

1 March 1965

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EP65-24

ERA CONTRIBUTION TO JAG

ECONOMIC IMPACT OF ALTERNATIVE MILITARY FORCES, USSR  
1963-76

ORR Project No. 13.4522

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ECONOMIC IMPACT OF ALTERNATIVE MILITARY FORCES, USSR, 1963-76

I. Introduction

The four alternative projections of Soviet military forces described in this report are based on the assumption that Soviet leaders are influenced predominantly by political and military considerations in their choice of a military posture for 1975 and are willing or forced to accept the economic consequences. The purpose of this Section is to examine the effect of military forces on economic growth and the allocation of resources. In assessing the economic impact, attention will be focused on the rate of growth of Gross National Product (GNP) and on the allocation of resources to the two principal non-military claimants for the economic "pie" -- the investment goods industries and the consumer.

Hypothetical projections of GNP to 1975 have been developed in order to evaluate the economic impact of the alternative military forces. The projections of GNP and other economic indicators presented in this Section are not intelligence estimates. They are based on assumptions concerning feasible economic alternatives that are available to the Soviet planners, as well as assumptions concerning future productivity trends that are consistent with the economy's past performance.

Although the projections of the military forces extend a decade into the future, many of the decisions required to build any one of the forces must be made by 1965 or soon thereafter. The uniqueness and increasing sophistication of modern weapons systems have lengthened the lead time required from the development to the production stages. In addition, the increasing difficulty of converting

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from civilian to military or from military to civilian production makes the "guns or butter" decision appear much earlier in the economic process than was the case during World War II or even during the Korean hostilities. Because of the technological complexity of modern weapons systems, they require special equipment, a very highly trained professional labor force, and in some cases unique productive capacity. The "guns or butter" decision is not necessarily one of use of available productive capacity and labor force, but of use of investment resources to create a certain type of capacity for production.

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II. Recent Developments in Defense and Economic Growth

The relationship between economic growth and military expenditures may be illustrated by a brief review of developments during 1956-58 and 1959-63, as shown in Table 1.

Table 1

Average Annual Rates of Growth in Key Soviet  
Defense and Economic Indicators a/  
1956-58 and 1959-63

Indicator	Percent	
	1956-58	1959-63
Gross national product	7.5	4.5 <u>b/</u>
Industrial production	8.5	7
New fixed investment	14.5	6.5
Total defense expenditures	-2.5	5.5
Expenditures for defense machinery and equipment <u>c/</u>	1.5	8

a. The base year used for computing rates of growth in this and subsequent tables is the year preceding the given period -- for example, the base year for the period 1956-58 is 1955. All figures have been rounded to the nearest one-half percent.

b. 1964 was used as the terminal year to offset the abnormally low agricultural production in 1963.

c. Including expenditures for military hardware, spare parts, and RDT&S (Research, development, Testing, Evaluation, and Space).

During the earlier period, Soviet defense expenditures declined whereas GNP increased rather rapidly. However, during the period 1959-63, when defense

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expenditures rose rapidly, Soviet GNP grew at a considerably slower rate than previously. During the earlier period, when new fixed investment increased very rapidly, expenditures for machinery and equipment for defense grew very slowly. In the later period, however, when expenditures for machinery and equipment for defense grew rapidly, the rate of growth of new fixed investment decreased.

These data suggest the effects that variations in defense expenditures may have had on economic growth. Investment and, hence, industrial production and GNP grew faster when defense expenditures were growing more slowly or declining and, conversely, grew slower when defense expenditures were growing at higher rates.

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III. Cost of Alternative Force Levels 1963-76

In order to simplify the economic assessment of the military forces projected in this report, only the most expensive alternative (Force II) and the least expensive alternative (Force IV) will be considered. The economic impact of Forces I and III may be assumed to be less severe than Force II but more severe than Force IV.

As noted earlier in this report, Force II represents a concerted Soviet effort across the entire range of force components to introduce improved weapons systems and to maintain forces capable of diverse military actions. Force IV, on the other hand, represents an effort to reduce military expenditures by maintaining a credible deterrent with a smaller number of strategic nuclear weapons systems, while improving the capability of conventional forces for intervention in limited conflicts. The estimated expenditures required to develop and maintain each of these forces through 1976, and in selected earlier years, are summarized in Table 2.

