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THE RACE TO CONTROL NUCLEAR ARMS

By Paul Doty, Albert Carnesale and Michael Nacht

AS the nuclear age lengthens and the opportunity for viewing it in perspective grows, its essential features seem increasingly related to successive eight-year American presidential administrations. Measures to control nuclear weapons have been seriously considered in each of the first four postwar "octades," and there has been an acceleration in the number of agreements reached—most notably in limiting nuclear tests, slowing nuclear proliferation, restraining the quantitative growth of the Soviet and American nuclear arsenals, and restricting defenses against nuclear weapons.

Yet, as the nuclear age enters its fifth octade, the race to control strategic arms is being lost. Numerous obstacles have arisen to block further progress in the Strategic Arms Limitation Talks (SALT), thereby creating the danger of a new escalation in "vertical" arms proliferation. And the spread of nuclear weapons to other countries—"horizontal" proliferation—appears to have been rekindled, attributed by some to the stagnation of SALT. Moreover, new weapons systems likely to be deployed within the next few years are certain to exacerbate the arms control problem, for the already shaky SALT process appears inadequate to the task of bringing them under control. Clearly, a major change in our approach to arms control is necessary—one that addresses more decisively and more urgently the inter-related problems of vertical and horizontal proliferation.

The present commitment to joint Soviet-American negotiations to preserve the nuclear balance at progressively lower numerical levels of armaments is wise and prudent, but it is not the only course. If this approach does not produce meaningful limitations and reductions, and if it means the neglect of the growing threat of horizontal proliferation, then it is possible that a reversion to non-negotiated management of nuclear forces and unilateral initiatives offers more hope of restraint than the deceptive pursuit of "arms control" that does not bring control.

II

Each of the four postwar presidential administrations has left its

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distinctive imprint on the nuclear age. The Roosevelt-Truman years, 1945–1952, the first octade of the nuclear age, comprised the development period of nuclear weaponry, stretching from the first explosion in 1945 to the thousand-fold greater yield of the first thermonuclear device in 1952. At the outset, Secretary of War Henry Stimson saw relations with Russia being “dominated by the atomic bomb” but no agreement was reached on mutual management of the new force. Instead, the cold war became dominant. In 1952, the United Kingdom became the third member of the nuclear club.

The Eisenhower octade, 1953–1960, saw the full flowering of nuclear weapons systems. Both sides developed thermonuclear weapons and built large bomber forces for their delivery. With the United States in the lead, massive retaliation became its official strategic doctrine. Meanwhile, planning shifted to second-strike forces, ballistic missiles were born, and the octade closed with the deployment of the first Polaris submarine. American and Soviet arms control plans became more realistic and showed some convergence, but fell short of agreement. In 1960, France exploded her first atomic bomb.

The Kennedy-Johnson octade, 1961–1968, saw the completion by the United States of a modern nuclear force based on about 2,000 delivery systems consisting of intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs) and bombers (mostly B-52s). The Soviet buildup lagged by nearly a decade, finally producing by 1968 about half as many modern delivery vehicles as the United States. Anti-ballistic missile (ABM) systems developed to the point where claims for their practicability were taken seriously, generating concern that second-strike effectiveness might be compromised, and that the underlying premise of deterrence—mutual assured destruction—was jeopardized. The growing radioactive contamination from fallout catalyzed the first substantive Soviet-American arms control agreement, the Limited Test Ban Treaty of 1963. The nuclear club expanded to include China, and the U.S. entrapment in Vietnam showed vividly how impotent nuclear weapons could be. Interest in a worldwide effort to prevent the spread of nuclear weaponry grew and became more focused throughout the 1960s, culminating in the signing of the Nonproliferation Treaty (NPT) in mid-1968. Despite the intensity of the Vietnam War, serious approaches to arms control, stimulated by the pressures of ABM developments and growing assurances on verification promised by reconnaissance satellites, pyramided in the summer of 1968 only to be disassembled in August by the Soviet invasion of Czechoslovakia.

