Red Lines, Deadlines, and Thinking the Unthinkable: India, Pakistan, Iran, North Korea, and China

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Early in the thermonuclear age, Herman Kahn warned the world that it had to "think about the unthinkable": The consequences of an actual nuclear war, and consider which side – if any – might "win." While the story may be apocryphal, Khan is also said to have told Curtis Lemay – then head of the Strategic Air Command – that Lemay did not have a war plan because he focused too heavily on strikes and inflicting maximum damage, while ignoring the consequences of nuclear weapons. Khan is said to have told Lemay that he lacked a war plan and all he had was a "wargasm."

The end of the Cold War seemed to put an end to the need for such thinking, but recent developments in North Korea and Iran make it all too clear that there is still a need for such horrifying yet "realist" analysis. Of course, calmer heads may prevail. Reason, deterrence, and arms control may still curtail nuclear proliferation, and are the most probable result of today's nuclear arms races. *But*, that probability is declining. Four different nuclear arms races are now interacting to change the need for strategic calculus and demand a strategy that looks beyond arms control and considers a much grimmer future.

India and Pakistan: Suicide with Minor Grand Strategic Consequences

Any war between India and Pakistan would be a pointless human tragedy, and a serious nuclear exchange would bring about the worst possible outcome. Of the current potential nuclear arms races, a nuclear exchange between India and Pakistan risks the most damaging consequences in terms of human deaths, as well as the costs and time necessary to recover. Ground burst strikes on Indian and Pakistani cities – "countervalue" strikes – would produce extremely high immediate and long-term deaths. Neither country has the medical and security facilities necessary to deal with such casualty burdens; no emergency aid agency is equipped and trained to deal with such events; nor is it clear significant outside aid could come or would come in time to be effective.

At present, both countries continue to build up their nuclear-armed missile forces and stockpiles of nuclear weapons. While unclassified estimates are very uncertain and differ greatly in detail, an Open Briefing report on Indian nuclear forces drawing on material published in the Bulletin of the Atomic Scientists noted that India continued to improve the nuclear strike capabilities of its combat aircraft and develop sea-based ballistic and

cruise missiles, and that its nuclear weapons stocks and missiles could be summarized as follows: [1]

> "India is estimated to have produced approximately 520 kilograms of weapons-grade plutonium (IPFM, 2011), sufficient for 100–130 nuclear warheads; however, not all of the material has been converted into warheads. Based on available information about its nuclear-capable delivery vehicles, we estimate that India has produced 80–100 nuclear warheads. It will need more warheads to arm the new missiles it is currently developing. In addition to the Dhruva plutonium production reactor near Mumbai, India plans to construct a second reactor near Visakhapatnam, on the east coast. India is building an unsafeguarded prototype fast-breeder reactor at the Indira Gandhi Centre for Atomic Research near Kalpakkam (about 1,000 kilometers or 620 miles south of Visakhapatnam), which will significantly increase India's plutonium production capacity once it becomes operational.
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> "… India has three types of land-based missiles that may be operational: the short-range Prithvi I, the short-range Agni I, and the medium-range Agni II. The Prithvi I has been deployed for almost 15 years, but the Agni I and II, despite being declared operational, both have reliability issues that have delayed their full operational service.
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> "India has been busy growing its missile program, with four more Agni versions in progress: an Agni II+ was test-launched in 2010 but failed; the longer-range Agni III, after at least four flight-tests, remains under development; and the Agni IV may be a technology bridge to the newest type, the long-range Agni V, which had its first test-launch in April. Some of these Agni programs may serve as technology-development platforms for longer-range versions.
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> "The bulk of the Indian ballistic missile force is comprised of three versions of Prithvi missiles, but only one of these versions, the army's Prithvi I, has a nuclear role. Given its small size (9 meters long and 1 meter in diameter), the Prithvi I is difficult to spot on satellite images, and therefore little is known about its deployment locations. The Prithvi I is a short-range missile (up to 150 kilometers or 93 miles) and is the mainstay of the Strategic Forces Command, India's designated nuclear weapons service.
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> "In December 2011, India successfully test-launched its two-stage Agni I missile, which has a range of 700 kilometers (435 miles), for the eighth time—suggesting that the missile might finally have become fully operational. But a ninth test-launch scheduled for early May 2012 was postponed due to a technical glitch.
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> "The road- or rail-launched Agni II, an improvement on the Agni I, can fly up to 2,000 kilometers (1,243 miles) and can carry a 1,000-kilogram payload, and it takes just 15 minutes for the missile to be readied for firing. The missile has been test-fired eight times with several failures, but more recent test-flights, on May

> 19, 2010 and September 30, 2011, were successful, demonstrating some progress toward making the Agni II fully operational. A 2010 test-launch of an extended-range Agni II, known as the Agni II+, failed.
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> "Still under development is India's rail-mobile Agni III, a two-stage, solid-fuel missile with a range of more than 3,000 kilometers (1,864 miles)…. India took a significant step forward with the successful test-launch of the Agni V ballistic missile on April 19, 2012. With a range reportedly greater than 5,000 kilometers (3,107 miles), the Agni V can reach any target in China; however, the missile needs more testing and is still several years away from operational deployment.

