

A COMPARISON OF CONSUMPTION  
IN THE USSR AND THE US



January 1964

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THE CENTRAL INTELLIGENCE AGENCY

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(Supplement)



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1. Please provide an English translation of the defense budget figures as they appear in the official Soviet published documents for each of the past ten years.

The Soviet Union provides very little public information on its annual expenditures for defense purposes. Only one statistic--the single line entry "For defense" in the annual state budget--is announced each year. The published figures for the past ten years are shown in the tabular presentation under Question 2. The published state budget contains no information on what activities are covered by these figures.

There have been occasional references in Soviet publications dealing with the financing of the economy to a Ministry of Defense budget known as the *smeta* (estimate). These accounts describe the *smeta* as covering a wide range of defense activities while making no mention of military R&D. So far, however, there has been no basis for establishing a link between the Ministry of Defense *smeta* and the defense expenditure line in the state budget.

2. *Please provide an English translation of those portions of the official Soviet published budget documents believed to contain defense and defense related expenditures not contained in the official figures for defense for each of the past ten years.*

The principal categories of the published Soviet budget are listed in the attached table. Those categories believed to contain defense or defense related expenditures are shown in italics. For the first main category in the budget--Expenditures for the National Economy--the sub-elements that are given do not exhaust the total, leaving an unidentified residual. Also, an overall budget residual may be calculated by subtracting the identified categories of the budget from the total budget figure.

There is no firm evidence concerning the location of Soviet defense spending in the State budget over and above the explicit allocation to Defense. Most military R&D, however, is thought to be funded through the Science allocation. In addition, outlays for a portion of pre-induction military training may be contained in Education expenditures and some military medical benefits may be contained in Health expenditures. Pensions are thought to be paid from Social Security funds. Some researchers believe that the unidentified residuals may contain military activities. The allocation to Industry and Construction presumably includes investment in the defense industries (not part of direct defense expenditures, but a defense related item) and possibly some investment in industrial facilities that may perform military R&D.

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 USSR STATE BUDGET BY ITEM OF EXPENDITURE, 1965-1974  
 (Billion Rubles in Current Prices)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
<b>TOTAL</b>	<u>101.621</u>	<u>105.577</u>	<u>115.242</u>	<u>128.558</u>	<u>138.531</u>	<u>154.600</u>	<u>164.15</u>	<u>173.20</u>	<u>183.98</u>	<u>198.5</u>
<b>I. For the National Economy</b>	44.915	45.175	52.761	58.727	62.384	74.554	80.4	84.9	91.3	N.A.
<i>Industry and Construction</i>	<i>20.990</i>	<i>21.058</i>	<i>23.530</i>	<i>24.150</i>	<i>24.681</i>	<i>30.532</i>	N.A.	N.A.	N.A.	N.A.
Agriculture and Procurements	6.772	6.304	6.961	9.271	10.853	12.375	N.A.	N.A.	N.A.	N.A.
Trade	2.272	2.842	4.921	6.094	6.430	6.258	N.A.	N.A.	N.A.	N.A.
Transport	2.585	2.356	2.349	2.377	2.563	2.841	N.A.	N.A.	N.A.	N.A.
Communications	0.244	0.257	0.269	0.277	0.325	0.264	N.A.	N.A.	N.A.	N.A.
Housing and Municipal Economy	4.226	4.526	5.046	5.247	5.885	6.458	N.A.	N.A.	N.A.	N.A.
Unidentified Residual (Computed)	7.828	7.834	9.685	11.311	11.647	15.826	N.A.	N.A.	N.A.	N.A.
<b>II. For Social-Cultural Measures</b>	38.165	40.761	43.481	48.310	51.860	55.941	59.437	63.485	67.343	71.22
Education	13.245	14.120	15.043	16.326	17.425	18.226	26.295	27.949	29.808	31.2 <sup>a/</sup>
Science	4.285	4.612	5.050	5.522	5.884	6.543				
Health	6.623	7.047	7.384	8.072	8.492	9.208	9.623	10.030	10.495	10.7 <sup>a/</sup>
Physical Culture	0.045	0.053	0.067	0.066	0.060	0.077				
Social Security	9.050	9.745	10.372	11.256	12.017	12.738	13.624	14.448	15.109	
Social Insurance	4.037	4.328	4.717	5.475	6.286	7.335	7.774	8.302	9.123	
Assistance to Mothers	0.462	0.456	0.449	0.448	0.438	0.435	0.431	0.420	0.408	26.43
Social Security Fund for Collective Farmers	0.437	0.400	0.400	1.145	1.259	1.380	1.690	2.336	2.400	
<b>III. For Defense</b>	12.780	13.403	14.500	16.700	17.702	17.854	17.9	17.9	17.9	17.6 <sup>a/</sup>
<b>IV. For Administration</b>	1.280	1.412	1.512	1.616	1.716	1.661	1.8	1.8	1.9	1.8 <sup>a/</sup>
<b>V. Unidentified Residual (Computed)</b>	4.481	4.826	2.988	3.205	4.869	4.590	4.663	5.115	5.787	N.A.

