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OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

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DIRECTOR OF NET ASSESSMENT

18 SEP 1975

Mr. Richard Kaufman
Joint Economic Committee
Room G-133, Dirksen Senate Bldg.
Washington, D.C. 20510

Dear Mr. Kaufman:

The material at Tab A presents a summary of my views on (1) the value of and problems with currently available estimates of Soviet Union defense expenditures and (2) how Soviet and U.S. defense expenditures can best be compared. In general it follows the points I made in our discussion a couple of weeks ago. Tab B contains a description of the projects relevant to this general problem area which this office has underway, or intends to initiate in the future. These projects focus upon (1) the comparative size of U.S. and Soviet defense efforts and (2) the relative efficiency with which the U.S. and the Soviet Union produce, maintain, and operate comparable military forces, and the comparative effectiveness of the forces produced.

Properly conceived and executed analyses of comparative U.S. and Soviet defense expenditures can provide valuable insights into the status and trends of the two defense efforts. However, current official estimates of the Soviet programs have some serious shortcomings. The "burden" analyses concentrate too narrowly on the economic opportunity cost of defense, and neglect the important non-economic factors which determine how this opportunity cost is perceived and reacted to by the effective decisionmaking groups. Even with regard to the narrow economic concept, current analyses are not convincing, for a variety of reasons discussed in Tab A. Soviet defense activities are much more likely to absorb, in my opinion, 10 to 20 percent of Soviet GNP than the 6 to 8 percent indicated by past CIA studies. There are considerable uncertainties in all these estimates, but over the course of the next couple of years improved estimates and comparisons could be available.

I believe the methodology used to estimate the absolute dollar size of Soviet military activity involves a number of shortcomings which, on balance, underestimate the Soviet size relative to the appropriately

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comparable U.S. defense expenditures. The general trends shown by the comparative dollar size analyses do seem reliable, however. When measured in constant dollar terms, the magnitude of Soviet military activity has increased steadily since at least 1964, whereas the comparable U.S. real expenditure levels decreased from 1969 to 1973, inclusive.

The annual allocation of resources to Soviet military activity has exceeded its counterpart in the United States in every year since 1971, inclusive, and in calendar year 1974 exceeded the counterpart U.S. defense expenditures by at least the 20 percent estimated by the CIA analysis.

These comparative sizing analyses of U.S. and Soviet military activity focus on the size of the input of resources to the two military establishments, and not upon the relative efficiency with which these resources are used. The way in which the dollar cost of the Soviet program is estimated does, however, reflect in part the different sorts of capabilities the Soviets build into their weapons and forces. Doing this appropriately is a complex undertaking that I believe needs review and my office is directing an effort to do that job better.

There are some interesting trends in Soviet weaponry that will affect comparisons of forces and resources. Recent analyses indicate that the major new Soviet land armaments and tactical aircraft introduced since the mid 1960s are substantially more complex, and incorporate significantly more military capability, than the weapons they are replacing. Such trends as these imply that the Soviet forces can no longer be viewed as quantitatively large, but qualitatively second rate.

Much more can be done than has been done in the past in these difficult issues of military efficiency, capability, and the military balance. A number of studies we have started focus attention on U.S. and Soviet training, maintenance and other qualitative factors that are important to the effective performance of the two forces. We are trying to move beyond the usual analyses that stop at counting men and equipment, and the assessment of the technical excellence of weapons. When these studies begin to produce results I would be glad to discuss them with you.

Sincerely,

Andrew W. Marshall

ANDREW W. MARSHALL
Director, Net Assessment

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WASHINGTON, D.C. 20301

DIRECTOR OF NET ASSESSMENT

16 September 1975

# COMPARISONS OF US AND SU DEFENSE EXPENDITURES

## I. General Introduction

### A. Outline of the Issues

In the literature and policy discussions which refer to comparative US and Soviet defense expenditures two distinct questions are addressed. One is the "burden" question, which attempts to shed light upon the strains which the production, maintenance, and operation of the respective defense establishments impose upon the two societies. The other is the "sizing" question, which attempts to provide a consistent measure of the relative magnitude of the two defense efforts. The concepts of "burden" and "size" are not precisely or uniquely defined even in abstract terms, and are frequently inappropriately mingled in discussions and analyses.

In general the two issues may be distinguished along the following lines. The burden issue is focused upon the ability and willingness of a nation to sustain real defense expenditures at a given or increasing level over an extended period of time. What are the physical (economic) factors which constrain the ability of a nation's economy to carry the "burden" of the military programs? What are the non-economic factors that influence the nation's perception of the economic cost of defense, and therefore influence the national willingness to continue to allocate resources to defense at given levels? Although an adequate treatment of the burden issue must view a society's defense effort in relation to a number of parameters, the point to be emphasized is that all of these parameters are domestic, i.e., they are descriptive of the specific society in question. Consequently, the burden issue is one which is internally oriented, and the units of measure which are applied to a country's defense program must scale that program to such other domestic parameters as are considered relevant, in so far as these are measurable.

The sizing question, however, attempts to compare the magnitude of one country's defense effort to that of another country. For this task the units of measure which are applied to the defense activities

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of one country must be consistently applied to the defense activities of the other country. In an important sense the units of measure in the sizing analyses are arbitrary; what is required is that comparable military resources be entered in the sizing of one military force with the same weight as they are entered in the other military force. This does not imply that an adequate sizing of a nation's military effort can be achieved by a simple linear combination of physical military elements using straight forward or obvious value weights. The question of what weights are appropriate for the entering of tanks, aircraft, men, etc., is complex, and depends not only on their numbers and physical characteristics, but also on the practices which determine how these physical elements are organized, operated, deployed, and trained. However, once a given system of measurement is selected and applied consistently to each of two (or more) military efforts, their relative size can be discussed (subject to the system chosen) as one input to the question of the appropriateness of that relation.

The issues of burden and size are therefore distinct in concept, in the questions to which they are oriented, and in the principles of consistency appropriate to each. With due acknowledgement to the fact that principles are easier to state than to follow, these distinctions are not always maintained.

B. Outline of the Estimation Processes

Estimates of Soviet defense activities are provided in dollar and ruble terms. Both estimates begin with the detailed identification and listing of the physical components and activities which define the Soviet defense program for a given year. By a variety of methods this common physical data base is converted into two aggregates, one denominated in rubles, the other in dollars. For certain components, conversions are made from one value base to the other by applying ruble-to-dollar ratios which reflect the estimated relative efficiency of the Soviet Union and the US in a particular activity.

