

## *Viewpoint*

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# The Spread of Ballistic Missiles and the Transformation of Global Security

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**W**e are witnessing at the start of the 21st century an inversion of many traditional hierarchies across the spectrum of social and political life. In international affairs, as in innumerable other fields, issues that used to be secondary or even marginal increasingly compete with old heavyweights to shape global priorities.

The revolution in perceptions of weapons proliferation is one example. Before the end of the Cold War, even nonproliferation specialists conceded that theirs was a secondary aspect of global security, often overshadowed by the greater priority then appropriately given to superpower strategy and arms control. In the same vein, however, few would now deny that proliferation has emerged as a primary force shaping global security dilemmas, often dominating perceptions of the likely sources of instability.

In a field rich in irony, it should come as no surprise that the proliferation and strategic weapons agendas in turn are being transformed by the weakest of the major nonproliferation regimes, that for ballistic missile proliferation. Whether they alter strategic realities or just

perceptions, missile programs in Northeast Asia, South Asia, and the Middle East have the potential to undermine key aspects of global strategic stability, including the prospects for arms reductions between the former superpowers themselves. The vicissitudes of regional ballistic missile programs increasingly influence the extent of US regional security guarantees and the character of US relations with Russia, China, and even Europe. These missile programs almost certainly will be the greatest force determining whether the United States deploys national missile defenses (NMD) and perhaps even abrogates the Anti-Ballistic Missile (ABM) Treaty.

This viewpoint seeks to summarize the major trends in missile proliferation and their implications in three areas: the ability to control proliferation, the risk of renewed arms competition among major powers, and the future of nuclear deterrence. The viewpoint begins by discussing how missile programs are increasingly driving other weapons programs and strategic considerations, leading the different nonproliferation regimes to become increasingly interconnected. It then reviews present and planned missile development efforts in individual coun-

tries, starting with the traditional nuclear weapon states, then turning to emerging missile powers. Finally, the viewpoint draws out the global implications of the developments it describes.

Three major themes emerge from this review. Starting with nonproliferation, while there are measures that potentially can strengthen the ballistic missile nonproliferation regime based on the Missile Technology Control Regime (MTCR), there also are limits to what nonproliferation can achieve, limits that proliferating countries are gradually breaching. After developing for decades at a deliberate pace, emerging missile programs are overcoming long-standing barriers, becoming so self-sufficient that they cannot be stopped by foreign technology controls. The shortcomings of the MTCR, moreover, cannot be isolated from other nonproliferation regimes. Its limitations directly affect other elements in the global nonproliferation system, threatening to weaken and perhaps even undermine the entire fabric of nonproliferation.

Nor can ballistic missile proliferation be separated from traditional strategic affairs; strategic relations between China, Russia, and the United States are no longer determined exclusively by their own policies or their interactions with each other. Rather, the missile programs of emerging regional and global powers are now also shaping the way the established nuclear powers deal with each other. It is no surprise that missile proliferation contributes to pressure for national missile defenses. Strategic armaments policy and nonproliferation have truly become one.

The greatest impact of ballistic missile proliferation, however, may not be to justify missile defense, but to undermine the credibility of deterrence. Ever since Bernard Brodie's epiphany 55 years ago, deterrence has been understood to be the basis of stability in the missile age.<sup>1</sup> If deterrence is no longer a reliable basis for security, then ballistic missile proliferation has changed the fundamental rules of international security as well as the chances for further disarmament. Because the potential implications of missile proliferation are so profound, greater dialogue is needed to begin addressing the uncertainties created by the spread of missiles and the fundamental issues they open up.

## MISSILE PROGRAMS MOVING TO THE FORE OF STRATEGIC TRANSFORMATION

While the nuclear weapon was once widely seen as the peak of strategic evolution, a new era in strategic and disarmament affairs is emerging at least as much through the spread of ballistic missiles. Long perceived as a secondary or enabling technology, little more than transportation for the destructive force of a nuclear explosive, it is increasingly the missile that dominates our thinking. Although nuclear weapons and missiles originated historically as separate programs, their evolution has become inextricably intertwined, and their political effects increasingly synergistic.

To be sure, the spread of ballistic missiles still matters in no small part because of its effect on international conflict. Missile proliferation globalizes disputes, making it impossible to contain them regionally. Indeed, many countries are acquiring long-range missiles explicitly for this reason, to force outside powers to become involved in their conflicts, so they need never fear being alone against a dangerous adversary. Examples include not just the 1970s-era pariahs like South Korea, Taiwan (where ballistic missiles are under consideration once again), and Israel, but also newer proliferators like Iran and Pakistan. For these countries, all of whom fear larger, better armed, or more assertive neighbors, ballistic missiles are a way to raise the stakes when these countries either cannot get or do not trust foreign security guarantees.

Missiles also matter as the most visible—and often the only visible—manifestation of broader efforts to acquire weapons of mass destruction (WMD). As Iraq proved, and Iran possibly may as well, it is possible to hide an entire nuclear weapons program from international inspection.<sup>2</sup> But it is virtually impossible to hide ballistic missile development for very long. Although countries have hidden some aspects of their large-scale rocketry development, such as some foreign technology acquisition and maybe even some static motor tests, the odds that flight testing will escape detection are increasingly small. As a rule, the larger the rocket, the more likely it will be spotted. Indeed, some countries like Iran appear to be stressing ballistic missiles precisely because they are the most visible aspect of WMD permitted under international law and custom.<sup>3</sup>

No less important than their unparalleled visibility, however, are the synergistic effects of missile programs on other efforts to acquire WMD. The failure of international efforts to control the spread of ballistic missiles does not merely presage greater pressure on the nuclear and biological weapons regimes. It is becoming one of the most immediate forces compelling many regional actors to circumvent those regimes as well. Countries have begun acquiring nuclear weapons as much to justify their missile programs as the other way around. In this respect the weakness of one nonproliferation regime damages the entire fabric of international restraint in WMD.

In several key countries, like India, Iraq, and Pakistan, ballistic missile programs come under the direct authority of the same agencies or individuals responsible for nuclear weapons. With easier access to missile technology, these countries appear to be investing their resources in this one area where immediate opportunities are greatest. Whether the decisionmakers are in Tehran or Taipei, Cairo or Pyongyang, technology for missile development is easier to acquire than are nuclear warheads. At first they may stress space launch capabilities or conventional warheads, later chemical and biological weapons, all the while waiting for nuclear requirements and technical opportunities to come together. They seem confident that, once they have established their ability to procure ballistic missiles, sooner or later they also will find the means to develop the weapons of mass destruction essential to make them militarily effective. The question no longer is of the chicken-or-the-egg sort. Rather it is both chickens and eggs, with the increasing certainty that if you see one, it is just a matter of time before you see the other.

### **THE NEW INTERDEPENDENCE OF NONPROLIFERATION REGIMES**

As they have become more salient to international security, the various proliferation challenges and control regimes all have become more interrelated. Despite a few brave efforts at cross-fertilization, in the past we perceived them separately, studied them separately, and tried to resolve the problems separately too. Now this attitude seems increasingly outdated. Having seen how different kinds of weapons proliferation affect others, it is impossible to resist the conclusion that nonproliferation efforts more than ever before need to be understood in terms of how they influence each other.<sup>4</sup>

This need not mean that we suddenly face pressure to crudely splice all the regimes together, creating a single nuclear-chemical-biological-missile-and-anything-else-you-can-think-of regime that would become a bureaucratic behemoth.<sup>5</sup> The interdependence of proliferation problems, rather, simply means that nonproliferation no longer can be conceived as a set of parallel but ostensibly separate campaigns, each conducted with unique means and achieving distinctive ends. This may have been an appealing thought in the early 1990s when it became obvious that some of the nonproliferation regimes were doing better than others, but it may have reflected mostly the wish that the strength of some would not be undermined by the weakness of others.

Nonproliferation regimes no longer can be considered parallel undertakings each proceeding independently. Instead, it is becoming more meaningful to think of the various nonproliferation mechanisms as connected in a series, with all potentially endangered by the failure of any one of them. If so, the failure to control the spread of ballistic missiles is especially troubling. Far from being an isolated phenomenon, the weaknesses of missile control endanger the credibility of other nonproliferation regimes. Above all, the failure to develop a moral principle legitimating international action against missile proliferation—comparable to the norms explicated in the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), the Chemical Weapons Convention (CWC), or the Anti-Personnel Land Mines Convention—may be the most important weakness in the entire fabric of nonproliferation. Although one naturally would want to insulate the other regimes from the weakness of missile control, it is not clear how long this can be accomplished.