This brings us to the fourth octade, which is now nearing its end. During this period, nuclear arms control has for the first time become a central focus of Soviet-American relations; yet its progress has been disappointing, its value increasingly questioned, and its future, and the ability of the superpowers to restrain proliferation, in doubt. If this central focus is to be marked by failure, what then is to become of the overall relationship? While the fundamental causes of this condition surely derive from various sectors of the unique Soviet-American experience, it is important to focus on those sources of difficulty inherent in the arms control enterprise itself in order to suggest goals and measures appropriate to the nascent fifth octade.

III

The Strategic Arms Limitation Talks have served throughout the Nixon-Ford octade as the primary forum for negotiation of limits on American and Soviet strategic weapons systems. As a result of SALT I, the two parties signed in May 1972 and ratified six months later the Treaty on the Limitation of Anti-Ballistic Missile Systems and the Interim Agreement on Strategic Offensive Arms. The ABM Treaty, with its protocol of July 1974, prohibits either party from deploying ABM systems outside of one small area, while the Interim Agreement limits the numbers of launchers for ICBMs and SLBMs. Unlike the ABM Treaty, which is of unlimited duration, the Interim Agreement is scheduled to expire in October 1977. Guidelines established at Vladivostok in November 1974 would, if converted into a formal SALT II treaty, take the place of the Interim Agreement. These guidelines call for a limit of 2,400 on the total number of strategic delivery vehicles—ICBMs, SLBMs, and heavy bombers—each side could deploy through 1985, as well as a ceiling of 1,320 on the aggregate number of ICBMs and SLBMs which could be equipped with multiple independently targetable reentry vehicles (MIRVs).

Further progress toward limiting the testing of nuclear weapons has also been accomplished. The Threshold Test Ban Treaty signed in July 1974 would limit the yield of underground tests of nuclear weapons to 150 kilotons (KT). (The Limited Test Ban Treaty of 1963 prohibited all nuclear tests in the atmosphere, in outer space, and underwater, but did not restrict tests underground.) In May 1976, the United States and the Soviet Union signed a companion treaty on underground nuclear explosives for peaceful purposes, which would limit to 150 KT the yield of any individual peaceful nuclear explosion (PNE) and to 1,500 KT the combined yield of any group of PNEs

detonated in rapid succession. Special verification procedures, including on-site observers, are provided for the group explosions and for some individual explosions over 100 KT. The Threshold Test Ban Treaty and the treaty on PNEs have not yet been ratified: some opposition is expected on the grounds that the 150 KT limit is too high and that the agreements would "legitimize" the PNE path to nuclear proliferation. (India justified her May 1974 nuclear explosion by calling it a PNE.)

Measured by diplomatic activity, numbers of agreements, and the extent of national armaments affected, the Nixon-Ford era undoubtedly represents a profound shift from the episodic contacts of earlier years to an acceptance by each side that its national interest is served by continuing mutual efforts to limit nuclear weaponry. The issue, however, is not whether serious problems have received serious attention in a sustained and comprehensive manner—they have—but that the rate at which limitations are being imposed, even assuming a successful conclusion to SALT II, falls far short of the rate at which the forces are being improved. The race to control strategic arms is being lost.

The accomplishments of SALT to date, including the Vladivostok guidelines, will leave the Soviet and American strategic forces at extraordinarily high levels through 1985. Paradoxically, the limit of 2,400 strategic delivery vehicles agreed to at Vladivostok is not very different from the total number of delivery vehicles in the U.S. arsenal in the early 1950s, before the age of intercontinental ballistic missiles, when the strategic inventory was comprised solely of propeller-driven bombers! But the number of deliverable warheads has increased dramatically and continues to do so, with both superpowers likely to pass the 10,000 mark by the end of the decade.

What is and is not included in SALT remains a problem. The Chinese, French and British forces are excluded from limitation, and the Soviets, viewing these as potential threats, cite them as justification for a Soviet nuclear force greater than that of the United States. On the other hand, the Americans insist that their forward-based systems, including fighter bombers based in England, on the European continent, and on aircraft carriers are theater forces and should be excluded from consideration in SALT, despite the fact that they can carry out nuclear attacks on the Soviet Union, at least on one-way missions. A recently developed Soviet bomber, known in the West as the Backfire, presents a comparable problem, and hundreds of intermediate range ballistic missiles in the Soviet Union targeted on Western Europe—and now being MIRVed—have been

left totally untouched by negotiations.

