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*Improving forecasts***PREDICTING THE SOVIET STRATEGIC THREAT***

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The most common measures of the Soviet intercontinental attack force involve the size of the force. Since the early 1970s, however, the aggregate size of the force has been governed by the SALT agreements, so predictions of it usually have been accurate. In this arms control environment, issues of force modernization have become as important as issues of force size. To predict the Soviet threat, US analysts today have to predict how quickly the Soviets will improve their force. These improvements take the form of new technologies and the new weapon systems that use them, and US analysts thus have to predict the rate of force modernization. Consequently, new measures of the Soviet strategic threat have been developed that capture the issues of force modernization, and these new measures have been used to evaluate the forecasting record on modernization. The new measures focus on the number of weapon systems that enter the Soviet force during some period rather than the total number existing in the force at the end of the period.

All of the National Intelligence Estimates (NIEs) on Soviet strategic forces have offered alternative projections based on various assumptions about the general pattern of Soviet behavior, but some consistent criteria were needed to construct a unified forecasting record. Most NIEs since 1970 have contained two alternative sets of forces to incorporate both possibilities with regard to arms control: "SALT" force projections within the numerical limits and "No-SALT" force projections exceeding those limits. Because the Soviets have basically adhered to the key numerical SALT limits, we used the SALT force projections for our evaluations whenever they were available. We used the unconstrained force projections only when an NIE did not contain any SALT forces.

Similarly, the NIEs expressed uncertainty in the future Soviet level of effort by presenting more possible force projections. The NIE authors first constructed a "Moderate" or "Best" force that was consistent with past Soviet efforts; next, they constructed "High" and "Low" forces as excursions on either side of the first. In general, the high and low forces reflect high and low levels of effort and success with development and deployment. We used two forces from each NIE, a high force and a low force. Some NIEs did not contain a force labeled "Low," and, in those cases, the force labeled "Moderate" or "Best" was used.

The Forecasting Record

For this evaluation, we introduce the parameter new Strategic Nuclear Delivery Vehicles (SNDVs) as an aggregate measure of the Soviet intercontinental attack force. It is the number of new ICBMs, new SLBMs, and new heavy bombers entering the force each year. This measure has been implicitly predicted in each NIE, but it has not been emphasized. It also has been implicitly measured by National Technical Means each year. The rate at which new SNDVs enter a force is a measure of how quickly the threat is growing, as well as a measure of the level of effort being applied to upgrade the force.

* This article is based on a Research Paper published by CIA's Office of Soviet Analysis in April 1989.

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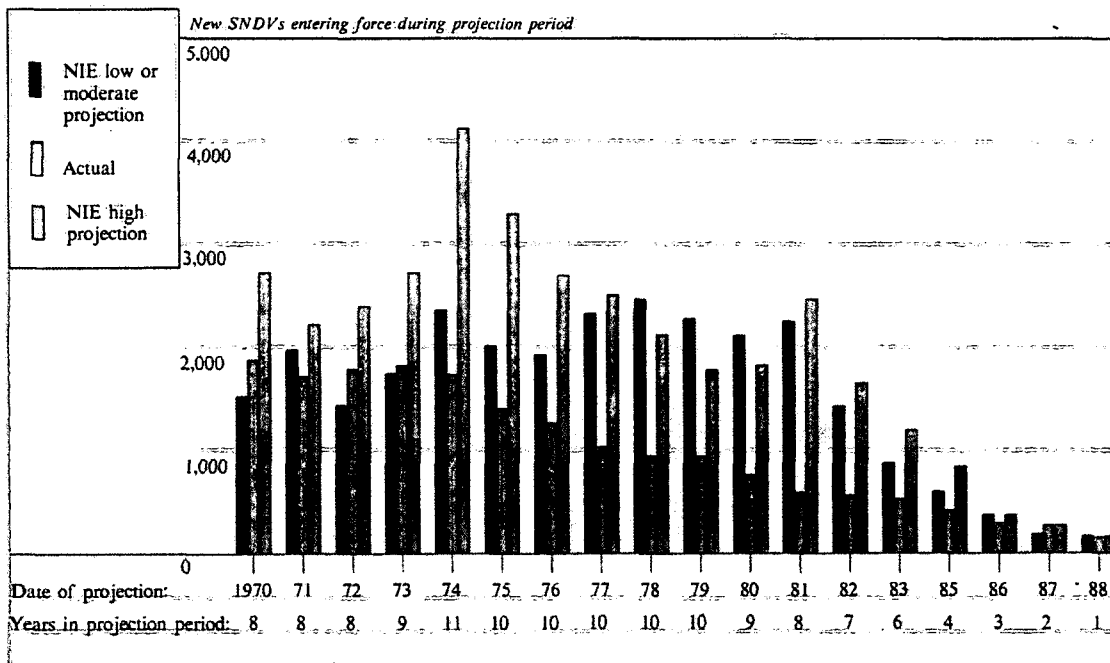
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Figure 1 compares the number of new SNDVs projected in each NIE from 1970 through 1988 to those that were actually deployed. The horizontal scale shows NIE dates and the number of years into the future each comparison extends. The number of years compared is either the NIE's total projection period or the number of years to 1989, whichever comes first. Comparisons begin in 1970 because the Soviets had deployed most of their initial intercontinental attack force by then; from that point on, they have been modernizing that force. The heights of the bars represent the numbers of new weapons entering the force during each NIE's specified projection period. The blue and green bars are the low and high projections, respectively, and the red bars in between are the actual historical deployments. For example, the chart shows that the 1970 NIE projected that during the next eight years the Soviets would deploy between 1,521 and 2,726 new SNDVs and that they actually deployed 1,880 new SNDVs.