Recent events in ballistic missile proliferation also illustrate broader changes in the strategic significance and nature of proliferation challenges. They show how even in an era of post-modern globalization, the state and the national interest remain the key to diffusion of military capability.<sup>6</sup> After a post-Cold War burst that saw their membership and enforcement rise dramatically, today nonproliferation regimes increasingly find their influence limited to preaching to the choir. This is not an unimportant task—as every pastor knows, even choir members occasionally wrestle with temptation—but it also means the system is losing its salience. It no longer provides solutions to the most urgent proliferation challenges.

Today's most serious challenges come not from countries within nonproliferation regimes, but increasingly from those outside. More than the international regimes, it is domestic decisionmaking that determines whether there is eventual proliferation of WMD in these countries.<sup>7</sup> The old tension between policies stressing regimes and those stressing proliferators is gradually being resolved in favor of a growing imperative to deal with proliferating states on their own terms. If there was a message behind the startling events of 1998—proliferation's *annus horribilis*—when North Korea launched its Taepodong, several other countries demonstrated long-range missiles of their own, and South Asia abandoned the comfortable routine of covert nuclearization, it was to take proliferators very seriously indeed.

The reaction to North Korea's rocket test, both in Japan and the United States, illustrates the changing logic of proliferation priorities. The massive nuclear forces of the Cold War are of serious concern today only at their fraying Russian edges, where warheads or fissile material might be lost. Other cases once seen as unfortunate but ultimately tolerable exceptions—something one could live with—because they were covert, regional, or involved relatively small potential forces, have become the determining cases; they are the ones establishing international political realities and priorities. Proof can be found in the radical reorientation of the US debate over NMD in the late 1990s. This is related to another realignment, whereby proliferation regimes that used to be judged largely on their successes now are evaluated primarily in terms of their failures.

### THE CHANGING STRATEGIC ENVIRONMENT

While there is little room for doubt about the implications of ballistic missile proliferation for the nonproliferation system, the impact on strategic policy is more controversial. It is tempting to conclude that the spread of long-range ballistic missiles constitutes a genuine strategic revolution, one that requires a complete reorientation of our appreciation of the most dangerous threats and how they must be addressed. In response, some authorities have gone to some lengths to argue that there is less here than meets the eye. For example, Joseph Cirincione recently pointed out that the total number of deployed ICBMs around the world is decreasing as Russia and the United States move towards ceilings established in START I and II. The newer regional missiles

that are becoming part of the global military balance, moreover, are less survivable, less reliable, and less accurate.<sup>8</sup>

This interpretation, while obviously true, may miss a more important shift in the strategic environment. For the first time since the superpower missile competition began in the mid-1950s, the major powers no longer dominate the emergence of new ballistic missiles. The center of activity for development and deployment of offensive weapons has shifted to emerging regional and global powers, the only group consistently introducing new ballistic missiles into their arsenals. They may have neither numbers nor sophistication, but they have captured the role of strategic innovators. Several of them also are the most unpredictable strategic actors. In this sense, they already have given the 21st century a distinctive strategic culture.

While the strategic assumptions that guided the second half of the 20th century no longer dominate, their influence has not disappeared either. All the established nuclear powers recently completed or still are undertaking measures to strengthen their nuclear missile forces. France, Russia, and especially China are in the process of acquiring new ballistic missile systems. While these countries are not at the forefront of today's rocketry developments, their programs generally remain considerably more sophisticated than those of any newcomers. But it also is among this group, with the notable exception of China, that the most significant force cuts are taking place.

The actions of the established missile powers are important as evidence of their long-term commitment to the maintenance of ballistic weapons. But their efforts also betray an affinity for the strategic status quo. It is regional and emerging programs that are the engine of global transformation, determining the rules of strategic conflict and the focus of disarmament labors in the 21st century. Already some—notably China with its now infamous lightweight warheads, and slowly India as well—are achieving better technical sophistication as well, auguring the day when they may dominate all aspects of global missile proliferation. These contrasts between the established and the emerging missile powers are documented in the next two sections. The following section outlines the status of missile programs in established nuclear weapons countries.

## THE BALLISTIC MISSILE PROGRAMS OF ESTABLISHED NUCLEAR POWERS

### United States

Since the signing of the START II Treaty in 1993, public debate over strategic forces in the United States has been dominated exclusively by NMD. Consideration of offensive forces has been so greatly overshadowed that it almost takes deliberate effort to recall the days when US inter-continental ballistic missiles (ICBMs) were controversial too.

The dominant factor in its ballistic missile procurement is START II, which obligates the United States to reduce its land-based ICBM force to a total of 450 launchers with single warheads by the year 2007. Sea-based ballistic missile forces are being trimmed to a total of 336 deployed Trident missiles with no more than five warheads each.<sup>9</sup> There is widespread agreement that even these numbers cannot be sustained, due to pressure both to liberate funds to support procurement of planned conventional weapons systems and to make modifications of the ABM Treaty more palatable to Moscow and domestic American audiences, as even George W. Bush acknowledged in his first major speech as a presidential candidate on international arms control.<sup>10</sup>

The United States has no new ballistic missiles under development, except as blackboard studies. Its most significant ballistic missile program is an undertaking to extend the service-lives of its fleet of 450 Minuteman-3 ICBMs permitted under START II. The last of these missiles were delivered in 1977, so the youngest are 23 years old. To keep them in service, their engines are being remanufactured and guidance packages modernized, a 15-year program that will cost over \$6 billion. This will extend the missile's serviceability through the year 2020.<sup>11</sup> The only American long-range missile still in production is the Navy's Trident D-5, built at the rate of five to 12 annually, mostly to replace those used in operational testing.<sup>12</sup>

The United States also continues to procure the Army Tactical Missile System (ATACMS). Through incremental improvements and modifications, this gradually has been developed into a conventional weapon with a maximum range of approximately 300 kilometers (km). Designed for interdiction and suppression of air defenses and artillery, its shorter-range versions have been transferred to several allies. Although ATACMS has not been

politically important for the United States—except of course for exports, which remain controversial—this could change as the size of America's total ballistic missile force declines and political sensitivity rises.

### Russia

Its ratification of START II means that Russia's ballistic missile forces will continue their decline, a process likely to accelerate due to financial pressure. Although they continue to regard their ground-based missile forces as the nation's most important military asset, Kremlin leaders face rising pressure to shift resources to conventional weapons, salaries, and readiness instead.

In order to meet START II provisions and keep its remaining forces operational, Russia is replacing its complicated and aging fleet of four major types of ICBMs with a new single-warhead missile, the SS-27 or Topol-M, first deployed in December 1997. This is a very high national priority; according to some estimates over 25 percent of the limited Russian military procurement budget is devoted to this one program. Although Russian officials still speak of building some 500 SS-27s, the initial procurement plan calls for only 320, and some officials concede that 90 is more likely. Even so, development testing has been scaled down from the traditional 30 to 40 to probably no more than five to seven airframes.<sup>13</sup>

Deployment of new sea-based systems came to a halt with the suspension in 1998 of the SS-NX-28 missile and its intended platform, the Dolgoruky-class submarine. Instead Russia has, for now at least, chosen to rely even more on its land-based deterrent.<sup>14</sup> The result of this near paralysis in strategic force development is a rapid decline in both launchers and warheads. According to one estimate, Russia's land-based ICBM force will decline to as few as 200 launchers and its submarine-launched ballistic missile (SLBM) force to perhaps 124 missiles by the year 2010, deploying between 700 and 1,300 strategic warheads.<sup>15</sup>

Russia also has a new short-range weapon under development, the 280-to-400-km range solid-fueled SS-26 Iskander. Although the Russian Army has a requirement for such a system, it has no funds to purchase it. Instead the system is being developed by KBN Engineering largely with its own funds, and it is being promoted primarily for export as a replacement for the ubiquitous

Scud.<sup>16</sup> Russian officials have made it clear that the MTCR-compliant short-range version of the Iskander will be emphasized in their arms export campaigns.<sup>17</sup>

Even before the *Kursk* sinking brought Russian military priorities into question, President Putin had accepted greater debate over military restructuring. With strategic forces receiving a reported 70 percent of procurement spending, pressure to shift investment in favor of conventional forces is becoming harder to resist.<sup>18</sup> The reductions in manpower announced in September 2000 may be the first tangible evidence of Putin's determination, but they leave this fundamental question of priorities unresolved.<sup>19</sup>