Note: Items that are italicized are believed to contain some defense or defense-related expenditures.

a. Plan figure.

3. *Please provide a table showing the US defense and defense related expenditures for each of the past 10 years, expressed in the ruble amounts the Soviet Union would have to spend to replicate the same forces. In other words, I would like you to use the same "building block" approach employed to estimate what it would cost the US to purchase the Soviet forces in US dollars, to estimate what it would cost the Soviet Union to purchase US forces in rubles. I would like this table to be broken down in two ways, one using the breakdown contained in the National Defense Table on Page 71 of the US Document for Fiscal Year 1976, and the other using the major military programs breakdown in the defense budget table on Page 73 of the Fiscal 1976 Budget Document.*

We do not have the ruble cost information necessary to develop such estimates at this time. One major conceptual problem in such an undertaking is how to ruble cost those items in the US inventory which are beyond the technological capabilities of Soviet industry.

4. *Please provide projections for the Soviet defense budget for each of the next five years, broken down in force structure, based on each of the following three varying options; that the Soviet Union will spend the same percent of GNP as it is now spending for defense, that it will spend a smaller percent of GNP on defense, and that it will spend a greater percent of GNP on defense.*

We do not have such projections at this time.

5. *In estimating Soviet defense expenditures is any allowance made for inflation; if so what assumptions are made about price changes in the defense sector of the Soviet Economy? Is any account taken of inefficiency or loss of productivity due to bottlenecks, shortages or governmental red tape, or costs imposed upon the Soviet economy due to inflation in other countries?*

Our estimates of the dollar costs of Soviet defense activities are in constant prices. This is done to permit examination of growth trends in real terms, independent of price changes. Our present time series are in 1973 dollars. They reflect US military wage rates, scarcities, and productivity levels of that year. We revise these dollar cost estimates every year. Our next estimate, which is now in preparation, will be in 1974 dollars. The new estimate will reflect the sizable inflation in US defense prices that took place between 1973 and 1974.

We believe the impact of inflation in other countries on Soviet military costs has been negligible.



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6. *What are the areas of uncertainty in the direct costing or building block method of estimating Soviet Union spending? What margins of error are assumed for each part of the Soviet force structure?*

We use a direct costing method to estimate the cost in the US of procuring and manning a military force of the same size and inventory of weapons as that fielded by the Soviets and operating that force as the Soviets do. This approach begins with detailed estimates of the Soviet forces and their operations. The cost estimates are generated by applying dollar prices to these weapons programs and activities.

Personnel Costs. Our dollar cost estimates for personnel are derived by applying US compensation rates to the Soviet manpower estimates. The compensation rates reflect US pay and allowances, rations, and clothing allowances for the base year (1973). The methodology used for estimating Soviet manpower strengths is described under Question 13.

Procurement Costs. These are derived by applying dollar cost estimates to our estimates of the numbers and types of weapons and other equipment procured by the Soviets. The methodologies used in our production estimates are discussed under Question 10. We have high confidence regarding the production of large, visible items which are the most costly items in the Soviet inventory. While we do not believe that any major Soviet weapons production programs have escaped detection, our estimates probably err in the direction of understating actual production to the extent that we fail to identify some of the smaller less visible items.