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Table 2

Estimated Military Expenditures Required for Forces II and IV,  
by Category, Selected Years, 1963-76

Category	Billion rubles				Average Annual Rate of Growth (percent)		
	1963	1968	1973	1976	1964-68	1969-73	1974-76
<u>Force II</u>							
Total	19.4	25.3	32.0	28.3	5.5	4.8	-4.0
RDTR&S*	4.2	7.0	9.9	11.1	10.8	7.2	3.9
Investment (Equipment and facilities)	7.4	9.5	12.7	7.4	5.1	6.0	-16.5
Operating (Personnel, operations, and maintenance)	7.8	8.8	9.4	9.8	2.4	1.3	1.4
<u>Force IV</u>							
Total	16.1	16.0	14.9	14.5	-0.1	-1.4	-0.9
RDTR&S	2.7	3.2	3.9	4.4	3.5	4.0	4.1
Investment (Equipment and facilities)	6.7	6.3	4.8	4.0	-1.2	-5.3	-5.9
Operating (Personnel, operation, and maintenance)	6.7	6.5	6.2	6.1	-0.6	-0.9	-0.5

\* Research, Development, Testing, Evaluation, and Space.

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As shown in the table, expenditures for Force II increase rapidly during 1964-73 and do not begin to decline until 1974. Expenditures for Force IV, however, reach a peak in 1966 (a year not shown in the table) and decline quite steadily during the following 10-year period. In 1973, the expenditures for Force II are more than two times the expenditures for Force IV.

A comparison of the structure of expenditures for each of the forces, also shown in Table 2, illustrates the importance to the civilian economy of specific elements in the two military programs. Expenditures on RDTE&S increase in both forces through 1976. However, they start from a higher base and increase more rapidly in Force II, and during 1973-76 they are two and one-half times higher than similar expenditures in Force IV. The large and increasing allocations to RDTE&S under Force II would pre-empt highly skilled manpower and scarce materials for the military and would seriously impede the flow of new technology to the civilian sector of the economy. In addition, the investment in equipment and facilities under Force II increases by more than 5 percent annually through 1973, whereas under Force IV it actually declines, implying a smaller share of investment to the civilian sector under Force II than under Force IV.

The strains that Force II would impose on scarce manpower and material resources are not apparent from the expenditure figures alone. [Currently, the Soviet armed forces number between 3.0 and 3.5 million men. The size of

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the Soviet armed forces in 1976 would range from a low of 2.4 million men under Force IV to a high of 4.6 million under Force II. Thus, Force IV would generate a reduction in the armed forces of perhaps one million men, whereas Force II would generate an increase of about that magnitude. This difference of two million men by 1976 would represent a difference in the rate of growth in the labor force of 1.6 percent under Force II and 1.8 percent Under Force IV. Although this difference in the rates of growth appears small, these men are in their prime working ages while in military service, and their educational attainment generally is higher than the average for the labor force as a whole.

Perhaps more important than the relative size of the armed forces, however, would be the relative demand for scientific and technical manpower for military research and development purposes. Under Force II, expenditures for military RDTE&S would increase at an average annual rate of 8 percent through 1976. During 1956-63, the number of advanced degree holders in the USSR increased at an average rate of only 5 percent annually, considerably below the annual increase in military RDTE&S, suggesting that a disproportionate share of such persons had to be directed into military rather than civilian uses during this period. Although recent changes in the Soviet educational system should accelerate the growth of advanced-degree holders, under Force II the civilian sector probably would continue to be short-changed in favor of the military.

Under Force IV, however, military RDTE&S would increase at an annual rate of only about 4 percent. When related to the expected growth of better

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than 5 percent annually in the number of advanced-degree holders, research and development in the civilian sector would increase substantially (since 1958, civilian expenditures on RDT&ES have been roughly half of the military expenditures on RDT&ES).

In addition to high manpower requirements, Force II would also pre-empt many of the physical resources that are crucial to the continuing modernization of the Soviet economy. The concentration of specialized resources on research, development, production, space activities, and deployment of advanced weapons would interfere seriously with the introduction of technology in industry. Its impact would be particularly critical in such areas as automation and new chemical processes, where the requirements of modern, sophisticated equipment compete directly with the requirements of a modern, space-age armaments industry.

The relative costs of Force II and Force IV over the next decade would be most clearly felt in the growth of factor productivity, the ratio of GNP to inputs of both labor and capital combined. Historically, factor productivity in the USSR during the long period 1928-63 increased at a rate of 1.5 percent annually; however, the rate of growth increased to a little more than 3.0 percent annually during 1950-58 when defense expenditures grew slowly, and then fell to a rate of about 1.0 percent annually during 1958-63 when defense expenditures were accelerated. It is assumed that under Force II, the growth of factor productivity would fall below the long-term trend and would average about 1.0 percent, as it did during the period of rapid military expansion 1958-63. On the other hand, it is assumed that the additional technological resources left over for the civilian economy under Force IV would raise the growth of factor productivity to perhaps 2.0 percent annually. It is unlikely that the growth of factor productivity would return to 3.0 percent annually under any of the projected force levels, because the 3.0 percent rate occurred only under the special conditions of post-war recovery during 1950-58.