### Britain and France

Both Britain and France are in the process of gradually bringing their ballistic missile procurement to a close. Having fully equipped its force of four Vanguard strategic missile submarines with Trident D-5 missiles, Britain has no plans to purchase additional missiles. The British Tridents have been downgraded to carry no more than five warheads per missile, and no more than 48 warheads per submarine.<sup>20</sup>

France has scrapped its land-based nuclear deterrent and now concentrates its ballistic missiles entirely on a submarine-based force. It maintains the M-45, a 6,000-km range multiple warhead missile in slow-rate production. The system arms a planned force of three Triomphant-class strategic missile submarines, of which one has been commissioned so far. Beginning around the year 2010, these will be replaced with M-51 ballistic missiles (whose characteristics remain successfully classified), deployed 16 per ship or 48 altogether.<sup>21</sup>

### Israel

Although Israel is not formally recognized as a nuclear weapon state, its nuclear and missile capabilities have long been known and its programs are almost as old as those of some of the official nuclear weapons parties to the NPT, so it makes sense to treat Israel as one of the established missile powers. Like Britain and France, Israel does not appear to be deploying additional ballistic missiles. In part this probably reflects satisfaction with the Jericho missile force developed in the 1970s and 1980s. Of equal importance, the rumored suspension of enrichment activity at the Dimona nuclear facility, if true, has left Israel unable to produce additional weapons-

grade fissile material.<sup>22</sup> Instead of developing new ballistic missiles, Israel appears to be devoting itself to creation of missile defenses based on the US-supplied Patriot and indigenous Arrow interceptors, recently becoming the first country to commission a dedicated theater ballistic missile defense (TBMD) system.<sup>23</sup>

### China

China remains the only established nuclear power with a fully active ballistic missile development program. All forms of large-scale rocketry have great political importance to Beijing. One side of this shows in China's preparations to launch astronauts into orbit, probably within the next two years, and its growing determination to establish its own manned space station.<sup>24</sup> For almost two decades, however, its ballistic missile program has pursued a separate path of development, emphasizing solid fuels and small warheads, while leaving liquid-fueled rockets and heavy payloads to the civilian space launch program. The political importance of the program, especially for the People's Liberation Army, is hard to underestimate, as revealed in atavistic displays of ballistic missiles in annual military parades.<sup>25</sup>

Having developed a small (approximately 750-kilogram [kg]) warhead, possibly influenced or even based on the American W-88 design, China is perfecting a new family of launch vehicles to carry it.<sup>26</sup> This new generation stresses mastery of all the classic Cold War-era ingredients of a secure second-strike force including not just solid fuels, but full mobility. Other aspects of the modernization go further to include some technical qualities more commonly associated with first-strike or counterforce targeting, especially multiple, independently targetable, re-entry vehicle (MIRV) capabilities and terminal guidance for short- and medium-range systems.<sup>27</sup> While it is not easy determining Chinese intentions from these emerging capabilities, it is clear that Beijing's spectrum of strategic options is being widened.

These new weapons include the submarine-launched JL-2 with multiple warheads and its land-based counterpart, the 8,000-km DF-31, and the 12,000-km DF-41, some of which could enter service within the next five years. Weapons previously thought to have been cancelled, like the land-based 2,400-km DF-25 intended to counter India, reportedly are back under development, too.<sup>28</sup> While these new systems are under development, China has been slowly expanding its inventories of ex-

isting liquid-fueled missiles as well. With an ICBM inventory of roughly 18 to 20, however, the emphasis clearly is on quality, not quantity. In the same spirit, China appears to be taking its time, stressing long-term capabilities over short-term advantages.<sup>29</sup>

### THE BALLISTIC MISSILE PROGRAMS OF EMERGING POWERS

Although regional and emerging global powers have tried to become self-sufficient in ballistic missile technology for decades, many were hindered by their inability to master several key technologies. Constrained at first by the immaturity of their infrastructures and later by the MTCR, they found it extremely difficult to surpass the level of sophistication represented by the 1950s-vintage Scud. Their programs were effectively stuck on a technological plateau, defined by the limits of the Scud technology on which they relied. This “Scud barrier” allowed their programs to readily carry nuclear weaponized warheads to ranges of roughly 1,000 km, but made it very difficult to go much further.<sup>30</sup>

One of the most fundamental changes in the nature of ballistic missile proliferation in the late 1990s was the collapse of this barrier. Country after country developed the capability to build longer range rockets on their own or acquired them from North Korea. Having surpassed this hurdle—overcoming the basic problems of large-diameter engines, guidance, stage separation, and re-entry vehicles—there are no inherent limits on what they can accomplish. Their solutions may be neither sophisticated nor elegant, but they appear to be effective. Although funding problems and continuing lack of foreign technology will slow them, eventually they will be able to field ballistic missiles of any range they want. Their progress may be glacially slow and eccentrically uneven, but it will be ineluctable unless halted for reasons of their own.

#### India

India’s missile program stands out for its highly centralized structure and gradual but persistent progress. It also is striking for its great salience in official policymaking; India’s nuclear tests of May 1998 appear to have originated in large part with demands from the country’s weapons establishment to perfect nuclear warhead designs suitable for missile delivery.<sup>31</sup>

The first Indian ballistic missile to complete development testing, the short-range Prithvi, appears to be in series production. The Indian Army reportedly will receive 75 of the current version, the Prithvi-1, which has a range of only 150 km. For the Indian Air Force, plans call for a smaller quantity of 25 of the 250-km Prithvi-2. Both systems can be launched with nuclear payloads. India also has conducted the first test flight of the Dhanush, a navalized version of the Prithvi intended to be fired either from surface vessels or possibly a surfaced submarine.<sup>32</sup>

Of greater strategic significance, the 17-year-old Agni program continues to make slow but certain progress, championed by the influential A.P.J. Abdul Kalam, director of the Defence Research and Development Organization (DRDO).<sup>33</sup> After the last of three “technology demonstrators” was fired in February 1994, the program was downgraded while a succession of governments put off the issue of whether to proceed. Revived by the DRDO itself in 1996, testing still had to wait for government approval; this finally came after the Bharatiya Janata Party (BJP) was elected in March 1998. Flight testing resumed in April 1999 with the first flight of the Agni-2, an extensively improved design capable of carrying a 1,000-kg warhead a distance of approximately 2,000 km. Unlike the original Agni, the new version relies on solid fuel for both stages, making it better suited for military operation.<sup>34</sup> Another version, the Agni-3, reportedly is under development as well, with the goal of achieving ranges on the order of 3,500 km, although this apparently remains a design-study without an agreed configuration.<sup>35</sup>

Only vague speculation surrounds the Indian ICBM program, the Surya. Indian officials do not deny the existence of the project, which they say could use the massive solid first-stage sustainer engine of the Polar Space Launch Vehicle created by the civilian Indian Space Research Organization. Since the DRDO is stretched thin by existing projects, and there is no evidence that actual flight hardware for an ICBM is ready for testing, progress on such a weapon is likely to be slow.

Nevertheless, a project like the Surya deserves to be taken seriously, if only because of the unusual tenacity of Indian weapons procurement; in 45 years of military research and development (R&D), India has never failed to complete a major weapons system program. To be sure, India also may specialize in some of the world’s

longest weapons development processes—systems still under development like the Arjun tank and Advanced Light Helicopter trace their roots back to the 1970s—but the process continues nevertheless. Having just raised its defense budget by 28 percent, with much of the increase going to R&D in order to maximize self-sufficiency, there is no reason to believe that any major weapons projects currently under development—such as the Surya or the ATV nuclear-powered submarine—will be abandoned either.<sup>36</sup>

### Pakistan

Illustrating the way a semi-isolated and poor country still can pursue technically demanding ballistic missile capabilities, Pakistan essentially runs three independent ballistic missile programs. Currently it relies on imported missiles, including several dozen Hatf-1 and -2 missiles, based on French-supplied scientific sounding rockets, and Chinese-supplied M-11s, a 300-km-range solid-fueled weapon. While these projects appear to have gotten its military rocketry going, the current emphasis is on longer range weapons.