The methodologies we use in estimating the dollar prices that we apply to production estimates are described under Question 11. To the extent that we have to fall back on US analogs when our knowledge of the physical and performance characteristics of Soviet systems is incomplete and that these US weapons are more complex, our estimates tend to overstate the costs of producing the Soviet design.

Operating Costs. Much less is known about operating rates for Soviet weapon systems. Information is available on such things as the time between overhauls for ships,

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on the number of flying hours for aircraft and mileage usage rates for ground force systems. In general, this information is much lower in quality and quantity than the data available on the types and numbers of weapon systems produced and deployed. Consequently, our estimates of Soviet operating costs are based largely on US analogy and adjusted to reflect Soviet usage rates where possible.

Evaluation. In summary, our estimates of the dollar outlays that would be required to purchase and operate Soviet military forces are limited by the Intelligence Community's knowledge of these forces and their changes over time. That knowledge, however, has been enhanced in recent years by sophisticated technical means of collection. Improved collection efforts have resulted in better descriptions of systems and programs. Such data permit more accurate estimates both of quantities and unit costs to be made. Nonetheless, our estimates should be viewed as having a margin of error, which for some items could be substantial. On balance, our best judgment is that the overall dollar estimate is not likely to be in error by more than 15 percent. It is important to understand that this judgment, although informed, is nonetheless subjective and not the result of statistical measurement.

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7. *What assumption is made for the portion of total Soviet R&D spending allocable to military R&D? When was the assumption first made? What is the rationale for the assumption?*

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While we use published Soviet data in estimating Soviet military R&D spending, our estimates are not derived as a proportion of the announced science allocation.



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*8....discuss the differences in U.S. and USSR strategies with respect to emphasis on basic research as opposed to development, multiple designs, fly-offs, and numbers of prototypes.*

The Soviets do not follow any general rule with regard to competition for weapons design. There appears to be some form of competition in most cases but the extent of competition varies.

In ballistic missiles, the Soviets typically have developed two designs for each operational requirement. At the conclusion of the test phase, one has received extensive deployment and the other merely token deployment.

This development strategy has been interpreted as competition. Another interpretation is possible. We know the Soviets are cautious relative to the US about adopting new or radically different technology in their weapons design, and they require that new technology be demonstrated in prototype flight hardware prior to series production. Some analysts believe that the lower technology missile is developed as a hedge against the possible failure of the more advanced design.

Soviet aircraft are designed by a prototype-oriented system which has been in operation, essentially unchanged, for nearly 40 years. Requirements for new aircraft are established by either the Ministry of Civil Aviation or Defense and sent to the Ministry of Aviation Industry. The latter Ministry, in charge of all aviation research and development, either disagrees with the requirement and seeks modification or agrees and orders the start of design. The Central Design Office issues the performance requirements to two or more of the ten design bureaus.

The design process starts with a preliminary design study. This phase takes only a few months to complete. Several preliminary design studies may be prepared to meet the requirement. From these, some are selected to continue into detailed design. Prototypes are produced and flight tested by the design bureau before a production decision is made.

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Competition among design bureaus almost always exists in the preliminary design phase and, for more advanced aircraft, will continue through the detailed design stages. There may have been a few instances where the competition has continued through the prototype stage with the winner chosen by a flyoff between the different prototypes.

With or without competition, the Soviets use a "fly before buy" system. They do not authorize production until a final and often modified version of the selected prototype has been approved. Through the 1960's aircraft design bureaus constructed at least three prototypes per program. In the case of fighter aircraft, as many as ten were produced. In the US about 15 test aircraft are normally employed in fighter development programs.

In recent times the Soviets have developed more different missile and aircraft systems than the US. By developing in many cases two missile systems to fulfill a given mission requirement the Soviets have produced 20 ICBM designs, the US 7. The number of SLBM designs produced by both countries is much closer-- 6 by the Soviet Union and 4 by the US.

The number of fighter aircraft designs flight tested since 1950 is about the same in the two countries --25 by the Soviet Union and 26 by the US. This ratio has changed through time, however. During the fifties 17 US fighter aircraft achieved first flight status compared to 8 Soviet aircraft. During the 1960's and 1970's, however, the situation reversed. The Soviets produced 17 designs and the US 9.