The listing here of what is not covered by the SALT agreements and the Vladivostok guidelines suggests that if strategic arms are to be brought under control, the achievements of the Nixon-Ford era can only be considered the essential stage-setting for what must follow.

IV

Considering the comprehensiveness of approach and the continuity of effort one must ask why it took seven years of SALT to reach even this point. Had this been accomplished in half the time there would have been ample opportunity to grapple with the problems of real control—reductions, restraints on improvements and new systems, improved command and control arrangements, and limitations on weapons systems of intermediate range. Of course, the 1973 war in the Middle East and its aftermath, as well as Watergate, were unusually disruptive diversions. But the real impediments to progress in SALT lie deeper. In retrospect, four obstacles stand out.

The first obstacle has been the mismatch in strategic conceptions of the two sides. When one side may see an advantage—even a mutual advantage—in proceeding with some arms control measure, the other side may not, and over time each side may reverse its position and remain out of phase with the other (as occurred in the negotiations leading to the Limited Test Ban Treaty and the ABM Treaty). A coincidence of some perceived interests is a prerequisite for any meaningful agreement. It is a function of diplomacy to see that opportunities are identified and brought to the attention of the other side.

It is likely that each side bases its weapons requirements on two strategic conceptions: that of maintaining secure second-strike forces and that of maintaining a nuclear war-fighting capability. The acceptance of a virtual ban on ABM systems at SALT I implies that both sides accepted the view that the assured destruction of the attacker is the primary deterrent against an attack; however, this stability is threatened if either side perceives that a major portion of its deterrent force may be vulnerable. Hence, the development of high accuracy, reliable, counterforce missiles and their deployment in large numbers are destabilizing. A major requirement of future SALT agreements should be the removal of this threat.

Both sides consider that strategic weapons are also needed for use against fixed targets of military value other than strategic forces. This targeting doctrine justifies the development of high accuracy weapons, but it is precisely this development that can threaten the stability of second-strike forces. Moreover, since target lists can be generated al-

most without limit, the numbers of warheads required can be inflated to very high levels. Thus, the superpowers must find sufficient common ground in their strategic doctrines to justify diminishing requirements for nuclear weapons.

The second obstacle to further progress in SALT is the difference between Soviet and American perceptions of strategic parity. A decade ago it was obvious that the United States had a considerably superior nuclear capability. It was not so obvious that this brought much advantage, because the Soviet forces were capable of inflicting unacceptable damage on the United States in a retaliatory attack. In the decade that followed, the Soviets have matched approximately our level of strategic delivery vehicles. Indeed, the buildup has been sufficiently aggressive to indicate that they will not stop at parity unless restrained by SALT agreements.

Nevertheless, that the preservation of parity, or essential equivalence, must be a central aim of SALT is unquestioned. But unfortunately, the virtue of parity preservation as a final goal does not ensure its usefulness at every step in the negotiating process.

How is it to be decided that a certain proposal for limiting the strategic forces of both sides meets the criteria of equality—or rough equality? One approach would be to ascertain whether panels of experts on each side would reach the same consensus that the military capabilities of the two forces were approximately the same. Considering only static indicators of weapons systems performance, such a judgment could be made despite the many asymmetries involved. But would this judgment be meaningful? Probably not, for most informed analysts would argue that it is the ability of the weapons to perform important missions that is decisive, not the numbers, placement and characteristics of the hardware itself.

Yet it would hardly be possible to reach a consensus on what missions are to be chosen, on the criteria by which success is to be measured, and on other elements of the scenarios that are relevant (such as effectiveness of command and control, and likely actions and reactions of the adversary). Thus, the search for a test of parity flounders in the complexities and uncertainties of war-gaming. It would seem more prudent to admit that parity can be claimed to exist only within rather wide bounds and that many changes are possible within the bounded area without upsetting the overall judgment of parity. The important consequence of such an approach is that the asymmetric forces of the two sides can be subjected to symmetric constraints while parity is maintained.