The best known is the liquid-fueled missile program under the direction of the nation's most prominent engineer, A.Q. Khan and the Khan Research Laboratories, the source of the country's nuclear weapons program. The test of the Ghauri-1 in April 1998 was one of the events that presaged India's nuclear tests barely one month later. The 1,150-km first flight of a weapon reportedly capable of ranges up to 2,000 km surprised many observers, who had not appreciated Pakistan's capabilities. Although the Ghauri is widely reported to be based on North Korea's Nodong missile, there are small but important differences which suggest that Pakistan has refined the North Korean design to better serve its own requirements. On April 14, 1999, Pakistan announced the successful test firing of an improved version, the Ghauri-2, with a maximum range of 2,300 km.<sup>37</sup>

Pakistan's solid-fueled rocket program reportedly is an entirely separate and competitive effort, under the direction of Dr. Samar Mubarak Mund and the Pakistan Atomic Energy Commission, which produces the Shaheen series rockets. The Shaheen-1, first test flown in April 1999, is said to have a maximum range of 750 km with a nuclear weapon-sized payload. Although media reports have associated this system with many possible technology suppliers, including China and (less credibly) North Korea or Russia, it appears to be an en-

tirely new system, indicative of substantial indigenous expertise. A much larger version, the 2,400-km-range Shaheen-2, is said to be under development.<sup>38</sup>

### Iraq

Iraq's ballistic missile programs were sharply curtailed by the destruction imposed by the allied air campaigns of 1991 and 1998, and even more by the work of the UN Special Commission on Iraq (UNSCOM). But Baghdad's ambitions remain intact. Showing the weakness of any system of technology controls and inspection imposed from outside, even the draconian effort organized after the Gulf War, Iraq has been stymied but not stopped. While Iraq's intentions are unambiguous, major questions remain regarding how long its missile projects will need to recover and how dependent they remain on foreign technology and help.<sup>39</sup>

Several dozen 500-km-range al Hussein missiles remain unaccounted for as well as a cache of Scud missile motors. UN resolutions permit Iraq to work on rockets capable of ranges up to 150 km, and there is considerable activity up to this threshold. The most important projects are the liquid-fueled Samoud missile, based on engines developed from Soviet SA-2 anti-aircraft missiles, and the solid-fueled Ababil-100. With the former in flight testing and the latter ready for mass production, Iraq has preserved the basic spectrum of fundamental rocketry engineering capabilities, although its ability to make rapid progress in vigorously debated.<sup>40</sup>

Reports from UNSCOM after 1995 and more recently from US intelligence sources leave no doubt that work and planning continue for manufacture of a series of new weapons ranging from Scud-sized to space launch vehicles. Although slowed by the bombing campaign of Desert Fox in November 1998, Iraq is believed to be ready for rapid expansion of its missile program as soon as international sanctions ease and new technology suppliers and assistance can be found.<sup>41</sup>

### Iran

Iranian rocketry projects have made slow but mounting progress. Although hindered by a lack of funds and access to technology, missile projects remain a national priority. For 15 years the program has been essentially opportunistic, accelerating as foreign technology becomes available, then slowing until the next infusion. Recent evidence of greater spending and progress in the



Iranian nuclear program suggests that missiles will be receiving stronger emphasis as well.<sup>42</sup>

Today Iran has both a liquid-fueled program based on extensive North Korean and Russian assistance and a solid-fueled program of more obscure, possibly Chinese, origins. Scud-type missiles reportedly are in full-scale production. The most important milestone for the Iranian missile program so far came in July 1998, when the Shehab-3 was test fired.<sup>43</sup> Apparently based on the North Korean Nodong, this 1,400-km-range weapon already may be in limited production in Iran. An improved version, capable of ranges around 2,000 km, reportedly is under development. A space launch vehicle also appears to be under development.

Although Iran originally relied on technical assistance from China, and more recently from North Korea and Russia, recent reports indicate that it is becoming largely self-sufficient. Its program to develop a very large rocket, the Shehab-4 (variously described as a ballistic missile or a space launch vehicle), appears to be virtually autonomous; although originally based on the Soviet SS-4 intermediate-range ballistic missile (IRBM) and Russian technical assistance, it may have evolved beyond the point where foreign export controls can bring it to a halt.<sup>44</sup>

## Libya

Libya's missile program is as close to being fully secret as a ballistic missile program can be. The few reports published in the 1990s suggest a policy of grasping at any conceivably relevant technology, to the point of pursuing several separate paths of development, stressing both solid and liquid fuels, and both foreign and indigenous designs. None of these projects appears to have reached the level of testing at which it would be observed by telemetry collection or photographic satellites.

Its projects appeared to stop in the early 1990s, but Libyan officials have never completely ceased looking for foreign parts and technical assistance as they become available. In 1993, solid-fuel technology was discovered being imported from the former Soviet Union. These efforts appear to have accelerated since the end of United Nations sanctions in April 1999.<sup>45</sup> In November 1999, British customs police revealed that Libya was importing specially ordered liquid-fuel rocket engine components from a Taiwanese firm.<sup>46</sup> Chinese participation also has been reported.<sup>47</sup> These reports are far too sparse

to clarify Libya's intentions beyond the obvious fact that Libya has not abandoned its ballistic missile ambitions.

## North Korea

North Korea fully illustrates—and largely defines—the ironies of contemporary ballistic missile proliferation. Not only is it the pivotal actor transforming the global missile situation, it also is the most economically backward of missile proliferators. Although its rockets seem technically primitive and poorly tested, they have been developed with exceptional skill, given the country's aging technical infrastructure and limited access to foreign technology. When one considers the significant share of national wealth allocated to the program during years of frightful poverty, North Korea's determination is unmistakable.

While North Korean ballistic missiles almost certainly are highly unreliable, inaccurate, and probably lack much of the range attributed to them, their political impact is unmistakable. In the United States, the North Korean program engenders concern about national safety and has revitalized debate on the need for missile defenses. In Japan and South Korea, it has re-ignited fears that America will not live up to its security guarantees, leading Japan to reconsider its constitutional limits on defense preparations and compelling South Korea to reconsider its need for WMD.<sup>48</sup>

Isolated by sanctions and by choice, North Korea has made due with Scud missile technology purchased from Egypt 20 years ago.<sup>49</sup> By incrementally improving this tiny inheritance, North Korea has accomplished what no other would-be missile power could, creating a complete family of ballistic missiles and perhaps even a space launcher. Circumstantial evidence also points to extensive Russian technical assistance.<sup>50</sup> The resulting fleet ranges from versions of the original Scud to the 1,000-plus-km Nodong, the Taepodong-1 launched in August 1998 as an unsuccessful space launch vehicle, and the still-untested Taepodong-2, which may be able to reach large parts of the United States.

Diplomacy and trade concessions made it possible for Washington to achieve an informal agreement in September 1999 whereby North Korea will not test the Taepodong-2 while negotiations on the missile program continue, a pledge it has since reaffirmed.<sup>51</sup> Under enormous political pressure from US plans for NMD and the peace dialogue with the South, North Korea has begun

to show unprecedented flexibility on the missile issue. Although reports are highly contradictory, North Korea reportedly accepted a Russian proposal to abandon its missile program in exchange for international space launch assistance.<sup>52</sup> Despite this apparent momentum, there still is no evidence that Pyongyang has been persuaded to cease development or exports of its missiles.

Commercial satellite photos showing the relatively primitive nature of North Korea's test facilities have been used to argue that its programs have been exaggerated.<sup>53</sup> This misses the essential nature of missile proliferation, a field in which there is no such thing as obsolete technology and 50-year-old designs remain as potent as ever. Whether North Korea's missile program approaches Western sophistication in the early 21st century matters far less than its similarity to American, British, French, and Russian projects of the 1950s.

The motives for the program remain hidden within Pyongyang's cult of secrecy, but the scale of the investment by the impoverished country leaves little doubt that Pyongyang's leaders have not abandoned the possibility of developing nuclear armament for their missiles. Nor is it certain that they respect the orthodox assumptions of nuclear deterrence, leaving them potentially more willing to use their new weapons. With no reluctance to sell its missile technology to any buyer able to pay for it, North Korea has become the leading source of global ballistic missile proliferation.

North Korea's exports illustrate the sensitivity of the 21st-century world order to the machinations of relatively small actors. North Korean Scuds have been transferred in large quantities (usually estimated at several hundred) to Iran and Syria, and possibly to Egypt, Libya, and Vietnam.<sup>54</sup> Egypt reportedly plays an important role funneling equipment into North Korea in exchange for support sustaining its own quiet ballistic missile projects.<sup>55</sup> Iran appears to be manufacturing North Korean versions of the Scud on its own. Nodong missile technology apparently has been transferred to Iran and Pakistan, forming the basis of the Shaheen-3 and Ghauri-1 and -2 missiles.