The point to be noted is that the ruble and dollar estimates of Soviet defense activity are interdependent, both through the common physical data base and through the conversion factors. Biases which appear in one estimate, therefore, can influence the other in a similar fashion. This is particularly true of those errors which affect the estimation of the physical resources actually allocated by the Soviets to defense activities. In the following pages specific examples of such biases will be discussed without

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repeating that they apply to both the ruble and the dollar estimations. A listing of the major biases which influence both estimates through the physical data base includes the failure to fully represent:

--Soviet defense resources provided by non-defense ministries.

--The resource requirements of extreme Soviet locational and climactic conditions.

--Soviet manpower, especially of the higher command and general support levels.

--The increasing sophistication of recent Soviet weapons.

## II. Burden Estimates

### A. Summary of Major Points

Burden analyses should be considered as one input into appraising the status and future of the long run competition between the United States and the Soviet Union. How long can the two nations continue to sustain large scale military forces; which feels the strain the most, and what are the implications of these perceptions? Existing burden analyses have concentrated on only a limited aspect of this question, the economic opportunity cost of US and Soviet defense expenditures. A good assessment of comparative economic opportunities cost would be very valuable. But such a focus is too narrowly economic, and excludes important bureaucratic, ideological, historical and other factors which influence how the economic cost of defense is perceived by the effective decision-making hierarchies of given nations. We need to understand much more about these non-economic factors, particularly in the Soviet case. Until we do, comments to the effect that the burden of Soviet defense is not a heavy one are not persuasive.

Moreover, even in their analyses of the opportunity cost of Soviet defense, present studies are not convincing. There are a number of Soviet national policies which suggest that present estimates of the proportion of gross national product absorbed by defense significantly under-represent the real resource drain of the Soviet military. Several examples come to mind: the dispersion and location, for national security reasons, of civilian oriented production units which may increase costs of production or require more investment than would be needed in more economic locations; selective streaming of resources to the military production sector; the extraordinary costs of creating a supporting environment for the Soviet force build-up along the Sino-Soviet border.

In the past few years we have obtained some intelligence and other information which suggest that Soviet military production may not be as efficient relative to the Soviet civil sector or to US production as has been assumed. This would mean, if it is confirmed, that the dollar-ruble ratios used by the CIA to translate their dollar cost estimates of Soviet programs to ruble estimates have underestimated the ruble cost of the Soviet programs.

For these reasons and others past burden analyses which indicate that Soviet military activities absorb only 6-8% of GNP are suspect. The CIA now is much less confident that the percentage of GNP is this low. I believe the more likely range is 10-20%, which reflects an increase overall and more uncertainty as to our current ability to measure the economic burden of the Soviet defense programs. We need much more sophisticated analyses both of the broader interpretation of burden, and more convincing estimates of the opportunity cost of the Soviet defense effort.

B. The Opportunity Cost Measure of Burden

1. Rationale and Measurement of Opportunity Cost

The issue of the burden imposed upon the US or Soviet society by defense programs arises in the context of the long run political-military competition in which the two countries are engaged. Without attempting to define the nature of that competition, it is clear that there is in part an adversary relation between the two countries, and that each sees its military force as one dimension in the competition. How long can that competition be sustained? Which nation is most burdened by the resource drain of military forces? Which will find its "burden" too heavy to carry?

The resources allocated to a nation's defense effort represent one dimension of the burden of defense. These resources are diverted from other national objectives with perhaps more popular appeal, and reduce the nation's capability to increase future production in non-defense areas through investment. Allocation of resources to defense, therefore, imposes upon a nation an opportunity cost in terms of foregone achievements in the other components of gross national product. It is common to term this opportunity cost the "burden" of defense, and to quantify it as a percentage of the nation's GNP. For any given year, the percentage is calculated by dividing the value of the resources allocated to defense by the value of that year's GNP, where both values are--or should be--calculated using

the nation's domestic relative price structure. However, there are several points which should be raised.

First, the purpose of the percentage calculation is to represent the relative size of the non-defense production which is foregone by allocating resources to defense. This means that the defense resources and GNP must be measured in terms of the same domestic relative price structure. The assumption is that the domestic relative price structure represents with some accuracy the relative value of the resources in producing real product independent of the particular sector in which they are employed. Since the relative productivity of resources will vary between economies, so will the relative prices of those resources. It follows that attempts to estimate the opportunity cost burden of defense to a given society must involve in principle defense expenditures and GNP calculated in terms of that society's realtive price structure. No legitimate insights regarding burden can be drawn from Soviet defense percentages calculated in terms of dollar weighted variables, or from US defense percentages calculated in terms of ruble weighted variables.

The second point relates to the assumption, noted above, that a country's price structure represents the relative value of resources in producing real product independent of the particular sector in which they are employed. In an economy such as that of the US, where prices are determined principally by market forces, where industrial units producing military products are closely integrated into the civilian product and resource markets, and where the sets of incentives and constraints which apply to military production are not different in kind from those which apply to civilian production, this assumption can be accepted as reasonably accurate, and a dollar's worth of defense resources accepted as implying a dollar's worth of divil output foregone. However, where, as in the Soviet Union, those descriptive characteristics do not generally apply, it is not likely that the productivity of resources is independent of their sector of employment.

More particularly, there are two general reasons to believe that a ruble's worth of resources transferred from the Soviet military production sector to civilian production will not result in a ruble's worth of real civilian output. First, the ruble prices of resources in the Soviet Union are established by bureaucratic decision, and not by the interaction of market forces. As a consequence they

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cannot be accepted as reflecting the opportunity cost of the resources to which they apply. A specific example is found in the extremely low wage and benefits in kind paid to the Soviet conscripts which comprise the majority of Soviet military manpower. Current CIA estimations attempt to correct for this distortion (and a range of others, including distortions in the rate of return to capital between sectors) by shadow pricing conscriptees at wage levels which seem reasonable approximations of their (higher) opportunity cost. Similar distortions permeate the Soviet price system, and suggest that observed ruble prices can seldom be taken at face value as an adequate reflection of resource productivity within the Soviet System.

The second, and perhaps more pervasive type of distortion, involves a whole range of Soviet national policies which are not fully reflected in the current estimates, and which tend to increase the real cost of Soviet national defense in ways not reflected in established prices.