A slightly more dated article in the *Bulletin of Atomic Scientists* describes Pakistan's nuclear program as including its F-16 fighters and the following nuclear and missile capabilities:[2]

> "Pakistan is building two new plutonium production reactors and a new reprocessing facility with which it will be able to fabricate more nuclear weapons fuel. It is also developing new delivery systems. Enhancements to Pakistan's nuclear forces include a new nuclear-capable medium-range ballistic missile (MRBM), the development of two new nuclear-capable short-range ballistic missiles, and the development of two new nuclear-capable cruise missiles.
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> "We estimate that Pakistan has a nuclear weapons stockpile of 90–110 nuclear warheads, an increase from the estimated 70–90 warheads in 2009 (Norris and Kristensen, 2009). The US Defense Intelligence Agency projected in 1999 that by 2020 Pakistan would have 60–80 warheads (Defense Intelligence Agency, 1999); Pakistan appears to have reached that level in 2006 or 2007 (Norris and Kristensen, 2007), more than a decade ahead of predictions. In January 2011, our estimate (DeYoung, 2011) of Pakistan's stockpile was confirmed in the New York Times by "officials and outsiders familiar with the American assessment," who said that the official US estimate for "deployed weapons" ranged from the mid-90s to more than 110 (Sanger and Schmitt, 2011).1 With four new delivery systems and two plutonium production reactors under development, however, the rate of Pakistan's stockpile growth may even increase over the next 10 years.
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> "The Pakistani government has not defined the number and type of nuclear weapons that its minimum deterrent requires. But Pakistan's pace of nuclear modernization—and its development of several short-range delivery systems—indicates that its nuclear posture has entered an important new phase and that a public explanation is overdue.
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> "…Pakistan has three operational nuclear-capable ballistic missiles: the short-range Ghaznavi (Hatf-3) and Shaheen-1 (Hatf-4) and the medium-range Ghauri (Hatf-5). It has at least three other nuclear-capable ballistic missiles under development: the medium-range Shaheen-2 (Hatf-6), which may soon be operational, and the short-range Abdali (Haft-2) and Nasr (Haft-9) systems.

> "… Pakistan is developing two new cruise missiles, the Babur (Hatf-7) and Ra'ad (Hatf-8), and it uses similar language to describe both missiles. According to the ISPR, the Babur and Ra'ad both have "stealth capabilities" and "pinpoint accuracy," and each is described as "a low-altitude, terrain-hugging missile with high maneuverability"

One has to assume that there should be a high level of rational restraint and deterrence, but both states have a history of overreaction, nationalism, and failure to demonstrate stability and restraint in arms control. More broadly, historical precedent, particularly over the 20th century, does not make a strong case for behavior based on rational bargaining.

It is unclear that either has really thought out the consequences of a nuclear exchange beyond the "Duke Nukem" school of planning: who can kill more of the enemy. Rhetoric asides, the military buildup by both sides suggests a competition aimed at creating the largest possible nuclear "wargasm."

The bad news is that this ongoing nuclear arms race receives little real attention in terms of what would happen if both sides actually went to war. The good news, from a ruthlessly "realist" viewpoint, is that such a human tragedy does not necessarily have serious grand strategic consequences for other states, and might well have benefits.

Some fallout perhaps, but not that much in terms of serious radiation exposure in terms of exposure measured in rads. The loss of India and Pakistan might create some short term economic issues for importers of goods and services. However, the net effect would shift benefits to other suppliers without any clear problems in substitutions or costs. Some outside aid costs may be incurred, although one has to question whether outside states have any moral obligation to help the truly self-destructive, and how much outside aid could really be useful. In this sense, assistance would be a matter of sentiment rather than imperative.

This is not a reason for outside powers to give up on seeking some form of arms control agreements, confidence building measures, and restraint. It is, however, a cause for Indian and Pakistan strategic analysis to start realistically modeling where they are headed if a nuclear war occurs now, or 5 or 10 years in the future. Unlike conventional weapons, this is not a matter of "toys for the boys."

It may also be a reason for outside actors like the US and the International Atomic Energy Agency to start assessing these consequences independently, and to force transparency in terms of nuclear stockpiles, delivery capabilities and the results of given types of exchange. It might also be a time for nations, NGOs, and the UN to make it clear there will be no aid to either country in the event a nuclear exchange does occur. These two options, in conjunction with arms control efforts, seem to be the only options where the outside world can really make a difference.