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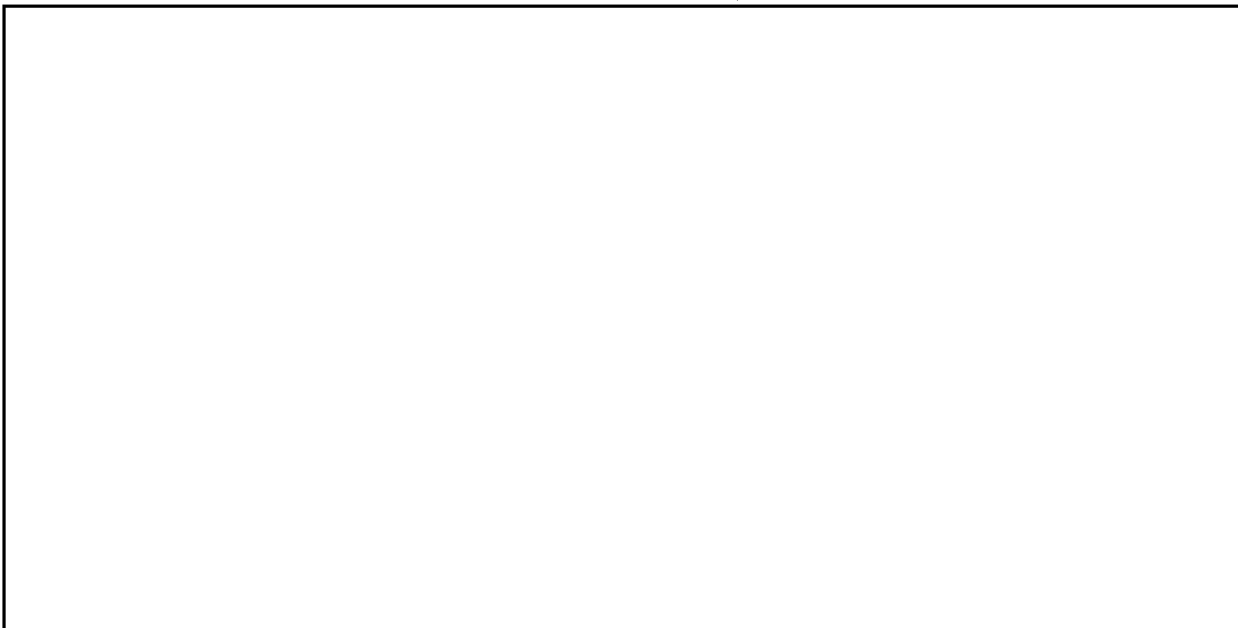
9. *In last year's testimony you indicated that the ratio of direct personnel costs to operating costs was higher in the Soviet Union than in the US (see page 33 of the published hearings). As pay scales for military personnel are far lower in the Soviet Union than in the US, I would have assumed that the opposite would be the case. Please explain your findings.*

The costs referred to on page 33 of the published hearings are in dollars. When estimating dollar personnel costs we use US compensation rates--i.e., the cost of procuring manpower in the US. Inasmuch as the Soviet force is more manpower intensive than the US force, in dollar terms the ratio of personnel costs to total operating is higher in the Soviet force.

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10. *Several private groups such as the Institute of Strategic Studies publish inventories of Soviet forces including number of types of weapons. Your estimates of the annual defense expenditures of the Soviet Union assume knowledge of annual production. Please explain how annual production estimates are derived for aircraft, missiles, ships, tanks, trucks, small arms, ammunition and other items.*

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Production of trucks, small arms, and ammunition are more difficult to estimate. These estimates are for the most part based on fragmentary direct data and requirements implicit in order-of-battle estimates. In the aggregate, trucks, small arms, and ammunition make up less than 5 percent of total Soviet procurement costs.

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11. *What provision is made in your estimates of dollar costs to purchase Soviet forces for the austerity or complexity of the different types of weapons, or do you estimate the cost based on the nearest US equivalent of each Soviet weapon?*

Our dollar concept is the cost of producing the Soviet design in the US using base year US production technology, input prices and profit margins. Our ability to reflect the Soviet design depends to a large degree upon our knowledge of the physical and performance characteristics of the individual weapons. When we have good data, our cost estimates capture the "austerity or complexity" of the Soviet weapon. We have to fall back on US analogs for weapons or components when our knowledge is less complete. In these cases we attempt to adjust the analog results by extrapolating from our general understanding of Soviet design practices.

