantially stronger Soviet Union, economically, politically, and militarily, in the 21st century.

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