The third obstacle to arms control is the view widely held on both

sides that the effectiveness of nuclear weapons in actual use would be roughly proportional to their megatonnage or numbers. This is surely not the case. In an exchange against urban-industrial complexes, the delivery of a few hundred low-yield weapons would destroy so much of the target areas on both sides that additional weapons would be of little effect. And a credible war-fighting exchange might involve tens, hundreds, or even a few thousand warheads. Because individual warheads in a given missile can now be directed to any of a number of different targets by simple adjustments prior to firing, deliverable warheads in excess of a few thousand are largely superfluous even though the list of possible targets may be much larger. In all cases, then, military utility is not proportional to the number of warheads but reaches a plateau beyond which further increases in the number of warheads provide virtually no increase in military effectiveness. Therefore, experimentation with mutual reductions and restraints involves much less risk than is generally alleged.

The fourth and perhaps most decisive obstacle to bringing strategic weapons under control lies in the profound differences in cultural attitudes and military traditions of the United States and the Soviet Union. In any negotiated schedule of reductions and restraints both sides would naturally attempt to preserve forces considered most vital, maintain certain war-fighting options, retain military postures thought capable of yielding political advantage, and keep open the possibility of introducing new weaponry. However, the culture and tradition of each side strongly influence its patterns of force structure and modernization, making difficult the adoption of common limits and reductions.

Most striking is the contrasting emphasis placed on numbers and new technology by the two powers. Despite much progress the Soviet Union continues to lag technologically and has had its attitudes molded by a long heritage of inferiority in technological innovation. In its wars its survival has been due largely to numbers—numbers of weapons or numbers of men. Because numbers have saved it in the past, it still gives priority to numbers in seeking security and in projecting political power. With few exceptions, the traditions of the United States give priority to technological innovation and quality of weaponry in order to achieve the same ends. It is not surprising, therefore, that even in a state of parity the United States seeks to maintain an image of strength by continuing to innovate and introduce sophisticated weaponry, while the Soviet Union relies on the maximization of numbers and sizes to project its power image.

To cope with this divergence of national outlooks it is, of course,

essential to deal with the two proclivities together: to negotiate reductions in numbers, and perhaps in sizes and ranges, together with restraints that limit the rate of improvement and the rate of introduction of new systems.

V

The approach to overcoming these four obstacles which has been attempted repeatedly in the past seven years is to extend the time allotted to negotiations. Experience demonstrates, however, that this does not work. The dynamics of the arms competition will not be stilled. The rates of improvements of old systems and development of new ones set a pace that negotiations have not been able to match, and that threatens to overwhelm the modest repertoire of verification measures that makes negotiated arms control possible. (Nuclear-armed cruise missiles illustrate this latter point.) Consequently, the ultimate challenge to arms control now confronts the Soviets and the United States. Either ways must be found to cope with the obstacles and negotiate comprehensive agreements within a very few years, a period considerably shorter than the development time of major improvements and new systems, or the whole process seems destined to become obsolete and futile.

New weapons systems already on the horizon will only complicate the arms control problem further. Soviet systems include a new submarine designed to carry 16 missiles of 5,000-mile range; a new missile, the SS-20, that may attain intercontinental range and be fired from mobile launchers; and the Backfire bomber, that may or may not be considered as strategic. Emerging U.S. systems include a new larger missile designed for mobile land and air basing, the MX; a new strategic bomber, the B-1; and a new submarine, the Trident, with 24 missiles, initially of 4,600-mile range. Both sides are developing long-range cruise missiles, and recent developments increase the likelihood that space-based laser weapons may lead to a new generation of strategic weapons.

It is under this pressure of a new generation of weapons systems and the approaching termination of the Interim Agreement in October 1977 that the United States and the Soviet Union must decide whether or not to commit themselves to an accelerated negotiation of arms control agreements. Failure to step up the pace of negotiations, and continuance at the slow rate of the Nixon-Ford era, mean not attaining the rate necessary to experience a turning down in the growth of strategic capabilities. If this is not attained and its benefits tested, the justification for the whole enterprise comes into question.