For some weapons we have engineering cost studies performed by US industrial firms. (We try to do this whenever we get possession of engineering drawings or of the weapons themselves.) Most of our costs are derived using cost estimating relationships (CERs) which are based on US weapons costs adjusted to "Sovietize" the weapon. Some weapons--usually lower cost items--are costed on the basis of the nearest equivalent US weapons.

To the extent that we are not able to "Sovietize", and US weapons used in the cost estimating methodology are more complex, our estimates tend to overstate the costs of producing the Soviet design. This is probably the general case. It should be noted, however, that we have a number of cases where acquisition of Soviet weapons has shown them to be far more complex --and far more costly to produce--than we had previously estimated.

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12. *What would be the cost in dollars for the US to build the following Soviet systems: the Mig 23, the Krivak class ship, the ABM deployed around Moscow, the SST?*

The estimates listed below are in 1973 US dollars and are exclusive of RDT&E costs. The aircraft estimates are fly-away costs which do not include spares. These costs would be much higher if spare engines were included inasmuch as the Soviets normally use five engines per engine emplacement over the life of the aircraft. The US spare practice calls for about 1.5 engines per engine emplacement over the life of the aircraft. We have neither the direct nor the analog information necessary to make a confident estimate of the dollar cost of the TU-144.

<u>MIG-23 (Flogger)</u>	Million 1973 Dollars
Cumulative average cost for production run of approximately 1000 aircraft.	3
<u>Krivak Class Ship</u>	
Cost of follow-on ship	55
<u>ABM System around Moscow*</u>	
Facilities, missiles and equipment at four launch locations	520
Early warning and battle management radars	1040
Radar calibration satellites	600

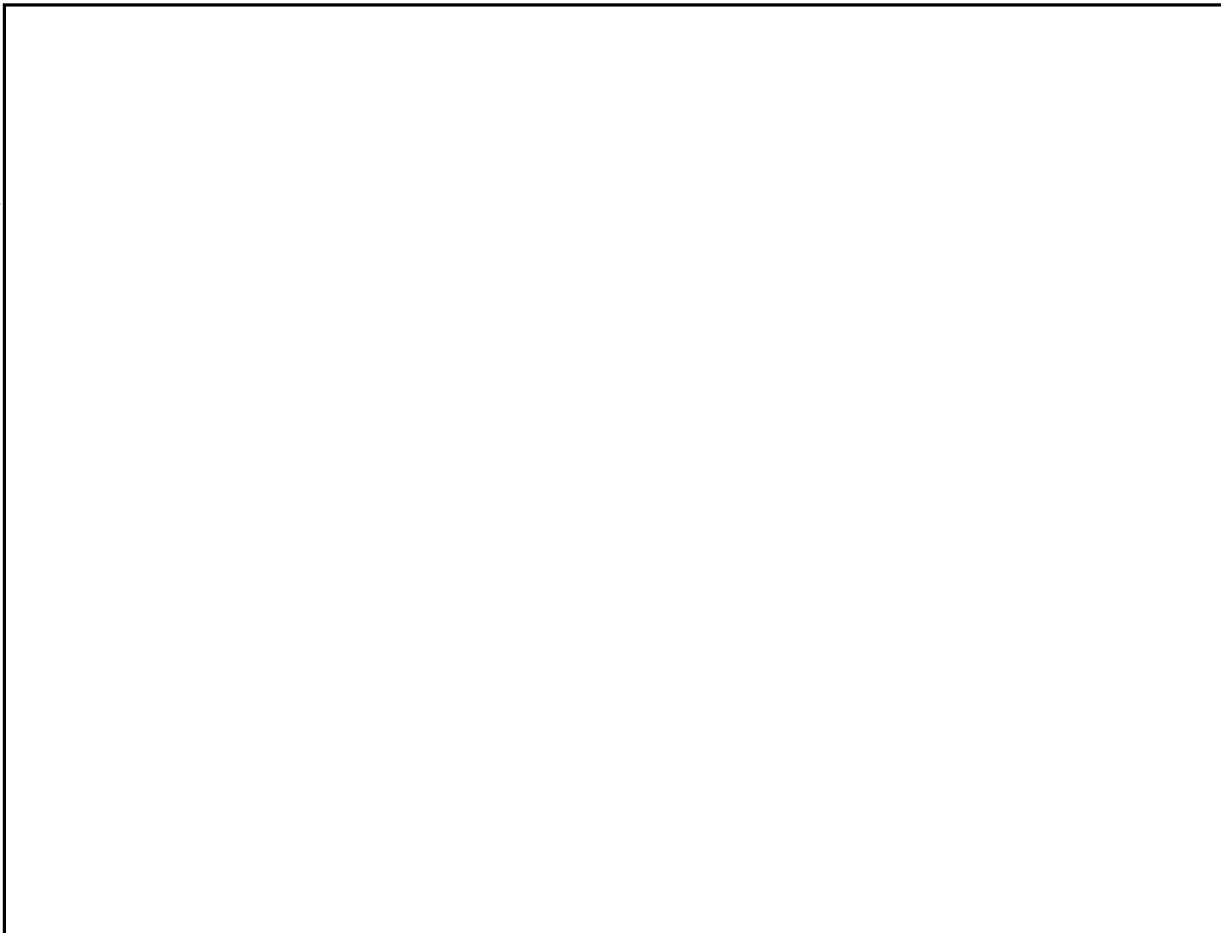
\*Does not include nuclear warheads or operating costs.