Figure 1
Forecasting Record on Modernization: New Soviet SNDVs



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The High force projections always depicted a modernization rate in excess of what actually occurred, often by a factor or two or more, even though for most of them the total SNDV count was assumed to be limited by the SALT agreements. In all of the NIEs from 1974 through 1986, the modernization rates derived from the Low/Moderate force projections also exceeded actual Soviet deployments. In some cases, even the Low/Moderate projections of force modernization were high by a factor of two.¹

The Low/Moderate forces in Figure 1 are the lowest forces projected in each NIE. However, as the name implies, not all of the Estimates contain forces based on an assumption of a "low level of effort." The 1971 lowest force projection is described as a "likely" force. The

¹ The heights of the bars in Figure 1 generally increase from 1970 to 1974, then decrease to 1988. These trends should not be interpreted as changes in projections or history from year to year. The increase is due to the lengthening of the NIE projection period from 8 to 11 years, while the decrease is due to the gradual reduction in historical data available as one approaches the current year.

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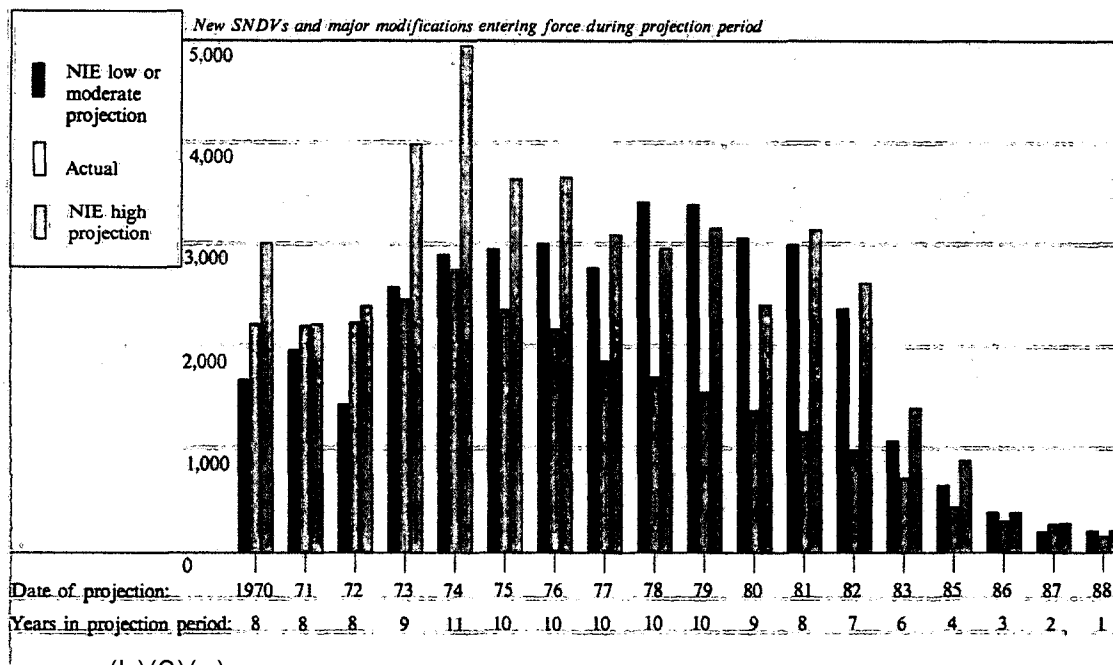
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1977-1979 lowest projections were labeled "Moderate," and they were based on the assumption of a moderate level of effort and technological success. The lowest force projections in the 1981 and 1982 NIEs were based on the assumption that the SALT era was nearly over, so they cannot properly be interpreted as low-effort or SALT forces. The 1983-1986 lowest force descriptions are similar to the earlier descriptions of "moderate" forces because they contain statements such as "a pace reasonably consistent with that observed over the past 10 years." The series of high force projections does not suffer from such ambiguity; every NIE has at least one force based on a high level of effort.