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IV. Projections of GNP, 1963-76

Alternative annual rates of growth of Soviet GNP have been projected to 1976 and are shown in Table 3.

Table 3

Hypothetical Average Annual Rates of Increase in Soviet GNP\*  
1964-76

	High Investment		Low Investment	
	High Productivity	Low Productivity	High Productivity	Low Productivity
Force II		4.8		4.0
Force IV	5.8		5.0	

\* The method used for projecting GNP figures is described in the Appendix.

For any military expenditure there is still an economic policy choice between investment and consumption. Growth of GNP can be increased by increasing the growth of investment and hence of capital stock, but at the expense of consumption. The projections in Table 3 contain high and low investment alternatives. In a later section, the impact of these alternatives on consumption will be examined.

In all four cases, the labor force is assumed to grow by 1.7 percent annually, which is the expected rate of growth for the adult population during 1964-76. The high investment assumption corresponds to an annual growth in the capital stock of 10 percent, similar to that experienced during 1950's. The low investment assumption corresponds to an average growth of 7 percent in capital stock, comparable to that experienced during the much longer period 1929-58. Productivity, the ratio of GNP to inputs of both labor and capital combined, is assumed to grow at 1.0 percent annually (low productivity) under Force II

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and at 2.0 percent annually (high productivity) under Force IV, as explained in Section III above.

It is conceivable that during the next decade factor productivity could grow at a higher rate such as 3.0 percent annually, which would cause GNP to grow more rapidly under either Force II or Force IV. However, it is unlikely that such a high growth rate in factor productivity could be achieved unless the entire Soviet system of economic administration were radically reformed to achieve greater efficiency. On the other hand, it is also conceivable that the decline experienced in productivity growth from 2.0 percent in the 1950's to 1.0 percent in the early 1960's is not a temporary drop but is a new trend that will continue into the future. In this event, the growth rates in GNP in Table 3 would be lower under either force level.

V. Impact of Military Expenditures on Economic Growth

Although the military force levels in this paper are projected through 1976, the most significant economic impact occurs through 1973 because defense expenditures decline after that date for both Force II and Force IV.

A. Military Expenditures as a Share of Gross National Product

A rough measure of the burden imposed on the economy by alternative military expenditures is the share of GNP going to defense. The relative demands on GNP of Force II and Force IV are shown in Table 4. Under Force II, the military share of GNP remains above 10 percent through 1973 with both the high and the low investment alternatives. By contrast, the military share of GNP under Force IV declines in every year and by 1973 is less than half the share under Force II.

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Table 4

Military Expenditures as a Share of Gross National Product, a/  
Selected Years, 1963-76

	(Percent)			
	1963	1968	1973	1976
	<u>Force II (low productivity) b/</u>			
High investment	10.6	10.9	10.9	8.4
Low investment	10.6	11.3	11.8	9.3
	<u>Force IV (high productivity) c/</u>			
High investment	8.9	6.7	4.7	3.9
Low investment	8.9	7.0	5.1	4.3

a. Source: The Appendix, particularly Table 6.

b. The military share of GNP under Force II would decline through 1973 only if the high investment alternative (10% increase in capital stock) were combined with the high productivity assumption (2% annual growth), an unlikely combination.

c. The military share of GNP under Force IV would decline more gradually if the low investment alternative were combined with the low productivity assumption.

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B. Impact of Alternative Military Expenditures on Consumption

During the past decade, the Soviet consumer has become accustomed to a gradual but steady rise in his living standards. Consumption has been increasing on the average of about 5 percent annually, and per capita consumption by about 3.5 percent annually. In order to raise worker productivity and conserve scarce materials and manpower, the USSR in recent years has steadily increased worker incentives while relying less and less on compulsion and coercion. A reversal of these trends might have a seriously adverse effect on the morale of the population as a whole and of the labor force in particular.