### **South Korea and Taiwan**

South Korea, showing the overwhelming role political considerations can have in missile decisionmaking, abandoned its ballistic missile efforts in 1980 in response to US pressure and stronger security guarantees. In the

wake of North Korea's recent missile progress, however, leaders in Seoul have begun to question the certainty of American security commitments once again. Fearing that Washington could be deterred by North Korean threats, South Korea has begun to invest in the development of indigenous long-range rockets. Two projects have been made public, one a short-range ballistic missile (up to 300-km range) and the other a space launch vehicle with obvious military applications. Both projects have been the subject of considerable bilateral diplomacy with Washington, which is anxious to squelch an incipient Korean missile race.<sup>56</sup> More recently, Taiwanese officials have shown renewed interest not only in acquiring ballistic missile defenses, but also in the possibility of building ballistic missiles as well.<sup>57</sup> Whether or not such proposals can be accepted at face value is difficult to judge. Typically discussed in guarded and ambivalent language, they have become inseparable from Taiwan's continuous bargaining with China.<sup>58</sup>

### **THE MTCR'S ROLE NOW**

With so much potentially at stake from ballistic missile proliferation, it is all the more ironic that its restraint rests on something so modest as the MTCR. When US officials began work to control the spread of missile technology in 1978-80, they were not anticipating a major international regime. The problem was seen as a secondary threat, requiring only a secondary response. It seemed sufficient to harmonize export controls among a handful of like-minded Western governments. As actual negotiations got going in 1983, the mood among participants was—for the most part—of friendly consultation. The MTCR was based not on the nuclear non-proliferation regime and its universal aspirations, but on the much narrower Nuclear Suppliers Group, with its smaller membership and focus solely on export controls, making it relatively easy to implement as well.<sup>59</sup>

Although some favored the idea of developing the MTCR as a treaty, this would have required expanding the small like-minded group and exposing the simple idea behind the MTCR's Technology Annex—the detailed list of proscribed and controlled technologies either essential or potentially critical for ballistic missile development—to much harder negotiation. The result would have been trade-offs and compromises, which participants feared would fatally weaken the enterprise. But failing to open the process came with costs too. The negotiations alienated Moscow, which has never given

more than its grudging participation. And they antagonized the government of China, which later refused to join, in protest of its earlier mistreatment. No effort was made to develop an all-encompassing set of norms and principles. With all the major Western technology suppliers involved, it was assumed that most would-be rocket-makers would just give up. The few that were not discouraged would make only slow progress.

In practice, this worked rather well for a time. Success came easily at first, as the number of formal adherents grew from seven when the MCTR was unveiled in 1987 to 32 in 2000 (plus several informal participants). Regional missile programs collapsed one after the other as nations as diverse as Argentina, Belarus, Brazil, Egypt, South Africa, and Ukraine called it quits. But most of these halted programs that were highly dependent on Western technology. Other forces also were at work, such as the long-building rapprochement between Argentina and Brazil, the end of apartheid, and America's unique influence with key clients and allies. But even if the MTCR alone was not *sufficient* to bring about the end of ballistic missile programs in these countries, it clearly was *necessary* to the process, which would not have occurred otherwise.<sup>60</sup>

Yet, early success could not conceal the regime's shortcomings. Programs without extensive reliance on Western technology were not hindered; an example is India's now self-sufficient space launch and military rocketry. Other countries, of which Israel is the most prominent, relied upon Western technology to get started but have long since developed an impressive and fully independent technical base. North Korea continued to develop Scud-based rocketry and filled the export niche abdicated by the West.

These problems led the Clinton administration to raise the profile of missile nonproliferation efforts in 1993, by trying to bring countries previously outside the MTCR into the regime. This dramatically altered both the goals and the tools of MTCR diplomacy. In order to bring former missile proliferators into the regime, the Clinton administration needed flexible mechanisms to attract wider participation. Instead of simply insisting that countries accept the principles of the regime, the United States now cut deals with countries that had mastered missile technology. Brazil was allowed to keep its civilian space launch program. South Africa was given money to disassemble key facilities. Russia got to define which of its technologies were affected. And Ukraine was allowed

to stay in the ballistic missile production business. These compromises diluted the strength of the regime and weakened its already fragile foundations. It also meant that countries were joining because they found it expedient, not out of conviction. As their needs and calculations change, it is possible that their participation will change as well.<sup>61</sup>

As the 1990s progressed, the potential of the MTCR was being exhausted. The remaining missile proliferators could not be dismissed as a residual phenomenon. With leadership on this issue coming exclusively from the United States, the Clinton administration had to do more. The solution was to go beyond formal MTCR diplomacy to deal bilaterally with countries still exporting rocket technology or developing ballistic missiles. The most prominent bilateral initiative was the Gore-Chernomyrdin Commission, which repeatedly dealt with Russian exports of rocketry technology to China and Iran. Robert Gallucci was appointed as special representative to deal with the Russian government and exporters. The results of this last stage of missile proliferation diplomacy were mostly discouraging. Russia did not object to the process but otherwise was slow to respond. North Korea did agree in September 1999 to halt test flights while talks are under way, but also used the process to extort economic concessions from Washington without slowing its missile exports to Iran and Pakistan. A lengthy series of high-level talks with India produced no tangible results.

The Clinton experience of the 1990s probably demonstrates the limit of what can be accomplished through technology denial. The MTCR has an enduring role to play. But it cannot be adapted to respond to the most pressing contemporary needs. The international community has become more concerned with the issues of missile proliferation and anti-missile systems—especially now that the US NMD program is creating pressure on the 1972 ABM Treaty—but there is a severe shortage of good ideas for what to do next. Proposals to move beyond the MTCR by replacing it with a global missile ban or a global version of the 1987 Intermediate-Range Nuclear Forces (INF) Treaty have received little support. Similarly, proposals for an outright ballistic missile ban continue to receive serious thought, but the moment for such ideas clearly is not ripe.<sup>62</sup>

One of the most imaginative proposals to adapt the MCTR to changing circumstances came unexpectedly in June 1999 at the Cologne summit of the G-8, where

Russia proposed a Global System of Control. This would strengthen the MTCR with a regime for prior notification of all ballistic missile launches, supported by an international center to monitor launches.<sup>63</sup> The idea, which received little recognition at the time, would not solve the missile proliferation problem. But it has considerable potential to reduce some of the risks of missile proliferation and should be actively pursued. Russia revived the idea during the April-May 2000 NPT Review Conference as part of its efforts to court European opinion.<sup>64</sup> Even if it would not solve the missile proliferation problem, such a scheme would be essential for establishment of a boost-phase ballistic missile defense system—the option advocated by the Russian government—which would depend upon such a scheme to distinguish benign space launches and missile tests from aggressive missile launches.

### THE NEW MISSILE DEFENSE QUANDARY

Beyond the questions it raises about the missile non-proliferation regime, the global spread of ballistic missiles compels us to address even more fundamental questions about the nature of security and disarmament. Fifty-five years after the birth of the nuclear era, we face new challenges that may require new attitudes and solutions. Just as the nature of today's security dilemmas are different, solutions that were not appropriate in the past may be more relevant today.<sup>65</sup>

Among the most immediate challenges created by missile proliferation is a shifting consensus in favor of ballistic missile defenses in America and some of its allies. The debate was radically altered by two events in 1998. The first was the publication of the Rumsfeld Commission Report, an investigation into the ballistic missile threat facing the United States. The commission was created by conservatives in Congress to refute the 1995 National Intelligence Estimate—which they believed deliberately suppressed evidence of emerging missile threats to the United States—and build support for missile defenses. Despite its partisan origins, the bipartisan design of the commission and its highly professional staff gave it exceptional credibility. When it concluded that “[t]he threat to the US posed by these emerging capabilities is broader, more mature and evolving more rapidly than has been reported in estimates and reports by the Intelligence Community,” this assessment had to be taken seriously.<sup>66</sup>

The report shifted the consensus on missile defense, even though it was not specifically about missile defense. Its portrait of unambiguous—albeit numerically small—regional missile forces possibly targeting North America enormously strengthened proponents of national missile defenses. More importantly perhaps, the report led many erstwhile opponents into ambivalence; the seeds of a new strategic consensus were created, no longer opposed to missile defense in principle, judging it more in terms of its cost and effectiveness.