2. Soviet National Policies Not Fully Represented in Current Burden Estimates

There are a range of Soviet policies or practices which accord preferences to military production over civilian counterparts and, on balance, increase the opportunity cost of military activity in ways not reflected by the price structure nor captured adequately by current estimates. As a first example, selective streaming of high quality human and material resources into the military sector, and away from civilian oriented activity, has been practiced over a long period. The military research and development (MR&D) sector, for example, has clear preference over the civilian counterpart (CR&D) in obtaining the best scientists in a broad range of fields (applied math, computer science, systems analysis, bio-chemistry, bio-physics), and the resulting quality differentials are only partially reflected in differential wages between the sectors.

Second, there are some reports of accounting practices which systematically under-price military production relative to civilian production. MR&D and military production in general are more capital intensive than their corresponding civilian activities. Since the use of investment funds is subsidized throughout the economy, this relative capital intensity conveys a cost advantage to MR&D over CR&D. In addition, the allocation of overhead costs in plants which produce both military and civilian goods is said to be done in proportion to the respective shares of total labor costs. This appears

to be an arbitrary accounting practice which may shift production costs from more capital intensive military products to more labor intensive civilian products. In so far as observed ruble prices are used to ruble price Soviet military activity and Soviet GNP, such accounting practices would tend to underprice the former relative to the latter.

Other sources of underestimation of the real cost of Soviet military activity derive from direct or indirect subsidies (financial or material) from non-defense Ministries, or the society at large. As a specific example one can cite the extensive system of pre-military training (PMT) which is intended to prepare Soviet youth for military service. The Soviet PMT does not receive budgeted defense funds, but is supported financially and materially through a variety of sources such as membership dues, donations from non-military enterprise, lottery revenues, and state grants. Some state aid comes indirectly through the Ministries of Defense and Education, with the latter funding the estimated 75,000-100,000 instructors working full or part time, as well as providing other assistance to the program. The PMT program does not appear very efficient in its primary goal of early military preparation, and there are undoubtedly some aspects of the program which benefit the civil economy. Nonetheless, by inculcating patriotism and respect for the armed services, in preparing specialists for the armed services, and in upgrading the quality of conscripts and reserve forces, the PMT program contributes to Soviet national defense and imposes a resource cost which is not now included fully in our estimates of Soviet defense activity.

Resource requirement costs associated with peculiar locations or climactic conditions impinge on both civilian and military activities in ways which increase the costs of Soviet defense, but which also are not adequately reflected in current estimates. We believe there exists a national program for the dispersal of civilian production units to remote areas for defense and other reasons. In many cases this dispersal entails increased costs for infra-structure, construction, and transportation which to some extent should be considered a portion of the real cost of Soviet defense. A more direct example is found in the recent build up of Soviet forces along the remote and climatically hostile border with China. Based in the relatively underdeveloped economic environment of the Soviet Far East, these units have required far more in support resources than equivalent units based to the west of Lake Baikal and the Urals, largely as a result of the adverse natural conditions of the region, the long distance from suppliers of goods and services, and the small scale

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of regional demand for most items. The magnitude of this east-west cost differential depends upon a number of factors under examination, but a preliminary and conservative estimate is that the Soviet general purpose forces in East Asia cost about half again as much as their average counterpart elsewhere in the Soviet Union, and could easily cost twice as much.

A number of the foregoing remarks indicate areas in which the physical quantities of real resources directly or indirectly allocated to Soviet defense activities probably have been underestimated. Such underestimations apply not only to the ruble based calculation of the opportunity cost burden of defense, but also to the dollar based calculations which are used in the sizing comparisons with US defense expenditures, to be discussed in Section III, below. Indeed, since both the ruble and the dollar valued calculations are based upon the same estimate of the physical resources devoted to Soviet defense, any shortcomings in these physical estimates apply equally as criticisms to the burden and sizing analyses. There is one additional major methodological problem which suggests that the quantity of physical resources devoted to Soviet defense activities has been underestimated in relation to the corresponding resources devoted to US defense, but this will be treated more conveniently in the discussion of sizing.

There is a further point which is peculiar to the opportunity cost burden calculation: the assumed greater efficiency of the Soviet military production sector relative to the civil sector.

### 3. The Relative Efficiency of Soviet Military Production

Certain of the factors discussed above, and others, have led many analysts for some years to argue that the military production sector of the Soviet Union is highly efficient, both in relation to comparable US production and to the Soviet civilian production sector. This position has buttressed the conclusion that the opportunity cost of Soviet defense resources, calculated as a percentage of Soviet ruble GNP in a given year, was relatively small, the current CIA estimate being in the range of 6-8% of GNP. The presumption of high efficiency in military production relative to the US is expressed by the application of relatively low ruble-to-dollar ratios when the previously calculated dollar costs of Soviet military hardware are translated into ruble costs. The result is a lower ruble cost of Soviet military activities than would have been calculated had the military sector not been assumed so peculiarly efficient, and correspondingly higher ruble-to-dollar ratios used to translate dollar costs into ruble costs.

There may well be a number of allocation, incentive, and institutional factors in the Soviet Union which cause military production to be more efficient than Soviet civilian production; this point is not seriously in question. However, there is some evidence which suggests that the magnitude of that efficiency margin has been over-estimated, at least for some major hardware categories, and that, therefore, the ruble valuation placed upon the estimated physical quantities of resources absorbed by the Soviet military has been inappropriately low.

For example, in the past the CIA estimated the ruble cost of the basic ship portion (i.e., total ship less armaments and electronic) of major Soviet surface combatants by first estimating the dollar cost to produce these ships within the US. These dollar costs were then converted to rubles by applying a ruble-to-dollar ratio reflecting the estimated relative efficiency of Soviet and US shipbuilding. However, the CIA has recently analyzed Soviet maritime cost planning factors which have appeared in unclassified Soviet publications. This analysis has determined that the previously applied ruble-to-dollar ratios were too low, and that the actual ruble cost of the basic ship components was more than double the estimated amount. The direct implication of this new appraisal applies only to the ruble cost of Soviet major surface combatants. However, in general it supports the broader view of certain independent analysts who believe that the relative efficiency of Soviet military production (relative to both the Soviet civil sector and to US military production) has been overestimated, and that therefore the ruble-to-dollar ratios applied to a wide range of Soviet hardware are likely to require upward revision.