The fact that about half of the Low/Moderate forces were intended to be "Moderate" rather than "Low" does not explain why every one of these force projections turned out to be high in terms of modernization. Theoretically, the record on these "Moderate" forces should have been equally split between high and low. Nor does it explain why several of them were high by more than a factor of two. Regardless of whether the frequent omission of a true "Low" force was proper or improper, the Intelligence Community did not project modernization rates for Soviet intercontinental attack forces accurately from the mid-1970s to the mid-1980s.

The conclusion reached from the comparison in Figure 1 requires further justification, to demonstrate that it is not merely a consequence of our procedures or assumptions. To that end, our inquiry is broadened to include, in addition to new systems, the major modifications to those systems that the Soviets routinely deploy later. These results are shown in Figure 2. The modernization rates derived from the High force projections again exceeded the actual modernization rates every time. In all of the NIEs from 1973 through 1986, the Low/Moderate force modernization rates also exceeded the actual modernization rates. Thus, the problem is not simply one of interpretation of the degree to which the Soviets would modernize each weapon system. If some of the major modifications had been labeled follow-ons or vice versa, the trend would still be evident.

Figure 2
Forecasting Record on Modernization: New Soviet SNDVs and Major Modifications



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Each aggregate projection is the summation of many individual weapon system projections, each of which is composed of an Initial Operational Capability (IOC) date projection and a deployment rate projection. These two component projections were compared to historical data for all the intercontinental attack weapon systems deployed since 1970. The record on the first component, IOC dates, is summarized in Table 1. Ten of the 17 weapon systems were generally predicted to reach IOC earlier than they actually did. In six cases, the projections were fairly accurate, while in only one case were the projected IOC dates later than the actual Soviet performance. Thus, since 1970 the NIEs have generally overestimated IOC dates of new Soviet weapon systems.

Table 1. The Record on IOC Dates Since 1970

Projected IOC Generally Early	Projected IOC Generally Accurate	Projected IOC Generally Late
SS-16*	SS-17 or 19	Bear H
SS-17 follow-on*	SS-18	
SS-18 follow-on	SS-25	
SS-19 follow-on*	SS-N-8	
SS-24	SS-N-18	
SS-N-6 follow-on*	SS-N-23	
SS-N-8 follow-on*		
SS-N-17		
SS-N-20		
Blackjack		

* IOC never actually achieved

There were three specific reasons for the trend of early IOC date projections. First, some weapon development programs were overestimated because US analysts misperceived Soviet military requirements. Second, sometimes the Soviets adjusted their weapon development plans for arms control reasons. Third, the Soviets sometimes delayed or canceled a development program in progress because it had serious and expensive technical problems. Often, two of these reasons were operative on the same weapon system at the same time.

In addition to predicting when a new weapon system will reach IOC, analysts have to project that system's deployment rate. Only six Soviet intercontinental attack weapon systems can be used to evaluate the record on new system deployment rates since 1970 because they have been in the field long enough—at least five years—to provide adequate historical data. In three cases the projections were generally high, in two cases the projections were generally successful, and in one case the projections were generally low. These results are summarized in Table 2. Of course, all the projected systems from Table 1 that did not actually achieve IOC had deployment rates equal to zero, so the projections of those systems' deployment rates turned out to be high.

Table 2. The Record on Deployment Rates Since 1970

Generally High	Generally Accurate	Generally Low
SS-17	SS-18	SS-N-18
SS-19	SS-N-8	

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The principal cause of the trend of high deployment rate projections was the use of the third-generation ICBM program, the SS-9 and the SS-11, as a model for the fourth-generation ICBM program, the SS-17, SS-18, and SS-19. Current projections of the fifth-generation ICBM program do not use the fourth-generation ICBM program as a model to such an extent, but there is not enough historical data to date to evaluate these projections.