As shown in Table 5, hypothetical trends in consumption during 1964-76 would be determined by investment policies and by the growth in factor productivity, which in turn would be greatly influenced by the choice of Force II or Force IV. Under Force II, a high investment effort would maintain a respectable growth in GNP (4.8 percent annually), but would result in an absolute decrease in consumption and a decline in per capita consumption of about 2 percent annually for the decade through 1976. This result would be unacceptable to the Soviet consumer and almost certainly would force a modification in either investment or military policies. Force II in combination with a low investment program would result in GNP growth of only 4.0 percent annually, but would permit increases in per capita consumption ranging from about one to two percent annually throughout the decade. In order to deploy Force II, therefore, the Soviet leadership probably would be forced to accept a lower growth in GNP in order to maintain a small annual increase in per capita consumption.\*

\* In the unlikely event that the Soviets should experience a high growth in factor productivity with Force II, they could maintain GNP growth at 4.8 percent annually and a small increase (rather than a decrease) in per capita consumption through 1976.

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Table 5

Average Annual Rates of Growth in GNP and Consumption  
Under Alternative Investment Policies  
and Productivity Trends, 1964-76 <sup>a/</sup>

	Percent			
	High Investment		Low Investment	
	High Productivity	Low Productivity	High Productivity	Low Productivity
<u>Force II</u>				
GNP, 1964-76		4.8		4.0
Consumption, 1964-76		-0.4		2.7
1964-68		-0.6		2.5
1969-73		-0.3		2.2
1974-76		-0.2		3.9
<u>Force IV</u>				
GNP, 1964-76	5.8		5.0	
Consumption, 1964-76	2.5		4.8	
1964-68	2.1		4.9	
1969-73	3.3		4.8	
1974-76	2.1		4.5	

a. Source: The Appendix, particularly Table 6.

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Under Force IV the low investment alternative would provide an average annual increase of 5 percent in consumption during 1964-76 comparable to the increase of the past decade. The annual increase in GNP in this case would be 5.0 percent. If under Force IV the Soviets seek a higher rate of increase in GNP (5.8 percent), the increase in consumption would average 2.5 percent annually, about half the increase of the past decade.\*

C. Differential Impact of Alternative Forces on the Machinery Industries

The modern, space-age armaments industry introduces serious problems of resource allocation, even when resources are growing rapidly and are under strong political control. The inverse relationship between expenditures for military equipment and for new fixed investment in the USSR during 1956-63 was noted above in Table 1. A rapid rise during 1959-63 in expenditures for military equipment and facilities was accompanied by a sharp decline in new fixed investment -- the primary element of economic growth. This represented a reversal of trends observed during 1956-58.

The expanded weapons systems required under Force II would involve heavy investment in military equipment and facilities, especially in the period of rapid buildup through 1973. Expenditures for military investment would increase at an annual rate of 5 percent during 1964-68 and 6 percent during 1969-73.

\* The increases in both GNP and consumption would be lower if factor productivity does not increase by 2 percent annually.

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Under Force IV, on the other hand, expenditures for military equipment and facilities would remain almost unchanged over the entire period and would decline as a proportion of GNP. The requirements of Force II, therefore, probably would make it difficult for the USSR to maintain a high rate of investment in new fixed equipment for the civilian sector. This possibility reinforces the conclusion made above in discussing consumption (Section V.B) that a high investment effort under Force II would be too strenuous for the Soviet economy. The same restraint on high investment would apply, though with less severity, to force levels intermediate between Forces II and IV.

VI. Conclusions\*

Force II would impose strains on scarce material resources that would require sharp adjustments in the civilian economy. In particular, Force II is not compatible with a high investment policy (growth in capital stock of 10 percent per year) because (1) it would result in a decline in per capita consumption every year through 1976, and (2) the heavy expenditures for military equipment would reduce the resources available for civilian investment. Force II would be possible with a lower investment policy, although this in turn would hold the growth in GNP to only 4 percent annually and would permit increases in per capita consumption only about half those of the recent past. Nevertheless, the economy would be able to bear the burden imposed by Force II.

\* These conclusions are based on the assumptions that have been made about investment, productivity, and increase in the labor force. See the Appendix for a discussion of these assumptions.

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Force IV would give the Soviet leadership more room for choice. A high investment policy would result in a growth in GNP of about 6 percent annually and still provide moderate increases in per capita consumption, although lower than consumption increases of the recent past. If the leadership preferred to maintain their present trends in consumption, they could reduce investment and let GNP growth drop to about 5 percent annually while growth in per capita consumption remained at 3.5 percent annually.