Further evidence on the relative efficiency question is provided by recent information being appraised by the intelligence community. This information suggests, that actual and planned Soviet total expenditures for defense in several years, were approximately double the US ruble estimates for those years. It should be noted that the information relates to certain categories of expenditures which have been explicitely excluded from the CIA estimates due to lack of sufficient information upon which to base estimates. However, the remaining difference is acknowledged to be too great to be explained by differences in coverage alone. The greatest part of that difference must be explained by some combination of real resource omissions from previous estimates, and inappropriately low ruble costing of those military activities which were included.

There is, then, some evidence that past official analyses have overestimated the relative efficiency of Soviet military production, and thereby systematically underestimated the ruble value of the resources devoted to Soviet defense activity. In real terms this implies that, for any given allocation of physical resources to

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defense, the Soviet opportunity cost has been larger than previously estimated.

These recent insights regarding Soviet efficiency support the preceding comments in suggesting that the resource devoted to defense activities in the Soviet Union are much more likely to account for 10 to 20 percent of Soviet GNP than the 6 to 8 percent indicated by past official analyses. It is clear, therefore, that we require improved analysis of the economic opportunity cost burden of defense. Indeed, the range of uncertainty as to what the actual level of this cost might be suggests that we should not rely upon a single measure. We need alternative and independent analyses which will provide checks upon improved official estimates of Soviet ruble spending for defense. For example, these could include manpower directly and indirectly involved in military programs, etc. We also need better analyses of the broader and more complex issue of how the opportunity cost burden of defense is perceived by the Soviet leadership.

C. The Perception Problem in the Burden Concept

The narrow economic opportunity cost concept is but one input to the burden issue, and is by itself inadequate to the essential point of the analysis. How heavy is the burden perceived to be by the nation's leaders? What pressures are they under to reduce the burden? How long can they continue to carry the burden?

With regard to the Soviet Union specifically, the economic opportunity cost of defense, even if accurately calculated, is only a preliminary input to such questions. What is critical is a better understanding of how that opportunity cost is perceived by the Soviet leadership and society. However united it may be to external view, Soviet officialdom comprises many leadership positions, each with a unique occupant and perspective, so what may be a cost to a certain individual, group, sector, or region may simultaneously be a benefit to another and even a larger cost to a third. To understand the burden of defense in any useful sense we need to know much more about how such conflicting and reinforcing views work themselves out in the Soviet system. The answer to this sort of question depends upon an understanding fo the internal bureaucratic and organizational politics of the decision processes which determine the allocation of resources. This suggests that not only is it important to move toward more sophisticated opportunity cost measures, but also to try much more sophisticated analyses of the perception of that opportunity cost of defense. There may be widely shared goals for the non-defense sector that cannot be met. If that is

true, the perceived burden of defense may be increasing over time even though defense takes but a constant or declining share of GNP. Therefore, it is impossible to address the problem of the burden, or the Soviet perception of the burden, without knowing how strongly the Soviet leadership in general, or subgroups of it, are attached to some alternative goals that could be obtained by diverting resources from defense even if the efficiency of the shift of resources is low. Until much more progress is made in these broader dimensions of the burden issue, statements to the effect that the burden of defense upon the Soviets is great or small will not be persuasive.

## III. Sizing Estimates

### A. Summary of Major Points

Sizing analyses attempt to provide a measure of Soviet military activity which is comparable to US military activity as represented by US annual defense expenditures. To do so, the dollar costs are estimated of "what US expenditures would be if the US pursued the same development, investment, and manpower programs as the Soviets and operated the resulting force as the Soviets do" (SR IR 74-7, p. 13; SECRET). The estimated dollar cost of Soviet military activity represents the magnitude of real resources allocated to the Soviet military when those resources are aggregated using the corresponding US dollar values as weights. Therefore, comparative sizing studies enhance our appreciation of the relative magnitude of the resources used as inputs to military forces in the two countries; they do not measure (nor claim to measure) the relative effectiveness or capabilities of those forces.

The methodology used to size the Soviet military effort begins with a detailed specification of the physical elements and activities of the Soviet forces as revealed by intelligence community observation and analysis. These physical dimensions are then dollar-costed and aggregated for comparison to US defense expenditures as obtained from official US budget documents. In the comparisons of military size, therefore, the Soviet and US data have been derived by significantly different methodologies: the Soviet data by US intelligence observation which cannot be exhaustive in its coverage of the details of Soviet military activities, and the US data by reference to official publications which are exhaustive of US defense outlays. Although the CIA does make major adjustments to the US data which improve the comparability between the two figures there are a number of factors which suggest that the observed and imputed physical dimensions of Soviet military activity are under-represented relative to their US counterparts.

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Once the physical dimensions of the Soviet and US military efforts have been specified, there remains the question of how to aggregate the disparate physical elements of each nation's program to provide commensurable aggregates for comparison. There is no system for which a priori preference can be claimed. The Soviet program has in fact been aggregated using US dollar prices for a number of practical reasons. Soviet ruble prices in principle could have been used to aggregate both the Soviet and the US programs, but the empirical problems associated with an accurate ruble comparison may be intractable for US analysts.

Even within the dollar-price estimates of Soviet military activity there are a range of legitimate estimates which can be made. It is not a simple matter of aggregating the physical elements of the Soviet effort by using their estimated dollar procurement or unit prices. The resource costs which are functionally related to the observable elements of military activity (men, ships, aircraft, etc.) depend not only on the physical and performance characteristics of the elements, but also upon the military practices which determine how these physical elements are supported, deployed, maintained and operated. Such practices differ significantly between the US and the Soviet military, and the estimated dollar size of Soviet military activity can vary greatly depending upon what mix of these practices are assumed in the costing methodology. Of course, actual US defense expenditures reflect US military practices exclusively. The current CIA methodology used to dollar-cost Soviet activity, however, embodies a mix of US and Soviet practices which results in an estimated dollar cost of the Soviet defense program which is relatively low; low, that is, in relation to other estimates which would result from equally legitimate alternative assumptions regarding military practices.

For these and other reasons the concept of the size of a military program is complex and is to a degree inherently arbitrary. That complexity and its associated uncertainty suggests that the important policy issues to which sizing analyses are addressed would be better served by a variety of supplemental measures of relative size. These could be based upon ruble prices, alternative assumptions regarding military practices, or real magnitude comparisons of major systems procurements by the US and the Soviet Union.