Popular Notions

When one first recognizes the consistency of the quantitative overestimates, it is intellectually tempting to rush to an obvious explanation, such as analysts "playing it safe" by shading their projections toward the high side or analysts bending under bureaucratic pressure.

While it might be "safe" to shade the high force toward the high side every year, to make low force projections "safe" analysts would shade them in the opposite direction, toward the low side. The record does not show both high forces that are very high and low forces that are very low, which is what one would expect if analysts had been "playing it safe." In addition, during the late 1970s, President Carter was negotiating and then seeking ratification of the SALT II treaty. There is certainly nothing "safe" about shading the SALT-limited projections toward the high side when the Administration is committed to a treaty. Finally, even if we could identify some specific instances of "playing it safe" by yesterday's analysts, this knowledge would not necessarily inspire tomorrow's analysts to perform better.

Regarding the second popular notion, the military intelligence services, civilian policy-makers, legislators, and Administration officials occasionally bring strong views to bear on the format and sometimes the content of the NIEs. This practice is well known in the Intelligence Community, and it is generally understood to be part of the working environment. It reflects the legitimate desire to make NIEs truly "national" by providing a forum for alternative views and addressing a wide variety of policy concerns.

For example, the Team "B" Experiment in Competitive Analysis, conducted from June through December of 1976, addressed the concern that the NIE 11-3/8 series might have been significantly underestimating the Soviet threat. This exercise was designed from its inception to apply pressure on the authors of NIE 11-3/8, as evidenced by the following quote from one of the Team "B" reports:

The mandate of Team "B" was to . . . determine whether a good case could be made that Soviet strategic objectives are, in fact, more ambitious and therefore implicitly more threatening to US security than they appear to the authors of the NIEs.

However, we find no evidence that this pressure produced any substantial effects. The projections of the Soviet force modernization rate did not increase dramatically in the wake of the Team "B" experiment, and US perception of Soviet strategic doctrine had already begun to change before the experiment. The projected threat to Minuteman silos did increase at this time, but this change was due to new evidence, not Team "B" analysis.²

The numerous footnotes and alternative views taken by the various intelligence agencies in the texts of the NIEs year after year also indicate that they often did not achieve the degree

² In the spring of 1978, DCI Stansfield Turner charged NIO/SP Howard Stoertz, Jr. with "running scared of Team 'B'," when Stoertz proposed changing the estimates of future Soviet ICBM accuracy, thus increasing the expected threat to Minuteman. Stoertz denied bending under any such pressure, and he showed Turner the evidence for the revised assessment. This incident is significant because it illustrates how important it was to those involved to remain objective and to base the NIEs strictly on evidence.

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of influence they desired. Finally, as is the case with playing it safe, even if we could identify some specific instances of unwarranted influence of bureaucratic pressures on yesterday's NIE authors, this would not preclude tomorrow's authors from repeating the error.

Corrective Actions

There is no procedure that analysts can use to make correct projections every time. Inevitably, some intelligence projections will be wrong. Nevertheless, our study of the NIEs has provided some insights into the projections process, and several steps recently have been taken toward projecting aggregate modernization more accurately.

First, a low force projection has been restored to the NIE series. In the 1987 NIE, we were able to use some of what had been learned in this study about the trend of overestimates in the aggregate number of new SNDVs. For this NIE, the decision was made to include a low force projection, which had happened only once in the previous 10 years.³

Second, increasing credence is being given to aggregate economic factors. Evidence on the Soviet economy usually has provided a restraining influence, but the Intelligence Community believed that the Soviets placed a higher priority on achieving their strategic objectives and that those objectives were ambitious. Beginning in the mid-1970s, the NIEs contained statements such as, "We believe that economic difficulties will have little or no impact on Soviet strategic programs during the period of this Estimate" and that these programs were intended to achieve a "capability to fight and survive a nuclear war."

In the early 1980s, evidence became available that the Soviet economy had deteriorated dramatically in the second half of the 1970s. But even though analysts realized the depth of Soviet economic difficulty, they still saw little reason for it to influence their projections. They continued to emphasize the Soviets' desire for "superior war-fighting capabilities" and did not "believe that domestic economic difficulties (would) bear significantly on the size and composition of future Soviet strategic forces because of the high priority the Soviets place on such forces."

In 1985, the NIE authors began to reevaluate the impact of economic factors and consequently the priority of strategic programs. It took another two years, however, before the reevaluation was explicitly translated into a force projection. The recognition that in some circumstances Soviet economic problems could have a major impact on future forces was an important consideration in the decision to restore a low force projection to the NIE series in 1987.