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IV. Note on Methodology

The estimates appearing in tables 2, 4, and 5 are based on data that appear in table 6. The separate growth models in table 6 were derived as follows:

A. Data on military expenditures for all years are those tabulated for JAG by MRA.

B. GNP data by end use for 1963, except military, are ORR estimates.

C. A basic Cobb-Douglas production function, with constant returns to scale, was used for the projections. The formula, in terms of rates of change, is as follows:

$$\frac{\Delta O}{O} = \frac{\Delta A}{A} + \frac{\Delta K}{K} (.25) + \frac{\Delta L}{L} (.75)$$

where O is GNP, A is factor productivity, K is the capital stock, and L is the labor force. The weights used to aggregate K and L represent arbitrary approximations.

D. The assumptions regarding future growth of A, K, and L, already noted in the text, are:

(1) A -- 1 and 2 percent

(2) K -- 7 and 10 percent

(3) L -- 1.7 percent

E. GNP was derived for each variant shown in table 6 by applying growth rates to 1963 level.

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F. Growth in investment represents the increase needed to raise capital stock by 7 and 10 percent respectively. It was assumed that depreciation would increase at the same rate as capital stock.

G. "Other" GNP was assumed to remain a constant share of GNP.

H. Consumption was obtained as a residual.

Many pitfalls are encountered in attempting to project the components of gross national product over the period of a decade, and there is no synthesized theory of economic growth which can make allowance for all of them. In making economic comparisons of alternatives over time, adjustments should be made for future changes in production costs, installation costs, and operating and maintenance costs, changes which may occur at different times and different rates throughout the course of a decade. No attempt has been made in this paper to compare and adjust for the costs and gains that may occur at different points because of changes in technology, changes in demand and changes in time preferences. The GNP figures in this paper are hypothetical projections only, based on assumptions about feasible economic alternatives in the USSR. The projections are not intelligence estimates; they were developed solely to accompany the hypothetical projections of military forces.

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Table 6

Hypothetical Projections of GNP by End Use, USSR,  
Selected Years, 1963-76

	Billion rubles				Average Annual Rate of Growth (percent)		
	1963	1968	1973	1976	1964-68	1969-73	1974-76
<u>Force II, (low investment; low productivity)</u>							
GNP, total	183.4	223.1	271.4	305.3	4.0	4.0	4.0
Consumption	109.3	123.5	137.9	154.5	2.5	2.2	3.9
New fixed investment	42.7	59.7	83.7	102.5	6.9	7.0	7.0
Military expenditures	19.4	25.3	32.0	28.3	5.5	4.8	-4.0
Other <u>a/</u>	12.0	14.6	17.8	20.0	4.0	4.0	4.0
<u>Force II, (high investment; low productivity)</u>							
GNP, total	183.4	231.9	293.2	337.5	4.8	4.8	4.8
Consumption	109.3	105.8	104.0	103.5	-0.6	-0.3	-0.2
New fixed investment	42.7	85.6	138.0	183.6	14.9	10.0	10.0
Military expenditures	19.4	25.3	32.0	28.3	5.5	4.8	-4.0
Other <u>a/</u>	12.0	15.2	19.2	22.1	4.8	4.8	4.8

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Table 6 continued

	Billion rubles				Average Annual Rate of Growth (percent)		
	1963	1968	1973	1976	1964-68	1969-73	1974-76
<u>Force IV, (high investment; high productivity)</u>							
GNP, total	180.1	238.7	316.4	374.7	5.8	5.8	5.8
Consumption	109.3	121.2	142.4	151.6	2.1	3.3	2.1
New fixed investment	42.7	85.6	138.0	183.6	14.9	10.0	10.0
Military expenditures	16.1	16.0	14.9	14.5	-0.1	-1.4	-0.9
Other <u>a/</u>	12.0	15.9	21.1	25.0	5.8	5.8	5.8
<u>Force IV, (low investment; high productivity)</u>							
GNP, total	180.1	229.9	293.4	339.6	5.0	5.0	5.0
Consumption	109.3	138.9	175.3	200.0	4.9	4.8	4.5
New fixed investment	42.7	59.7	83.7	102.5	6.9	7.0	7.0
Military expenditures	16.1	16.0	14.9	14.5	-0.1	-1.4	-0.9
Other <u>a/</u>	12.0	15.3	19.5	22.6	5.0	5.0	5.0
<p>a. Includes capital repairs, inventory adjustments, civilian research and development, and administration.</p>							

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Corrections to ERA contribution to JAG, "Economic Impact of Alternative  
Military Forces, USSR, 1963-76"

Page 13, second paragraph:

line 10: change "4.1 percent" to "4.0 percent"

Page 15, first paragraph:

line 4: change "5.1 percent" to "5.0 percent"

line 5: change "5.9 percent" to "5.8 percent"

line 5: change "2.8 percent" to "2.5 percent"

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