The political effect of the Rumsfeld Commission Report was reinforced by the launch of the first North Korean Taepodong six weeks after its release. While there still is very strong opposition to NMD within the arms control community, especially among those who maintain the overriding importance of the 1972 ABM Treaty for international stability, the debate has been altered fundamentally. Few American political leaders are proclaiming outright opposition to the *concept* of limited national missile defense in the United States. Outside of the arms control community itself, debate now focuses more on technical feasibility, how much to accelerate deployment, and how to renegotiate the ABM Treaty. A minor industry emerged among former opponents of missile defenses now struggling to design systems that are technically feasible and acceptable to the governments of China and Russia. Another group has begun to stress ways to reconcile the birth of national missile defenses with the need to alter the ABM Treaty.<sup>67</sup>

This may not be possible. Russian, Chinese, and several European leaders have gone to great lengths to make known their opposition to any deployment outside the ABM Treaty as it stands today. At first their statements that ABM deployment would “trigger a new arms race and jeopardize world and regional stability” were met with incomprehension in much of Washington, where the threat seems increasingly self-evident, but US officials are learning to take such statements seriously.<sup>68</sup> These critics have been frank about their reasoning, denying any threat and pointing out that their own countries cannot compete equally in a defense-dominated environment. But there also are important differences in their critiques, with different implications.

Moscow recognizes that the primary effect of US missile defenses will not be so much strategic as political; US deployment of limited national missile defenses, eventually totaling 250 or so interceptors, will not sig-

nificantly reduce Russia's ability to target and deter the United States. Rather, opposition is politically motivated. Just as Moscow opposed NATO expansion not because it damaged Russian security, but because it strengthened America, so US deployment of NMD is opposed not because it would weaken Russia, but because it would give America political advantages.<sup>69</sup> Prominent Russian officials and commentators have explained that Russia could accept expanded missile defenses under the right circumstances.<sup>70</sup> Their point was no sooner made than it was given shape by President Vladimir Putin, who championed an alternative system relying on boost-phase intercept.<sup>71</sup> With this sudden—albeit still nebulous—offer, Putin showed that Russia does not oppose expanded missile defense *per se*; rather it is concerned with the politics of who controls and benefits from defenses.

Because it fits into a calculus of gains and loses, though, there are compelling reasons to believe that the issue ultimately is negotiable with Russia. Just as Washington and Moscow negotiated protocols to the ABM Treaty twice before, they probably can do it again. Moscow can be expected to drive a hard bargain, at a minimum extracting a high cost in offensive force cuts, but this is something US leaders should find acceptable.<sup>72</sup>

Most revealing about Russian expectations is the *Joint Statement on the Principles of Strategic Stability* from the June 2000 Clinton-Putin summit.<sup>73</sup> The part of the document that got the most attention was the trade-off in articles five and six, where the United States reaffirmed the importance of the ABM Treaty and Russia agreed to the seriousness of missile proliferation for international stability. What deserves more consideration is the lack of any reference in the document to *deterrence*, which simply appears to be much less relevant in Russian-American relations. Its place has been taken by the term *stability*, a much more flexible concept, permitting a wider range of technical solutions.

The Chinese question is more delicate, since US plans for missile defenses threaten China not so much with change as with the maintenance of an unwanted status quo. Although Chinese officials have framed their strong objections in terms of defense of the ABM Treaty—most vigorously in the Joint Statement signed by Presidents Vladimir Putin and Jiang Zemin during their July 2000 summit—there is more here than initially meets the eye.<sup>74</sup> The same officials who stress arms control concepts like the ABM Treaty and nuclear no-first-use in

relations with the United States also have been quick, for example, to state that they do not apply to dealings with Taiwan. An exception like that shows that pragmatism and bargaining are just as important as abstract principles.<sup>75</sup>

Instead, Chinese policy on missile defense suggests not abstract respect for international principles so much as a strong sense of particular national interests, above all national prestige and emerging regional hegemony. China's unequivocal defense of the ABM Treaty reflects not general concern with the principles of 1972 but with the needs of Chinese power in the early 21st century. To be certain, there is no evidence that Beijing has any plans for territorial expansion other than reunification with Taiwan. One can surmise, however, that China may expect in the next decade or two to replace the United States as the dominant military power in East Asia. Since North Korean missile progress reduces the United States' ability to guarantee East Asian stability and even may increase Washington's reluctance to intervene in East Asian security, China has been loath to criticize the North and occasionally even defends it.<sup>76</sup>

While it cannot be pleasant bordering one of the world's least predictable states, key Chinese geopolitical interests are enhanced by the North Korean missile program. Since China benefits from North Korean pressure on the United States and its East Asian allies, the widely expressed hope that China eventually will intervene with Pyongyang on America's behalf probably is misplaced. Nor is it likely that Beijing ever can be reconciled to accept US missile defenses. Even more limited deployments like sea-based theater missile defenses, which would help Washington to preserve its role as the key balancer in the region and to continue setting regional political agendas, are simply not in China's interest and almost certainly will be resisted.

Traditional strategic issues also are at stake, due to the small size of China's ICBM force. An American defensive system as initially envisioned with just 100 to 125 interceptors theoretically would be capable of intercepting 20 to 40 attacking ICBMs, equal to or even double the force China has today. Although there are many ways such a system could be evaded, for China just the appearance of vulnerability is enough to weaken its confidence and prestige. Consequently, an American defense system would pressure China to at least double the size of its intercontinental missile force.<sup>77</sup> One de-

tailed analysis concludes that in response to even a limited defensive system, China might seek to deploy as many as 250 additional strategic launchers.<sup>78</sup>

Although it is no cause for comfort, such expansion need not be destabilizing. While it would be the height of irresponsibility to advocate expansion of anyone's nuclear arsenal, America's strategic situation need not be fundamentally affected, even if China's strategic forces grew to a level comparable to those of Britain or France. If this were the cost to be paid to avoid remaining defenseless against North Korea, US acceptance of broader Chinese capabilities would not be hard to imagine. In today's world order, national security is not based simply on numbers of warheads. Dozens of Chinese ICBMs should be much less disturbing to the United States than two or three North Korean ones.

Deterrence, in other words, should be sufficient to insure American and allied security vis-a-vis China in any event, but it may not be sufficient when dealing with North Korea. Almost 30 years of diplomatic engagement, business, and social contact have enabled the Sino-American relationship to evolve far beyond the fears engendered by the extreme secrecy and mistrust of the Cold War. The much younger diplomatic relationship with North Korea has done little to permit the kind of mutual understanding and relaxation of tensions that deterrence requires.

### A FUTURE FOR NUCLEAR DETERRENCE?

While Russian and Chinese opposition to US plans for national missile defense naturally attract more attention, European opposition potentially is the most significant of all. Russia and China are opposed for reasons that ultimately stem from *self-interest*, but the European critique is based more clearly on issues of *principle*. It makes explicit the relationship between missile proliferation and one of the essential building-blocks of post-World War II security. As prominent European security spokespersons have recognized, the greatest threat of ballistic missile proliferation is its potential to undermine the credibility of deterrence itself.

To be sure, self-interest is not absent from the European critique, much of which reflects Europe's relative distance—its lack of strategic engagement—from the regions being transformed by ballistic missile proliferation. Although a quick look at the map will confirm that Europe is geographically much closer to several key

missile proliferators, it is much farther away mentally. For some, a narrow-minded fear of having to buy American technology also plays a role, as does contentment with low defense spending.<sup>79</sup> Others, including European Union foreign policy chief Javier Solana, express the traditional but not unfounded concern that America will use missile defenses to retreat into isolation, decoupling its security from that of its allies.<sup>80</sup>

Overshadowing all these concerns is a preoccupation with world order: the fear that a stable and highly predictable world based on deterrence of major war is disappearing, compelling all countries to rebuild defenses of a kind Europeans hoped to leave in the past.<sup>81</sup> The most serious issue posed by ballistic missile proliferation is this challenge to the relevance of deterrence in the 21st century. Although the military threats originate with regional proliferators, it is American preparations that have catalyzed European anxieties. In contrast to hopes for a post-modern world in which military threats recede ever further into the background of consciousness, ballistic missile defense restores old fears and anxieties.<sup>82</sup> Maybe regional military threats can be ignored, but not an American challenge to fundamental strategic assumptions.

With its large and highly survivable offensive forces, the United States retains overwhelming deterrent capabilities, but US confidence in their ability to dissuade countries like North Korea or a post-sanctions Iraq is not great. No one doubts that the United States could destroy a country like North Korea, but are North Korean leaders convinced it actually would? Even in the darkest days of the Cold War, deterrence was not a mathematical quotient; it depended upon the perceptions and cultural biases of the people directly involved and upon a sense of insight into the mind of the other side, all of which are lacking in these situations today. If the Americans convince their allies that deterrence no longer is sufficiently reliable to serve as the basis for security against all nuclear attacks, then the debate over continental missile defenses is all but over. Once deterrence is seriously doubted, sooner or later it must be buttressed by defenses.

The challenge to deterrence comes not from the numerically tiny nuclear-armed missile forces that a North Korea might be able to create, but from the declining confidence of the American people and others. Deterrence has always relied upon the credibility of a response.