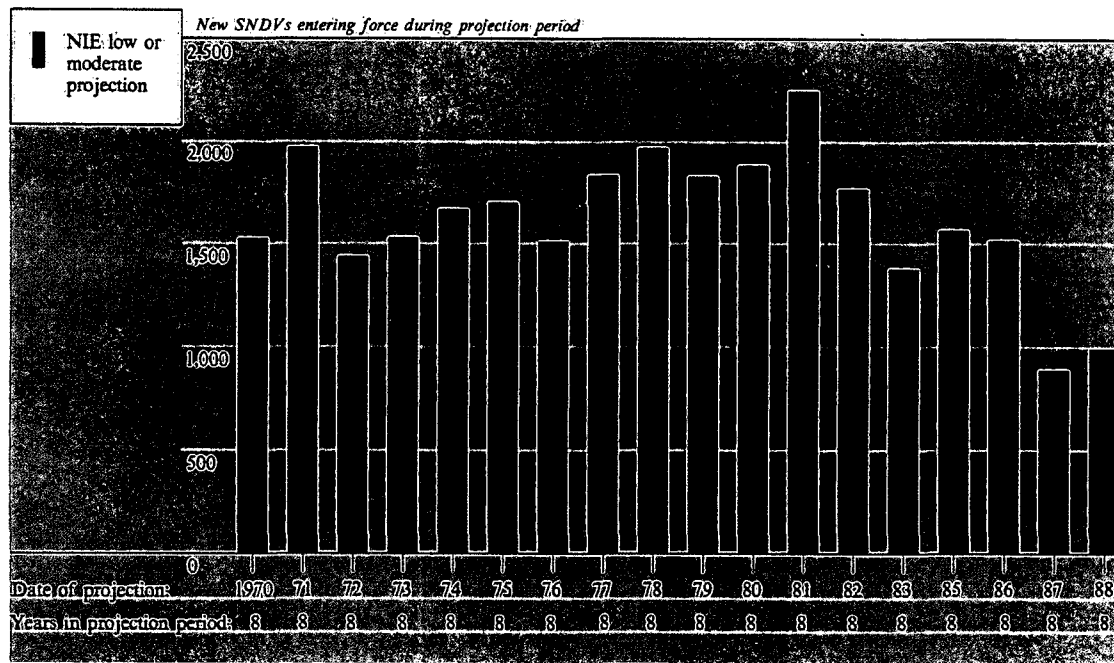
As a result of these two corrective actions, the 1987 NIE's low force projection is truly low. Figure 3 shows that it contains an aggregate modernization rate measured in terms of new SNDVs that is lower than any other NIE published during the SALT era. A figure using our alternative measure—new SNDVs plus new mods—would be similar. Figure 3 also shows that the aggregate modernization rate derived from the low force continued to be low in the 1988 NIE. (Because of time constraints, the 1989 NIE was not evaluated for this article.)

³ The low-level-of-effort force projections were discontinued in the 1977 NIE. From that time until 1987, the only NIE to contain a force labeled "low" had been the 1980 NIE.

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Figure 3
Recent Reductions in Projections of Modernization: New Soviet SNDVs

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Third, more attention is being focused on aggregate quantitative force modernization. US analysts are now using the measures we introduced—new SNDVs and new SNDVs plus new mods—as additional analytical tools when constructing Soviet force projections. Before a force is completed, analysts compute the number of new SNDVs and the number of new SNDVs plus new mods contained in that force for each year and for the full 10-year projection period; then they compare those values to past Soviet accomplishments. Analysts may then choose similar modernization rates or different ones, depending on their judgments about how similar the Soviets' current political, military, and economic conditions are to those in the past.

Interviews with the analysts involved indicate that aggregate modernization was not receiving explicit attention in the 1970s and early 1980s. Thus, it was difficult for the Intelligence Community to recognize the trend as it developed. If the focus of interest had been on aggregate modernization earlier, then the tendency to overestimate aggregate Soviet force modernization could have been detected earlier.

Figure 4 illustrates how this tendency might have been recognized. It displays an aggregate modernization bar chart of the type displayed earlier, but it was drawn using data available in 1980. As of 1980, the Estimates through 1974 usually contained the correct number of new SNDVs—the high and low projections bounded history. Beginning in 1975, however, the modernization rates derived from both the high and low/moderate force projections consistently exceeded history. Another chart based on the alternative modernization measure, new SNDVs plus new mods, again using only data available in 1980, would display similar characteristics—accurate projections from 1970 to 1974 and high projections thereafter. Thus, US analysts could have detected the trend as early as 1980.