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13. *Please discuss the method used to estimate the number of Soviet troops including the use, if any, of the Soviet tables of organization.*

The Soviets provide no information on the manning of their military forces. It is necessary, therefore, for the intelligence community to estimate the personnel strength of these forces.

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14. *In last year's testimony you apparently used a method other than the direct cost or building block approach to estimate Soviet expenditures for civilian goods and services. For example, on page 52 of the published hearings, health expenditures in the USSR are shown as only 32 percent per capita compared to the US. However, there are more doctors per capita in the USSR, more hospital beds, and a system of comprehensive free medical care. Much the same can be said for education, shown as only 63 percent per capita compared to the US. How are your figures derived and would the results be different if estimates were made for how much the US would have to spend in dollars to replicate the same civilian expenditures in the Soviet Union?*

In the transcript of last year's hearing, pages 52 to 55 relate especially to Question 14. The estimates on page 52 give Soviet per capita consumption as a percent of US per capita consumption in 1972 as follows:

Total . . . . .	34%
Education . . . . .	63%
Health . . . . .	32%
Personal services . . . . .	32%
Durable goods . . . . .	9%
Soft goods . . . . .	19%
Food . . . . .	60%

These results stem from analytical work extending back more than a decade. Each comparison is our best judgment of a single number that represents a range of possible estimates. Because of conceptual ambiguities and the incomplete nature of both Soviet and US data, however, the numerical results can only be approximations that support the following generalizations: (a) Soviet per capita consumption is a fraction of US per capita consumption, with "about one-third" being a handy representation of the relation; and (b) Soviet per capita consumption--which is governed by the leaders' decision, not by free choice in the marketplace--is comparatively high in certain categories (food and education), comparatively low in others (durable goods and soft goods).

To estimate Soviet per capita consumption as a percent of US per capita consumption, we take the geometric mean of (1) Soviet per capita consumption valued in rubles as a percent of US per capita consumption valued in rubles, and (2) Soviet per capita consumption valued in dollars as a percent of US per capita consumption valued in dollars. The attached report (A Comparison of Consumption in the USSR and the US, CIA, January 1964) describes the methods and underlying data in a good deal of detail. The comparison can be summarized in the following formula:

$$X = 100 \cdot \frac{N_{US}}{N_{USSR}} \cdot \sqrt{\frac{P_{US} \cdot Q_{USSR}}{P_{USSR} \cdot Q_{US}}}$$