The problems of assuring the credibility of US deterrent threats to prevent attacks on Europe bedeviled Western leaders throughout the Cold War. Now as then, threats to retaliate against attacks on American territory sound a lot more convincing than threats to retaliate against attacks on an ally.

The preferred solution of the Cold War era, flexible response, was reasonable to most national leaders then, but its relevance today is more questionable. Would the United States risk losing Fairbanks to prevent an attack on Seoul? In the era of post-heroic warfare, when military success is defined primarily in terms of few or no casualties to one's soldiers, such a proposition is not questionable, it is absurd.<sup>83</sup> "The threat," as Barry Blechman has remarked, "is that nations with aggressive ambitions could come to believe that because of the missile capability, we could be deterred from intervening in their region."<sup>84</sup>

Not surprisingly, the countries most insecure and uncertain of US willingness to engage its deterrent forces for their security—notably the two quasi-allies, Israel and Taiwan—also appear to be most willing to invest in missile defenses of their own.<sup>85</sup> TBMD may help the United States to maintain its regional security guarantees; it also may be necessary to protect expeditionary forces and peace enforcement forces deployed in unstable regions. But it does not resolve political pressure for territorial defense of North America.

Should North Korea or other unpredictable states resume testing of long-range missiles, the pressure on US leaders to deploy national missile defenses may become irresistible. As critics of missile defenses have shown, the current technical proficiency of such weapons is easily exaggerated.<sup>86</sup> But in a world transformed by missile proliferation, where the relevance of deterrence is more and more questionable, such criticism simply may be beside the point. The technical reliability of defenses matters less than their effect on national resolve. Irrespective of confidence in its technical capability to intercept all incoming warheads, even from a limited attack, such a system may be the political price that must be paid if the United States is to remain fully committed to the security of East Asia or other regions. In such circumstances, ABM Treaty modification could well become reality.

## **CONCLUSION: FROM BALLISTIC MISSILE PROLIFERATION TO THE PRINCIPLES OF SECURITY**

It is ironic that nonproliferation regimes must carry their greatest burdens now, just as those very regimes are themselves increasingly fragile. No longer is proliferation policy a secondary issue, of exclusively regional interest. Instead, strategic arms control and nonproliferation have truly become one. The uncertain future of the ABM Treaty—the result of the apparent weakness of one nonproliferation regime—will have significant effects on the future of weapons proliferation as well. Unilateral deployment of national missile defenses, without a carefully constructed sheath of diplomatic assurances, will make further cooperation on all aspects of nonproliferation much more difficult.

Precipitous abrogation of the ABM Treaty almost certainly would crush the already weak barriers against the spread of ballistic missiles. Not only Russia and China, but soon their neighbors like India would accelerate their offensive missile programs, arousing their neighbors in turn to redouble their own efforts. Countries that have shown restraint like Ukraine and South Korea could feel provoked to reassess their approaches as well.

Because of the relationship between the different nonproliferation regimes, moreover, the effects would not be limited to the spread of ballistic missiles; rather it could well augur a new wave of nuclear, biological, chemical, and other forms of weapons proliferation. The ABM Treaty may not be an ideal instrument for ensuring peace and security in the 21st century, but the effects of sudden abrogation could be catastrophic, bringing down with it the entire fabric of global nonproliferation.

While everyone can agree that the time for repeating stock phrases from the Cold War is over, we have no strong sense of whether and how to replace those old rules of thumb. The international community needs an open dialogue on the goals of nonproliferation policy, on the relationship between proliferation threats and military policy, and on the future of deterrence and defense in the 21st century. Dealing with these uncertainties well may be the most important task that ballistic missile proliferation compels us to undertake.

<sup>1</sup> Bernard Brodie, "Implications for Military Policy," in Brodie, ed., *The Absolute Weapon: Atomic Power and World Order* (New York: Harcourt, Brace, 1946), p. 76.

<sup>2</sup> James Risen and Judith Miller, "CIA Tells Clinton an Iranian A-bomb Can't be Ruled Out," *New York Times*, January 17, 2000, p. A1.

<sup>3</sup> Michael Eisenstadt calls ballistic missiles a "symbolic surrogate" for the full range of WMD capabilities that a country may possess, but cannot brandish due to treaty obligations. Eisenstadt, "Living With a Nuclear Iran," *Survival* 41 (Autumn 1999), p. 132.

<sup>4</sup> Michael Barletta and Amy Sands, eds., *Nonproliferation Regimes at Risk*, Occasional Paper No. 3 (Monterey: Center for Nonproliferation Studies, 1999).

<sup>5</sup> This idea received some attention—and was as quickly dismissed—a few years ago. For example, *Weapons of Mass Destruction: Are the Regimes Falling Behind?* 37th Strategy for Peace, US Foreign Policy Conference (Muscatine, Iowa: The Stanley Foundation, 1996).

<sup>6</sup> The same point is made more generally in Rajan Menon and S. Enders Wimbush, "Asia in the 21st Century: Power Politics Alive and Well," *The National Interest*, no. 59 (Spring 2000), pp. 78-86.

<sup>7</sup> This theme is developed at length in the case studies of Eric Arnett, ed., *Military Capacity and the Risk of War: China, India, Pakistan and Iran* (Oxford: Oxford University Press, 1997).

<sup>8</sup> Joseph Cirincione, "Assessing the Assessment: the 1999 National Intelligence Estimate of the Ballistic Missile Threat," *The Nonproliferation Review* 7 (Spring 2000), pp. 125-133.

<sup>9</sup> Shannon Kile, "Nuclear Arms Control," *SIPRI Yearbook 1998* (Oxford: Oxford University Press, 1998), ch. 10.

<sup>10</sup> "Excerpts from Bush's Remarks on National Security and Arms Policy," *New York Times*, May 24, 2000, p. A19.

<sup>11</sup> "First Launch of Remanufactured Minuteman III," *Jane's Missiles and Rockets*, December 1999, p. 5; "TRW Corners Contracts on Air Force ICBM fleet," *Defense News*, January 24, 2000, p. 2.

<sup>12</sup> Andrew Koch, "US Navy to Buy More Trident II D-5 Missiles," *Jane's Defence Weekly*, December 22, 1999, p. 8.

<sup>13</sup> Nikolai Sokov, *Russian Strategic Modernization: Past and Future* (Lanham, MD: Rowman and Littlefield, 2000), ch. 4.

<sup>14</sup> International Institute for Strategic Studies, *Military Balance 1999-2000* (Oxford: Oxford University Press, 1999), p. 111.

<sup>15</sup> "The Incredible Shrinking Russian Nuclear Force," Carnegie Endowment for International Peace (CEIP) Proliferation Brief, May 31, 2000.

<sup>16</sup> Steven J. Zaloga, "Russia's SS-X-26: the Son of the Scud," *Jane's Intelligence Review*, March 1996, p. 103; Seamer Johnson, "Iskander Will Replace Ageing Scuds," *Jane's Missiles and Rockets*, January 2000, p. 8.

<sup>17</sup> Simon Sardzhyan, "Russian Industry Upbeat About Export Prospects," *Defense News*, July 3, 2000, p. 8.

<sup>18</sup> Nikolai Sokov, "The 'denuclearization' of Russia's defence policy?" *Disarmament Diplomacy*, no.48 (July 2000) pp. 14-18.

<sup>19</sup> Andrew Jack, "Putin Calls for Shake-up of Armed Forces," *Financial Times*, August 12-13, 2000, p. 2; "Russian Defence Chiefs Reach Stand-Off Over Shake-up Plans," *Financial Times*, August 14, 2000, p. 14; and "Russia to Reduce Armed Forces," *Financial Times*, September 9-10, 2000, p. 6.

<sup>20</sup> Kile, "Nuclear Arms Control," ch. 10.

<sup>21</sup> Robert S. Norris et al., *British, French, and Chinese Nuclear Weapons* (Boulder: Westview, 1994), pp. 303-307; *The Military Balance 1998/1999* (Oxford: Oxford University Press, 1999).

<sup>22</sup> Although there are no reliable reports on changes in the tempo of activity at Dimona, partial substantiation appears in "Israeli nuclear arsenal may be smaller than feared," *Sydney Morning Herald*, August 21, 2000.

<sup>23</sup> "Israeli Air Force Takes Command of Arrow System," *Arms Control Today* 30 (April 2000), p. 32.

<sup>24</sup> Phillip Clark, "China's Space Dream Countdown is In Sight," *Jane's Intelligence Review*, September 1999, pp. 37-39; Erik Eckholm, "China Takes a Giant Leap Closer to Manned Spaceflight," *New York Times*, November 22, 1999, p. A3.