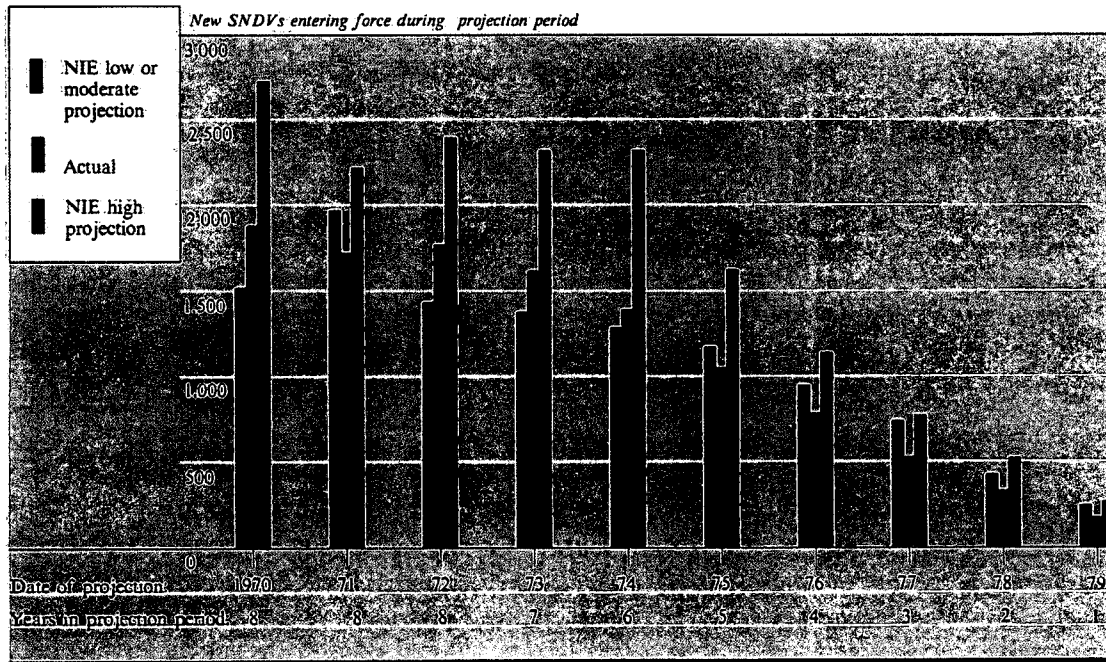
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Figure 4
Forecasting Record on Modernization as of 1980: New Soviet SNDVs

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As a corollary to the above, it appears that the Intelligence Community has neither an institutional mechanism nor a strong built-in incentive to seek out overestimates vigorously. On the other hand, because the Community and its principal consumers of Soviet strategic estimates are charged with protecting the nation against external threats, underestimates are likely to be viewed as serious mistakes. Although underestimates are sought out and corrected, this may not be the case with overestimates.

Fourth, the projections are being integrated more completely. The analysts responsible for predicting Soviet weapon system IOC dates and deployment rates are coordinating their projections with each other in greater detail. These discussions encourage each analyst to understand how his projection influences other projections. This also encourages analysts to develop a better understanding of the directions of total Soviet force modernization, rather than focusing on their own components of modernization.

Until recently, US analysts had predicted system IOC dates and deployment rates separately by projecting the IOC dates first and then by projecting the deployment rates. This procedure has worked well for individual weapon systems, but, if we consider a system and its immediate follow-on, we can find instances when this procedure may have caused problems. When the IOC date for a specific replacement system follows close on the heels of the current system, the existing system has to be deployed quickly or be overtaken. The early projected IOC dates for the follow-ons probably have contributed to making some projected deployment rates high.

Recommendation

To prevent the development of persistent error trends in the future, studies like this one should be performed periodically. Such studies also should be conducted on other forecasts, including theater-range weapons and strategic defense forces. If a study detects a growing

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trend of misestimates, then analysts may be able to halt it early. But those who perform the evaluations of projections should not restrict their inquiry to only those parameters that were emphasized in the NIEs. If this had been done in this study, we would not have noticed the pattern of aggregate modernization overestimates. In addition to describing the accuracy of past projections, the studies should serve as checks on the Intelligence Community's focus of interest.

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