Moreover, superpower arms control is, of course, linked to the problem of "horizontal" nuclear proliferation—a problem which has been exacerbated by the global rush to nuclear energy following the 1973 oil embargo. The lack of progress at SALT is used as a rationale, sincerely or otherwise, by spokesmen in non-nuclear states who advocate the acquisition of an independent nuclear capability. Nuclear proliferation, if it continues unabated, will produce substantial pressures within the United States and the Soviet Union to modify or abrogate the ABM Treaty and to deploy at least "thin" anti-ballistic missile systems to defend themselves against nuclear attacks by third countries. Thus, progress toward the goal of controlling vertical proliferation reinforces efforts to control horizontal proliferation, and vice versa. Similarly, a lack of progress in one area undermines efforts in the other. Both challenges must be met if either goal is to be achieved.

VI

What then is to be done? Policies to be adopted during the next octave must necessarily support the dual objectives of placing meaningful controls on the Soviet and American nuclear arsenals and minimizing the proliferation of nuclear weapons to other states.

The most immediate problem lies in converting the Vladivostok Accord into a longer term SALT II treaty. This conversion apparently has been delayed for well over a year by disagreement over the manner in which strategic cruise missiles and the Soviet Backfire bomber are to be treated. Because constraints on the cruise missiles are sought by the U.S.S.R. while constraints on the Backfire are sought by the United States, these weapons systems have become linked in the negotiating process. But there is no logical connection in military terms between the two systems; termination of the stalemate will require a purely political compromise. The October 1977 expiration date of the Interim Agreement heightens the urgency of resolving this deadlock.

From an American perspective, an agreement should inhibit the capability of the Soviet Backfire force to attack the United States. This can be achieved if a SALT II treaty prohibits both the deployment of tanker aircraft for in-flight refueling of the Backfire and the deployment of Backfire at Arctic and other forward bases. Such an agreement would, for all practical purposes, limit the Backfire to its designed role as a theater weapons system, eliminating the need for it to be classified as a strategic weapon in SALT II. Moreover, when SALT turns to negotiating controls on non-central systems, i.e., those

of less than intercontinental range, the Backfire will naturally become a candidate for limitations.

Because older generation cruise missiles of short range already have been deployed, it is unrealistic to expect that a complete ban on cruise missiles can be achieved. But the extraordinary potential flexibility of new cruise missiles to perform strategic and tactical missions, to be launched from a variety of land-, sea- and air-based platforms, and to be deployed in large and unverifiable numbers, is such that only negotiated limitations promise to inhibit their wide-scale deployment. A preferred formula would be (a) to ban the testing and deployment of cruise missiles with ranges greater than 2,500 kilometers, and (b) to prohibit the deployment of cruise missiles with ranges between 600 kilometers and 2,500 kilometers on platforms other than manned strategic bombers, counting against the 1,320 MIRVed launcher limit those strategic bombers on which cruise missiles were deployed. (There would be no limits on the deployment of cruise missiles having ranges less than 600 kilometers.) Because short-range attack missiles (SRAMs) have better payload capabilities than do cruise missiles, it is unlikely that, under such an arrangement, large numbers of cruise missile-equipped strategic bombers would be deployed. Such limitations on the deployment of cruise missiles in the strategic mode would retard their development and inhibit the spread of this technology to other nations, thereby helping to prevent the proliferation of a strategic weapons capability to many other states. While it is true that the verification procedures presently available cannot guarantee that all violations would be detected, a combination of testing and development limitations is sufficient to ensure that any undetected violations could not be great enough to be of military significance.

Following the completion of a SALT II agreement, nuclear arms control should be pursued along five fronts: reductions in strategic delivery vehicles, qualitative constraints, limitations on non-central strategic systems, unilateral initiatives, and nonproliferation measures.