<sup>25</sup> Erik Eckholm, "Beijing Shows Off Military Weapons to Impress the Chinese and Others," *New York Times*, October 2, 1999.

<sup>26</sup> The controversy over the extent of Chinese missile espionage in the United States is debated in "Special Section: The Cox Report," *Arms Control Today* 29 (April/May 1999).

<sup>27</sup> China's determination to deploy terminal missile guidance is explored in Richard D. Fisher, Jr., "China's Missile Over the Taiwan Strait: a Political and Military Assessment," in James R. Lilly and Chuck Downs, eds., *Crisis in the Taiwan Strait* (Washington, DC: National Defense University, 1997), pp. 191-195, 199-200.

<sup>28</sup> David Shambaugh, "Sino-American Strategic Relations: From Partners to Competitors," *Survival* 42 (Spring 2000), p. 105; Edward Timperlake and William Triplett II, "Beijing's Missile Game," *Defense News*, December 13, 1999, p. 19.

<sup>29</sup> "China's Nuclear Modernization," *CEIP Proliferation Brief*, April 7, 1999.

<sup>30</sup> Aaron Karp, *Ballistic Missile Proliferation: The Politics and Technics* (Oxford: Oxford University Press, 1996), pp. 204-206.

<sup>31</sup> Aaron Karp, "Indian Nuclear Ambitions and the Limits of American Influence," *Arms Control Today* 28 (May 1998), pp. 14-21; and George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley: University of California Press, 1999), pp. 364, 383. A related point on the role of ballistic missiles in nuclear weapons decisionmaking is made by no less an authority than K. Subrahmanyam, who noted that "...the Indian nuclear tests became inevitable and they were triggered by the Ghauri missile test by Pakistan on April 6, 1998." Subrahmanyam, "Indian Nuclear Policy, 1964-98: A Personal Recollection," in Jasjit Singh, ed., *Nuclear India* (New Delhi: Knowledge World and the Institute for Defence Studies and Analyses, 1998), p. 52.

<sup>32</sup> Atul Aneja, "Dhanush Test-Firing Likely in March," *The Hindu*, 3 February 2000; author's discussions with Indian Ministry of Defence and DRDO officials, New Delhi, February 17-20, 2000; Rahul Bedi, "Missile Test is 'Partial Success', Says India," *Jane's Defence Weekly*, April 19, 2000, p. 14.

<sup>33</sup> A.P.J. Abdul Kalam with Arun Tiwari, *Wings of Fire: An Autobiography* (Hyderabad: Universities Press, 1999), pp. 147-152.

<sup>34</sup> R. Ramachandran, "Developing a Delivery System," *Frontline*, May 7, 1999; Pravin K. Sawhey, "India to Test-Fire Extended Range Agni IRBM," *Jane's Missiles and Rockets*, January 2000, p. 12.

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<sup>36</sup> David Gardner et al., "India's Defence Spending Jumps by 28%," *Financial Times*, March 1, 2000, p. 1.

<sup>37</sup> Paul Beaver, "Pakistan Tests Ghauri II," *Jane's Missiles and Rockets*, May 1999, p. 7.

<sup>38</sup> Atul Aneja, "Pakistan Begins Work on Shaheen-II," *The Hindu*, September 27, 1999.

<sup>39</sup> Scott Ritter, "The Case for Iraq's Qualitative Disarmament," *Arms Control Today* 30 (June 2000), p. 9.

<sup>40</sup> For example, compare David C. Isby, "Desert Fox Delays Iraq's Offensive Missile Programmes," *Jane's Missiles and Rockets*, March 1999, p. 4-5; and Steven Lee Myers, "Flight Tests Show Iraq Has Resumed a Missile Program," *New York Times*, July 1, 2000, p. A1.

<sup>41</sup> "UNSCOM Reveals Iraq's Secret Missile Programmes," *Jane's Missiles and Rockets*, March 1999, pp. 1-3.

<sup>42</sup> James Risen and Judith Miller, "CIA Tells Clinton an Iranian A-bomb Can't be Ruled Out," *New York Times*, January 17, 2000, p. A1.

<sup>43</sup> Tim Weiner, "Iran Said to Test Missile Able to Hit Israel and Saudis," *New York Times*, July 23, 1998, p. A1.

<sup>44</sup> Aaron Karp, "The Lessons of Iranian Missile Programs," *The Nonproliferation Review* 5 (Spring-Summer 1998).

<sup>45</sup> Central Intelligence Agency, *Unclassified report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1 July Through 31 December 1999* (Langley, Virginia: US Central Intelligence Agency, August 2000).

<sup>46</sup> David Buchan, "Britain Protests at Libyan Smuggling of Missile Parts," *Financial Times*, January 10, 2000, p. 1.

<sup>47</sup> Bill Gertz, "Beijing Delivered Missile Technology to Libya, US Says,"



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<sup>48</sup> Peter Montagnon, "Moving Toward a More Robust Stance," *Financial Times*, July 13, 1999, p. 11.

<sup>49</sup> Joseph S. Bermudez, Jr., *A History of Ballistic Missile Development in the DPRK*, Occasional Paper No. 2 (Monterey: Center for Nonproliferation Studies, November 1999).

<sup>50</sup> Jim Mann, "N. Korean Missiles Have Russian Roots, Explosive Theory Suggests," *Los Angeles Times*, September 6, 2000.

<sup>51</sup> Jane Perlez, "North Korea's Missile Pledge Paves the Way for New Talks," *New York Times*, June 22, 2000, p. A8.

<sup>52</sup> Michael R. Gordon, "North Korea Reported Open to Halting Missile Program," *New York Times*, July 20, 2000, p. A6. Other reports quote North Korean leader Kim Jong-Il saying the offer "was just a joke." See John Burton, "N Korea Sets Rules for US Ties," *Financial Times*, August 15, 2000, p. 8.

<sup>53</sup> William J. Broad, "Spy Photos of Korean Missile Site Bring Dispute," *New York Times*, January 11, 2000, p. A8.

<sup>54</sup> Robert Karnoil, "Vietnam Stocking Up Scuds," *Jane's Defence Weekly*, April 14, 1999, p. 17.

<sup>55</sup> Andrew Koch, "USA Rethinks MTCR Options," *Jane's Defence Weekly*, May 10, 2000, p. 22.

<sup>56</sup> Calvin Sims, "South Korea Plans to Begin Rocket Programs," *New York Times*, January 15, 2000, p. A3; Don Kirk, "Seoul Seeks US Backing for Missile Development," *International Herald Tribune*, July 2, 1999, p. 4.

<sup>57</sup> Mure Dickie, "Taiwan 'Needs Long-Range Missile System,'" *Financial Times*, December 1999, p. 6.

<sup>58</sup> The statements of Taiwan's new Defense Minister Wu Shih-wen illustrate this ambivalence. He is quoted in Mure Dickie, "Taiwan Warriors Fight a Perpetual Battle for Better Weapons," *Financial Times*, September 1, 2000, p. 7.

<sup>59</sup> Richard H. Speier, *The Missile Technology Control Regime: Case Study of a Multilateral Negotiation* (unpublished manuscript, 1995).

<sup>60</sup> Not every scholar of missile proliferation would agree. For the case that the MTCR was all but superfluous, see Savita Pande, "Missile Technology Control Regimes: Impact Assessment," *Strategic Analysis* (September 1999), pp. 923-943.

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<sup>64</sup> Matthew Rice, "Russia Proposes Global Regime on Missile Proliferation," *Arms Control Today* 30 (May 2000), pp. 43-44.

<sup>65</sup> *Facing Nuclear Dangers: An Action Plan for the 21st Century*, The Report of the Tokyo Forum for Nuclear Non-Proliferation and Disarmament (Tokyo and Hiroshima: Japan Institute of International Affairs and the Hiroshima Peace Institute, July 25, 1999).

<sup>66</sup> *Report of the Commission to Assess the Ballistic Missile Threat to the United States*, Executive Summary (Washington, DC: US Government Printing Office, July 15, 1998), p. 5.

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<sup>73</sup> "Text: Joint Clinton-Putin Statement on Strategic Stability," *US Department of State Washington File*, June 4, 2000.

<sup>74</sup> Craig S. Smith, "Russia and China Unite in Criticism of U.S. Antimissile Plan," *New York Times*, July 19, 2000, p. A6. The text of the joint statement is reprinted in "China-Russia statement on NMD," *Disarmament Diplomacy* 48 (July 2000), pp. 40-41.

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