But dollar sizing of Soviet military activity is a perfectly valid analytic process with important policy uses. I believe there are serious problems in the current estimates which, on balance, underestimate the extent of Soviet activity relative to US defense expenditures. Little confidence can be placed in the absolute size of the

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Soviet effort as now estimated. However, the general trend between these estimates and US defense expenditures seems correct: in constant dollar terms, the annual allocation of resources to Soviet military activity has exceeded its US counterpart in every year since 1971, inclusive, and in calendar year 1974 this excess was at least 20 percent.

B. Methodological Conflict

1. Description

The US defense expenditures which are compared to the estimated dollar cost of Soviet military activity are taken from official US documents that presumably provide an exhaustive listing of US military spending. In contrast, the CIA process for estimating the dollar value of Soviet activity (and also its ruble value) begins with intelligence observation and analysis to develop a detailed inventory of the numbers and kinds of weapons and units that make up the Soviet armed forces. These physical elements of the Soviet force, and the other material support and activities which can be imputed to them, are dollar costed by a variety of means to arrive at the estimated dollar aggregate. In principle, therefore, the US expenditure data is exhaustive, while the estimated Soviet data can only seek to be so. In fact, the CIA excludes certain significant categories of US expenditures (for example, those for military aid and civil defense) where the intelligence base is insufficient to permit a reasonable estimate of Soviet counterparts. However, there remain a number of areas in which the current estimates may under-represent the physical resource base from which the dollar estimates of Soviet military activity are derived.

2. Exclusions from the Soviet Base

As cited above in the burden section there are several areas where significant resource inputs seem to be omitted from the Soviet estimate, including resources provided by non-defense Ministries in support of military activity. Some of these contributions are captured, but the amount of civil-military interaction is so extensive in the Soviet Union that it is doubtful that all of these have been adequately reflected. The additional resource costs entailed by dispersing civilian oriented production units for national defense purposes stands as another relevant but conceptually difficult area. We have also argued that the resources required for the Soviet buildup along the Chinese border easily may be half again as much as indicated within the current estimates. The cost factors for these forces have not adequately reflected the

location and climactic conditions which suggest that forces stationed in the Far East are significantly more expensive in real terms than their counterparts in the western regions of the Soviet Union.

Past estimates of Soviet defense manpower contain serious uncertainties, particularly with regard to civilian and military personnel in command and general support activities. A recent intelligence community review focusing on these areas indicates that, when all forces including the militarized security forces are considered, past estimates have understated the military personnel involved by approximately 600,000. Although this correction will presumably be incorporated in forthcoming sizing and burden analyses, the omission from previous studies illustrates the type of bias which the contrast in basic methodologies makes probable.

3. Non-defense Inclusions in the US Data

Whereas the dollar costs accorded to the Soviets are those related to observed military activities, the US documentary data includes DOD expenditures which are not related to military capability, or which make only a limited and indirect contribution. Many of these are associated with certain manpower policies. It is clear, for example, that retiree pensions and dependent and retiree health, education and other benefits do not contribute significantly or at all to current military capability. Soviet policies in these areas entail significantly lower dollar costs than the corresponding US programs, and this contrast creates difficulties in interpreting the sizing comparisons. These problems will be discussed in more detail in Section D2, below.

There are a number of US DOD expenditures which are explicitely in support of US non-defense values, such as expenditures for environmental, conservation, and equal opportunity programs, and civilian skill transition training. Such expenditures may not be individually large, but in so far as there are Soviet counterparts they probably are not included in the estimates of Soviet dollar defense costs which are compared to the US data. Of course, there are activities by the Soviet forces which are directed toward principally civilian programs in Soviet society. Such activities are known as "Sheftsvo" and include, for example, military troops and equipment assisting in crop harvesting and certain construction projects. Not all Sheftsvo activities are totally civil oriented, however, as troop involvement in the construction of the Baikal-Amur-Magistral railroad near the China border illustrates. Nonetheless,

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a more adequate comparative sizing analysis would attempt to eliminate such civilian oriented activities from both the US and the Soviet data.

4. Cost Estimating Relations and the Complexity of Soviet Military Hardware

The dollar costs of most Soviet major weapons--aircraft, missiles, and ships--are estimated through the use of cost estimating relationships (CER's) which represent what it would cost in the US to produce the physical and performance characteristics of the Soviet weaponry. During most of the post-WWII period Soviet weapon development appeared to incorporate technology which was relatively unsophisticated compared to US counterparts. Soviet design changes were viewed as evolutionary, drawing heavily upon on-the-shelf components and often involving little more than modifications of existing systems. As a result, Soviet weapons have been described as "simple, rugged, and easy to maintain", and as cheaper in dollar terms to develop, produce and maintain than their US counterparts. Indeed, when actual Soviet equipment was attained, in some cases it was less sophisticated than had been assumed and therefore cost less in dollar terms than had been estimated.

This presumption of relatively unsophisticated weaponry may no longer be justified. Recent analyses indicate that the major Soviet land armaments and tactical aircraft introduced since 1965 are substantially more complex than initially estimated, and substantially more complex than the weapons they have replaced. There are some cases in which the increased complexity and associated increase in capability entail lower dollar costs. But in most cases the unit production costs for the present generation of Soviet land arms are substantially higher than for older equipment performing similar missions. Some new weapons--such as the ZSU 23-4 anti-aircraft gun and the BMP infantry combat vehicle--are far more costly in dollars than their closest US counterparts.

It is not known how widespread may be this trend toward increased sophistication in Soviet weaponry. Its cost implications will extend beyond procurement costs to the training and maintenance structures required to support more advanced weaponry, and the effects in these areas are also uncertain. But it is certain that we have underestimated the complexity and capability of specific Soviet weapons. As a result, the CER's used to determine the dollar costs of these systems have resulted in significant underestimations.

C. Aggregation Problems: Dollars, Rubles, and "Bias"

1. The Concept of Size

The concept of the size of a military program is inherently a matter of definition. In the dollar-cost estimates of the size of Soviet military activity, the structure of US prices has been

used as the common unit of measure with which the disparate physical elements of Soviet activity are aggregated. But, in principle, Soviet ruble prices could be applied to the physical elements of both the US and the Soviet military for comparative sizing purposes. For a number of practical reasons the dollar base has been used: the US audience is more familiar with aggregates expressed in dollar terms; we know much more about the structure of US prices than about that of Soviet ruble prices; and the use of dollars requires that only one military activity (the Soviet) needs to be aggregated, whereas the ruble base would require that two aggregations be done (Soviet and US). A ruble based comparison would face such extreme practical problems that the degree of uncertainty associated with the result would be large in relations to that felt regarding the existing dollar comparisons. Given the magnitude of these problems it seems more fruitful to concentrate upon improving the dollar based comparison before devoting the extensive manpower required to produce reliable ruble based comparisons.