As argued earlier, numerical reductions and limits on qualitative improvements must proceed together. The most attractive approach is that of phased reductions—perhaps as much as ten percent of the remaining number of strategic delivery vehicles each year for ten years, with freedom to mix among systems. This would reduce the permitted number of vehicles from 2,400 initially to 836 at the end of ten years. A similar reduction formula should be imposed on MIRVed vehicles, thus reducing that ceiling from 1,320 to 460. This step, perhaps more than any other, would demonstrate the seriousness of Soviet and American arms control policy and be conducive to

stemming the tide of nuclear proliferation.

Qualitative constraints on new systems and on the improvement of existing systems are also essential if the competition in strategic arms is to be halted. A principal means of decreasing the likelihood of nuclear weapons use, particularly in a first strike, is to reduce the confidence which political leaders and military staffs have in the performance capabilities of the delivery vehicles carrying these weapons. These confidence levels can be reduced by imposing graduated limitations on the flight tests of strategic delivery vehicles. Given the first-strike threat posed by highly accurate land-based ICBMs, a negotiated limitation on the frequency of full-range ICBM flight tests is especially worth achieving. The available verification techniques are sufficient to provide substantial confidence that violations would be detected.

Limiting the rate at which major new strategic weapons systems could be deployed to one every five years, for example, would be an additional qualitative constraint of significant value. Though the problems inherent in negotiating a mutually acceptable definition of "major new systems" would be sizable, they should not be insoluble. If such an agreement were reached, the pace of weapons system modernization could be seriously slowed, and the element of surprise in strategic deployments would be greatly reduced. Qualitative restraints inevitably restrain technological developments, but they do not constrain all technologies. Development of those technologies which promise greater stability or improved verification should be permitted under agreements and should have priority. Under these constraints, the research and development process itself would bear a heavier burden than otherwise, since only a few, rather than many, of the systems developed could be carried through the deployment stage.

Related to this constraint on new systems and applicable to existing systems as well is the matter of deployment schedules. Often it is the uncertainty aroused by the pace of deployment, rather than the qualitative attributes of particular systems being deployed, which is the source of concern. This uncertainty can be alleviated by the establishment of pre-announced deployment schedules, perhaps on a yearly basis, which would map out the rate at which specific kinds of delivery vehicles would enter and leave the strategic forces. These schedules, by adding a highly desirable element of predictability, would help reduce the reliance on "worst case" assumptions in the force planning activities of both nations.

Non-central systems—those nuclear-capable delivery vehicles other than ICBMs, SLBMs, and strategic bombers—should be added to the

agenda of nuclear arms control negotiations. Reaching agreement on limitations and reduction in this area will be extraordinarily difficult because of the multiplicity of systems involved (e.g., medium-range and intermediate-range missiles, land- and sea-based tactical aircraft), because of geographical asymmetries between the superpowers, because alliance considerations may require multilateral rather than bilateral negotiations, and because of verification problems. But if both nations are serious about nuclear arms control and seek to block potential channels for redirection of the arms competition, it would be logical and desirable to pursue such negotiations.

Inasmuch as future negotiations will encounter difficulties and delays, it is useful to consider a separate, parallel counterpoise: reciprocal unilateral initiatives. The United States should be prepared to undertake one or several initiatives in restraint for a limited period of time, proposing that they would be continued if matched by comparable Soviet restraints. This posture would demonstrate that nuclear arms limitations are a significant element in American foreign policy, would support the arguments in non-nuclear states against "going nuclear," and would apply pressure on the other nuclear powers, particularly the Soviet Union, to exercise similar restraint. It is time that the strategy of reciprocal unilateral restraint be activated in American arms control policy.

Exercising prudence in the discussion of nuclear weapons policies is one relatively simple unilateral action which can contribute substantially to the goals of arms control. Regardless of the degree of success achieved in halting vertical and horizontal proliferation, it is crucial that the use of nuclear weapons be inhibited and, in the event of their use, that further use be halted as rapidly as possible. To discourage initial use, the firebreak between conventional and nuclear weapons must be preserved and indeed reinforced. This can be achieved in part by adopting a declaratory policy in which the possibility of using nuclear weapons is raised only by the President and is treated invariably with the awe it deserves. A balance should be struck in which allies are reassured of the strength of American security guaranties, including the use of nuclear weapons, without conveying in a cavalier fashion the notion that limited nuclear war is a readily feasible option.