"X" = Soviet per capita consumption as a percent of US per capita consumption

"N" = population

"P" = unit price of a given consumption good or service

"Q" = quantity of that good or service

Since we cannot identify the prices and quantities for all of the goods and services consumed by the Soviet and US populations, we start with categories of consumption--representing both private and public expenditures as reported in the Department of Commerce accounts for US GNP and as estimated from published Soviet data. We then value US consumption in rubles and Soviet consumption in dollars to obtain the comparisons described above. The purchasing-power-parity ratios (ruble-dollar ratios) derived in the attached report serve as the bases for these conversions. Calculated from an extensive sample of consumer goods and services in 1955, the ruble-dollar ratios have been updated year-by-year on the US side with price indexes published by the US Department of Commerce. Because Soviet consumption is estimated in constant 1955 ruble prices, the Soviet side of the price ratios does not need to be updated.

Even if specifications, quantities, and prices of US and Soviet goods were perfectly known, calculations of relative consumption would vary depending on which price system is used for valuation. In general, the comparison using ruble prices favors the United States, and the comparison using

dollar prices favors the USSR. This is so because ruble-dollar ratios tend to be high on goods and services which the US produces relatively more efficiently and low on goods and services which the USSR produces relatively more efficiently. The geometric mean of comparisons in two different sets of prices is a compromise commonly used in making international comparisons.\*

In fact, the establishment of specifications, quantities, and prices of Soviet goods is a painstaking task. Years of work by government and academic specialists have only partially overcome the serious deficiencies in the Soviet data and the inherent difficulties of comparing two quite different economies. In particular: (1) the Soviet economy is not designed to respond to price signals so that certain kinds of goods are not available (for example, a large number of additional housing units could be sold at existing or higher prices); (2) the range of choice is a key aspect of consumer welfare, and the question of choice still is not taken into account in our comparisons; (3) Soviet goods and services are generally of lower quality than US goods and services, notable examples being housing, construction, health and education services, and maintenance and repair services. The allowances made for quality in our comparisons probably err on the conservative side; in the case of labor services in health and education, we apply a 20% quality discount based on a consideration of standards of training. A 20% quality discount is also applied to the machinery and construction components of new fixed investment.

Certainly the main problem with the method is its reliance on benchmark data almost 20 years old. The price indexes that are used to update the 1955 ruble-dollar ratios become less reliable as time passes. We have therefore been engaged in a general revision of all of our ruble-dollar ratios, including those for consumer goods and services. The new ratios will reflect Soviet and US prices of the early 1970s.

\* See, for example, Paul Samuelson, "Analytical Notes on International Real Income Measures," Economic Journal, September 1974, p. 600.

The comparison of consumption of health and education services in the USSR and the United States covers current purchases of material goods and labor services; investment in buildings and equipment is classified in the new fixed investment component of GNP by end use. In the 1973 comparison, our procedure resulted in the following ruble and dollar comparisons:

Current Public and Private Expendi- tures on:	Billion 1955 Rubles		Billion 1973 Dollars	
	USSR	US	USSR	US
Health	7.2	30.9	57.8	83.1
Education	12.3	21.0	77.7	77.4

Clearly, the USSR does much better in a dollar comparison than in a ruble comparison. The reason is that (1) the ruble-dollar ratios for wages of employees in health and education (.07 and .11, respectively) are much lower than the ruble-dollar ratios for material purchases (.71) and (2) the United States spends far more on material purchases per employee in health and education. Therefore, a ruble valuation gives greater weight to the heavy US outlays on material purchases while a dollar valuation gives greater weight to manpower, favoring the USSR.

In health and education, as in the measurement of many services, comparisons must be made in terms of inputs--man years of labor and supplies of materials. The consequences of health and education services--healing, prevention of illness, training, knowledge--defy measurement. Although the USSR may approach or even surpass the US in the provision of individual inputs such as number of doctors, elementary school teachers, or hospital beds, these are poor indicators of the total quantity of inputs allocated to health or education. In the United States, for example, the range of services provided by hospitals and the equipment and drugs that are available for patient care markedly exceed the capabilities or the operating procedures of the typical Soviet hospital.\*

\* Because of the change in the range of services provided, measuring the real expenditures on health and education in the US in 1950 and 1975 by the number of doctors and the number of teachers would also result in a substantial understatement of the difference in the volume of services provided.