It is true that the relative size of the two military activities as portrayed by a ruble based comparison would probably differ from that indicated by the dollar comparison; indeed, even the time trend in relative size may differ. This is an inescapable problem with index numbers in general, and derives in this specific case from two empirical factors: first, that the forces of the Soviet Union and the United States are composed of military elements in different proportions; and, second, that the relative dollar prices of these elements differ from their relative ruble prices. One would expect as a general consequence that the ratio of Soviet military activity to US military activity would be higher when the indexes are based on dollar prices than when they are based on ruble prices.

Although the trend in a ruble based sizing comparison in principle can differ from that shown in a dollar based comparison, such a contrast is not necessary. Moreover, preliminary and rough comparisons in ruble terms reveal the same general relative trend as the dollar based comparisons.

More importantly, such differences as could appear would not necessarily be significant for the policy issues to which the comparisons of military size relate. But if the two approaches should have policy implications which conflict, the reaction should not be one which attempts to discredit sizing comparisons as an analytic approach, nor, necessarily, any of the particular indexes involved.

After all, any index is a short-hand aggregate representation of a number of disparate elements which are considered too numerous and too complex in their interrelationships to be considered individually as a normal rule. In certain cases the aggregation of an index number or index comparison may obscure the underlying factors relevant to a particular question. In such cases, as in cases of conflict between indexes in general, alternative analyses should be available to aid in interpretation. Therefore, although comparative sizing analyses in ruble terms would be useful if they can be done with adequate reliability, we also need further supplementary measures of size. Especially useful would be comparative real magnitude time series of US and Soviet annual procurements of major weapon systems (missiles, ships, aircraft, land armaments; each broken into significant functional categories). If such measures were presented within the sizing documents, the interpretation of the value-aggregated data would be enhanced.

## D. Dichotomies in Military Practices and the Concept of Military "Size"

### 1. Statement of Issue

The fact that the concept of size is open to various definitions presents a range of complexities even after accepting a particular value structure to use as the aggregation measure. In particular, the dollar sizing of the Soviet force is not a simple matter of using straight forward or obvious dollar procurement costs to aggregate the various physical elements involved. Within any military establishment, the costs which are functionally related to the quantity of a particular military resource go far beyond the procurement costs of that resource, and are determined by the military practices which define how the resource is supported, deployed, maintained, trained or operated. Such practices are often significantly different between the US and the Soviet military, and the dollar size estimated for Soviet defense activity may vary widely depending upon whether the US or Soviet practices, or some mix of the two, are assumed in the costing methodology.

It might be assumed that the appropriate practices to assume for costing the Soviet force are those followed by the Soviets; after all, the Soviet sizing is in some sense an attempt to represent in a manner comparable to US data the real resources which the Soviets actually allocate to their military, and these will be determined by the way the Soviets in fact use their forces. But the issue may not be so clear. It will help to clarify the point in question by referring to two quotations from the relevant CIA document which describe the methodology and interpretation of the Agency's dollar cost of the Soviet force.

"Estimated dollar costs of the Soviet defense effort are estimates of what it would cost the US to purchase the same military equipment and supplies; pay the same number of people; and carry on the same types of RDT&E (research, development, testing, and evaluation) and operations and maintenance programs as the Soviets. Conceptually, the Soviet defense program in this context can best be considered as an alternative US defense program."

--SRIR 74-7, p. 5, SECRET

"Estimated dollar costs of the Soviet defense effort show what US expenditures would be if the US pursued the same development, investment, and manpower programs as the Soviets and operated the resulting forces as the Soviets do. In essence, the dollar estimates present the Soviet military force as an alternative US force equipped with Soviet weapons and manned, operated, maintained, and improved on the basis of Soviet practices and priority decisions."

--SRIR 74-7, p. 13, SECRET

Although care should be taken in the exegesis of such summary quotes, the implication of these statements is that Soviet practices are the basis of the dollar costing methodology. But is this consistently the case? How are the dollar purchase prices of Soviet equipment determined? How is it determined what the United States would have to pay to raise the same number of military personnel as the Soviets (active duty? reserves? civilians?)?

In the case of military hardware the general procedure is to develop, on the basis of the equipments' particular physical and performance characteristics, cost estimating relationships (CERs) indicating what it would cost US firms to produce that Soviet equipment in the US. Here, clearly, US practices are embedded in the estimating process. Those involved in the CERs are US industrial practices, not military, but their inclusion causes the resulting estimate to diverge from a representation of the resources which the Soviets actually expend on military activity. The point here is that the actual estimation process contains a mix of Soviet and US practices which leaves the interpretation of the final dollar cost estimate of Soviet military activity unclear. A more specific--and perhaps more significant--example of this mixing of US and Soviet practices, and the resulting ambiguity of the estimates, will be provided in the following section.

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However, none of these remarks should be taken as arguing that the CIA estimates are "wrong" due to their assumption of a mix of US and Soviet practices. Given the essentially defined nature of the "size" of military establishments, the CIA methodology can and does provide useful insights into the status and trends of the US-Soviet military competition. But the following objections can be made. First, the specific mix of assumptions embodied in the current CIA estimates is only one of a set of legitimate assumption mixes. The documents which contain these estimates present them without adequate acknowledgement of the ambiguity of the "size" concept, and without any indication of the differences in magnitude of the Soviet estimate which would follow from certain specific alternative practice assumptions. Second, as will be illustrated below, the particular mix of US and Soviet practices assumed in the current estimates tend, on balance, to provide a dollar cost estimate for Soviet military activity which is relatively low; low, that is, in relation to many legitimate alternative estimates which could be made. And, third, that the current Soviet estimate under-represents relative to US defense expenditure what the US would have to spend in order to replicate within the existing US context the physical dimensions and operational capabilities of the Soviet military.