Finally, stemming the tide of nuclear proliferation is a challenge which requires aggressive and imaginative action. For of all the elements that can contribute to a less stable world, that of horizontal nuclear proliferation is perhaps the most threatening, and at the same time, the most diplomatically demanding. In concert with other

nations, the United States could do much to slow proliferation and to make that which does occur less threatening. The first step is to terminate the testing of nuclear weapons worldwide. With the United States and Soviet Union so far in advance of other states, they could best take the initiative by joining in an agreement not to test for at least five years, and by inviting all other nations to join. At the end of five years the agreement would be extended unless continued adherence somehow threatened the vital interests of the parties.

If handled with diplomatic skill, such an agreement would, in time, apply pressure on France, China and India to halt their testing programs. On balance, the contribution to nonproliferation, coupled with the knowledge that testing could be resumed in short order if deemed necessary, far outweigh the often-cited disadvantages of such an agreement (e.g., slowing American development of advanced weapons, reducing the reliability of these weapons, weakening the guard against technological breakthroughs by potential adversaries, and accelerating the flow of highly skilled manpower away from weapons research and development work).

A number of additional measures could also be part of the orchestration of an aggressive stance to stem the spread of nuclear weapons. On a case-by-case basis, the United States should apply unilaterally or, where possible, in concert with other nuclear powers, the wide range of incentives and disincentives at its disposal to prevent threshold countries from exercising their nuclear option. Such actions, of course, should not contravene existing treaties or guaranties of reactor fuel supplies, but renewals of alliance commitments and future guaranties of fuel supplies should be contingent upon adherence to nonproliferation policies.

Security guaranties and pledges to non-nuclear states can also play vital roles. Guaranties provided by the superpowers through alliance systems have undoubtedly served to diminish the incentive for client-states to develop separate nuclear capabilities—while also constraining their ability to do so. The recently demonstrated ability of the United States to dissuade South Korea from purchasing a nuclear fuel-reprocessing plant from France illustrates that political leverage within alliance structures can be an effective tool to inhibit proliferation; the threat to withdraw security guaranties can be as powerful in this context as the guaranties themselves.

But pledges not to use nuclear weapons against non-nuclear-weapons states should be viewed with caution. There is a danger that such pledges could undermine the coherence of alliances. For example, the credibility of the NATO alliance structure and American security

guaranties to South Korea rests in large measure on the continued deployment of tactical nuclear weapons in Western Europe and on the Korean peninsula. These weapons serve an important role in the "tripwire" strategy of nuclear deterrence. Should the United States make a no-use pledge generally or even in a regional context, it would substantially diminish German and South Korean confidence in the credibility of American security guaranties and, ironically, add to the pressures in both of these states for development of independent nuclear capabilities. The kind of no-use pledge that might advance the cause of nonproliferation, while requiring the least modification of existing alliance commitments, is that in which nuclear-weapons states pledge not to use nuclear arms against any non-nuclear-weapon party to the NPT unless the non-nuclear-weapons state is engaged in armed aggression in concert with a nuclear-weapons state. But if the United States must choose between maintaining strong alliance structures and issuing no-use pledges, the former choice is preferable.

These suggested measures to rescue arms control from a marginal role and to direct it toward reducing the strategic nuclear capabilities of the superpowers and decisively slowing the spread of nuclear weapons are complex and demanding. It cannot be otherwise. This contrasts with the much simpler arms control prescriptions of two decades ago, when nuclear weaponry was itself simple, albeit revolutionary. Twenty years of the most intensive technological development the world has ever seen, at a cost of more than half a trillion dollars, have made the difference. To control the products of this effort cannot be simple, elegant, or easy; at best it will be complex, messy, and unbearably difficult. But in a world in which the two superpowers are just learning to control their competitive impulses while their nuclear arsenals continue to grow, and the number of independent fingers on nuclear triggers threatens soon to increase beyond manageable bounds, the alternative to nuclear arms control is simply unacceptable.