2. Dollar Costing Soviet Manpower

The procedures used to dollar cost Soviet manpower provide a striking example of how US and Soviet military practices are mixed within current estimates, with significant consequence for the resulting Soviet figure. Reference to the first quotation, above, indicates that the estimate represents "what it would cost the US...to pay the same number of people...as the Soviets." But how inclusive is this concept of "pay"? How inclusive should it be to achieve a dollar estimate of the Soviet force which is comparable to US defense expenditures for a variety of purposes?

These questions do not have clear-cut answers. Is the sizing estimate to be interpreted as a dollar price aggregation of the actual resources allocated to Soviet defense? Or is it to be interpreted as the dollar cost required to replicate the physical elements and operational capabilities of the Soviet force in the United States? Both interpretations can be found in the literature on the subject; the former seems most consistent with interpretations of international economic comparisons in general, the latter most consistent with the official interpretation as represented by the quotations on page 18. Both are reasonable interpretations. Unfortunately they seem to imply conflicting assumptions regarding the particular mix of US and Soviet practices which should form the basis of the Soviet dollar estimate. The conflict can be illustrated by the present methodology used to estimate the dollar costs

associated with Soviet military manpower.

The CIA methodology begins with the calculation of US per man pay factors for each US service by dividing total pay, allowance, and food expenditures for each service by its respective total manpower. The factors are then applied to the manning levels of the corresponding Soviet services to determine the dollar cost of Soviet military personnel (SR IR 74-7, pp. 8-9, SECRET). As a preliminary point it can be noted that already a selection has been made between US and Soviet practices, i.e., the assumption of the US rank structure and its associated relative pay scale. In essence the assumption transforms the actual Soviet proportions between officers, NCO's, and enlisted personnel into the different proportions of the US system. Given that the choice of one rank structure rather than the other will have an influence on the resulting dollar size estimated for the Soviets one can reasonably ask why the particular choice was made. Are the differing rank proportions and salary differentials thought to be determinants of military capability, more or less consciously selected in relation to the mission emphases of the two military establishments? Or are they unrelated to capability, and more the product of the social and economic environments in which the two systems are embedded? Even if the answers to these questions are ambiguous they seem to be important considerations for the interpretation of the sizing estimates. Their relevance can be illustrated by exploring further the concept of the dollar cost of Soviet manpower.

The manpower costs reflected by the manning cost factors discussed above are only a limited portion of the costs which are functionally related to the quantity of manpower in any military system. Consider only an illustrative listing of other activities in which the resources expended are determined wholly, principally, or in perceptible part by manpower levels: training, personal equipment, transportation, professional education, active duty health care; dependent health care, overseas services for dependents (housing, transportation, education), retiree pension, health, and other benefits In estimating the dollar cost of these activities for the Soviets, the CIA assumes Soviet practices, reflecting in dollar terms the actual resources which the Soviets allocate in those areas.

For the activities listed before the semi-colon this "Sovietization" seems appropriate. Such activities presumably are determinants of the military quality of personnel. The differences between US and Soviet practices in such areas can be assumed to reflect the different mission emphases of the two forces, and the different tradeoffs

between quality and quantity which each side has made in pursuing military capability, however defined. For either interpretation of the sizing analyses it seems appropriate that such mission and capability related activities should be estimated on the basis of Soviet practices.

But the same logic does not apply to those activities which follow the semi-colon. Services and other benefits accorded dependents and retirees in either military system have no relation -or only the most tangential relation--to military capability or mission emphasis. They constitute a part of the real wage of military personnel. Differences in these payments between the US and Soviet military are rather to be explained by the wide range of social and economic characteristics which define the different national contexts in which the military systems are embedded; for example, the contrast in the general standard of living and the corresponding difference between the real wage needed to induce people into military service as opposed to that required to sustain a largely conscript force. Yet US practices in such areas influence the functional relation between the quantity of military personnel raised in the US and the magnitude of manpower related costs. In essence, a US military person enters US defense expenditures with a dollar weight determined not only by those practices which relate to military capability, but also by those which reflect the non-defense characteristics of US society. Soviet practices which determine the Soviet counterparts of these dependent and retiree programs cost less in dollar terms per man than do the US programs. Consequently, to assume, as the CIA does, Soviet practices in such areas, is to underweight the dollar cost of Soviet manpower relative to US manpower, and to do so in a way not representative of quality differentials. The resulting dollar size of Soviet military activity therefore underestimates what it would cost to raise a Soviet manpower level within the US system.

Let me summarize the preceding argument. First, in many cases unrelated to capability, Soviet practices provides fewer benefits and absorbs fewer resources than the corresponding US practices, and therefore result in a lower dollar estimate than if US practices were assumed. Second, if the Soviet manpower level was raised within the existing US system, the higher costs associated with US practices would be required. Third, the cited expense categories have only the most indirect--if any--relation to military capability. Consequently, the assumption of these Soviet as opposed to US practices can hardly be justified as reflecting the quality/quantity trade-offs which other practice dichotomies may represent. And, fourth, US military personnel are entered into US defense expenditures with

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dollar weights which reflect exhaustively the full range of US manpower practices. Therefore, to dollar cost Soviet personnel by in part reflecting Soviet practices with lower dollar costs than the corresponding US practices is to under-represent the quantity of Soviet manpower relative to the quantity of US manpower reflected in US defense expenditures.

In short, the particular mix of US and Soviet manpower practice assumptions used in the current estimate underestimates (1) the quantity of Soviet military manpower relative to US military manpower, or, what is an alternative interpretation, (2) the dollar cost required to raise in the United States a military manpower level equal to that of the present Soviet force.

3. Response to the Practice Dichotomy Issue

It was said earlier that sizing analyses do not measure military capability, and this point is maintained. However, they are one type of input relevant to judging the adequacy of US defense activities, and this question does require complex considerations of capability. Although exceptions are probable, it seems intuitively sound to argue that the relation between "size" and capability is positive. That is, most persons exposed to the sizing analysis, on observing an increase, say, in US defense expenditures relative to the estimated dollar size of Soviet activity, would view this change as prima facie evidence that the US has increased its capability relative to the Soviet Union. Given this tendancy to associate positively changes in "size" with changes in capability, it is important that the estimate of the size of Soviet military activity avoid the bias caused by the use Soviet practice assumptions which, while unrelated to capability, entail resource requirements with different dollar valuation than the corresponding US practices. Such "Sovietization" will distort what relevance to capability, and to the adequacy of US defense efforts, the sizing estimates reasonably may be interpreted to possess.

We have discussed at length one example of this bias. Others are pervasive. Many are related to personnel factors, such as the creature comforts considered necessary for shipboard personnel which influence the differences between internal and external configurations of US and Soviet naval vessels. Others derive from other societal influences, such as those which may constrain practicable US mobile ICBM concepts to a limited and more dollar costly subset of the range of alternatives open to the Soviet Union. Although such influences do not bear all in the same direction, the differences between the US and Soviet society in

general suggest that, on balance, the effect is to underestimate the extent of Soviet military activity relative to US defense expenditures.

The issue is complex in concept and its treatment difficult in practice. Yet there are major examples, such as that relating to personnel costs, where alternative sizing calculations can usefully be made: one "Sovietized" as in existing estimates, another (or others) employing a mix of US and Soviet practice assumptions selected to eliminate those practice dichotomies which do not bear on military capability. Consistent with a theme which has run throughout this paper, the policy issue to which sizing analyses are directed would be better served if several complimentary estimates of Soviet activity were available and appropriately documented.

E. Appraisal

The foregoing remarks have outlined a number of areas where there appear to be major conceptual or empirical shortcomings in the existing dollar cost estimates of Soviet military activity. On balance, the current estimates tend to underestimate the size of the Soviet activity relative to US defense expenditures. Little confidence is held, therefore, in the absolute magnitude of the Soviet dollar figure specified by the CIA documents.

However, the analytic uncertainties which have been discussed above do not appear to negate the basic relative trend between the two forces which is indicated by the comparative dollar cost time series. In real terms the Soviet defense effort has undergone a steady and significant expansion since at least 1964, whereas the US effort has declined from 1968 through 1973. In constant dollar terms, the annual allocation of resources to Soviet military activity has exceeded its counterpart in the United States in every year since 1971, inclusive, and in calendar year 1974 exceeded US defense expenditures by at least 20 percent.

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28 August 1975

CURRENT AND PROJECTED NET ASSESSMENT PROGRAM

The major objective of the net assessment program is to support the Secretary of Defense by supplying assessments of military balances, contrasting US and Soviet strengths and weaknesses, major trends and their underlying causes, and emerging problems and opportunities. Additionally, we wish to establish and institutionalize within DOD net assessment as a distinctive style of analysis. This will require the development of improved and appropriate methods of comparison over the course of the next several years.

The Secretary has indicated special interest in the following topics:

--Comparative Economics of US and Soviet Military Programs and Institutions

- Broad concern is for the comparative efficiency of US and Soviet military efforts. The US must have an effective, efficient military and industrial establishment over the longer run and to have good strategies for competing with the Soviets in developing and maintaining military forces.

- A more comprehensible and credible job of estimating the comparative size of US and Soviet defense efforts must be available.

- Assessments are needed of how well we are doing in efficiently competing with the Soviets. What is driving the US costs of competing up? Where are the major areas of future US technological advantage? How can we exploit areas of strong US technological or military economic advantage?

--The World-Wide Military Balance

- Assessments are needed of the current state of the world-wide balance, trends, emerging problems and areas of advantage:

  o Key sub-balances are:

    . Strategic Nuclear

    . Nato Central Front (and Flanks)

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- Maritime (specifically to include land-based air power)

- Comparative capability to project military power to potential crisis areas. We have been far ahead here but problems may emerge in the next decade given trends in Soviet forces and increasing foreign base availability.

A selected list of specific projects underway or contemplated follows:

COMPARATIVE ECONOMICS

1. Project 186. Comparative Economics of US and Soviet Military Programs. This project is aimed at comparing US and USSR military programs and forces, with respect to resource allocations, roles and missions, and capabilities achieved.

a. Phase I (Ground Forces)

b. Phase II (Tactical Air Programs)

2. Comparative Sizing of US and Soviet Defense Program (Joint CIA/OSD study). The objective of this project is to produce credible and useful comparative measures of the size of the two military programs.

a. Real Military Resource budget comparisons. This project focuses upon certain inconsistencies in the present comparative sizing analyses of US and Soviet military expenditures. The general thrust is to improve the accuracy with which the analyses represent the real resources devoted to defense by the two countries.

b. Comparison of US and Soviet procurement of military hardware. This project is developing consistent US and Soviet real magnitude time series for major military hardware categories. The product is intended to supplement the comparative defense expenditure analyses.

c. Documentation of CIA Strategic Cost Analysis Model. As an aid to understanding and improving present techniques used to develop Soviet defense expenditure estimates, the CIA is to produce a complete review and documentation of the estimation methodology.

3. Rand Projects

a. Long term competition characterization and analysis. This is an attempt to compare the way the US and USSR conduct their continuing competition to produce and maintain military forces. It should also produce methods of analyzing strategies for competing and to assess the present status and trends in the competition. How does one measure or assess good strategies? Is there a rationale for cost imposing strategies?

b. Costing of Soviet military programs. This is primarily a search for alternative means of assessing such costs. A specific study examines the extraordinary costs of the Soviet military buildup along the Sino-Soviet border.

4. Soviet Military Manpower. This project encompasses a comprehensive set of studies which compare the Soviet and US military manpower environment, practices, and potential problems. The studies are seen as inputs into the analyses of the relative efficiency of Soviet and US manpower practices, their impact upon present and future defense expenditures, and the abilities of the two countries to sustain large scale military forces over the long run. Representative topic areas are specified below.

a. Shefstvo and its US counterpart. (Military Shefstvo is the use of military resources for civilian purposes in the areas of economic and political-socialization objectives.)

b. Civilians and uniformed women in DOD and MOD

c. Pre-military training programs

d. Studies of Officer Corps management

e. Studies of Enlisted Force management

f. Economic/demographic constraints on military manpower

5. Sophistication Study. This study was undertaken to check the hypothesis, sparked by some Soviet equipment captured in October 1973, that newer Soviet equipment is far more sophisticated, complex, and expensive. Also of interest is the total (direct and indirect) impact on Soviet program costs.

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COMPARATIVE TRAINING AND MAINTENANCE STUDIES

These projects are comparative examinations of US and Soviet training and maintenance practices for major weapon systems. These aspects of military activity have significant impact on the effectiveness with which weapon systems can be employed. The project includes studies of US and Soviet pilot training, tactical aircraft maintenance, tank crew training, tank maintenance, naval surface ship training and maintenance.