The Pakistani Wild Cards

If there are wild cards in the India-Pakistani nuclear arms race, they lie in two aspects of the Pakistani nuclear and missile program. First, is the issue of proliferation beyond Pakistan. Pakistan seems to be heading towards over-capacity in nuclear fissile material production and it is developing reliable missiles it can export to third countries that probably do not require a covert presence of the kind China provides in Saudi Arabia.

The end result is the potential to export nuclear armed missiles to a country that Pakistan is convinced would never share nuclear weapons or lose control over them, such as Saudi Arabia. Such a transfer could produce a massive cash transfer and create a new nuclear power opposing Iran – not a serious threat to Pakistan but a regional nuclear rival on its borders. An abundant stockpile also provides Pakistan the potential to sell nuclear weapons design and test data, as well as missile designs and components. In short, no one can totally decouple Pakistan from future cases of proliferation, nor can one be certain Pakistan would not create new threats through such transfers.

Second, there is the marginal risk that Pakistani nuclear weapons might fall into extremist hands or Pakistan might become an extremist state. Either scenario would leave little hope of rational behavior. Rambo-like fantasies of US Special Forces securing Pakistani nuclear forces aside, these are possibilities that both broaden the scope of possible Pakistani-related nuclear strikes, and significantly decrease the impact of deterrence and restraint in terms of rational bargaining.

The good news is that neither option seems particularly probable in the near term. The bad news is that it is becoming far more difficult to assign such probabilities in the near term, and there is little the US and outside powers can really do to affect the situation. Preventive strikes do not seem any more credible than the "Rambo" option, threatening retaliation risks triggering further escalation and strikes, and Pakistani nationalism is hostile enough already. Negotiating safety measures, maintaining foreign aid, and pushing for arms control can all have some benefits, but they seem likely to be marginal or useless if internal developments within Pakistan continue to radicalize certain elements.

Iran: Red Lines versus Rhetoric

Iran has already managed to trigger a nuclear arms race without even having a nuclear weapon. Israel long ago extended the range of its nuclear-armed land-based missiles, probably now targets Iran with thermonuclear weapons, and is examining options for sea launched cruise missiles. The US has offered the Gulf states and the region "extended deterrence" – although without specifying whether this would be nuclear or conventional – and is deploying ballistic missile defense ships and selling THAAD, PAC 3, and radars. It is cooperating with Israel in improving the Arrow and shorter-range missile defenses. A credible Saudi voice like Prince Turki has stated that Saudi Arabia is examining nuclear options.

The de facto failure of the latest 5+1 talks with Iran, and the failure of the regime to react to sanctions – at least to date – does not mean that negotiations have failed. Iran has scarcely been forthcoming and has long used negotiations as a cover for continued nuclear programs, but the option of negotiations is still available. Moreover, sanctions are limiting Iran's military import, and it can take several years for the damaging and most recent rounds of sanctions to have their most severe political and economic impact. There is also the possibility that the coming Iranian election may signal that Iran is willing to accept some level of "reform" and added compromise; although it is just as likely that elections signal the opposite—that the Supreme Leader is in total control and will tolerate no real challenge.

At the same time, Iran's *red lines* have shifted to the point where they now are at the nuclear breakout and IRBM stage of development, and where Iran can now move towards the following new red lines: fissile grade enrichment, "cold" or passive nuclear weapons testing, creation of new dispersed or sheltered facilities with more advance centrifuges, testing an actual nuclear device, and arming its missiles with an untested nuclear warhead – a risk that sounds extreme until one remembers the reliability and accuracy of US nuclear-armed systems like Jupiter and the M-4/MGM-18 LaCrosse.

There is no reliable way to predict such events in advance. They are only likely to become "red lines" when they are actually crossed and have been detected. There also is no unclassified way to know how much design and test data Iran has received from the outside, and how well it can hide its efforts and leap frog to some form of weapons deployment.

Equally important, there is no way to know exactly how the US would react and how much international support it would get. Gulf leaders, for example, talk privately about such support but are remarkably silent when the subject of supporting and basing US preventive strikes is raised in any open forum that even hints at public commitment.

Moreover, there is no way to know how Israel would react. At this point, its nuclear efforts are so tightly concealed that there is no public debate over its nuclear weapons holding, missile forces, and possible addition of sea or air-launched systems. The US has made it clear that it does not want Israeli preventive strikes, but has never publically said it would ride out any Israel effort and let Israel take the consequences. Israel may or may not be able to hit at all of Iran's current major publically known nuclear enrichment facilities. The hardening of Natanz and Fordow raise questions for a force of fighter-bombers using conventional earth penetrators (although nuclear-armed penetrators would be a very different story).

As for the US, it has steadily refined its military strike options and kept them very real. The US can hit at the full mix of suspect sites – including research and centrifuge production, take out much of Iran's defenses and missile capabilities, and has access to Gulf bases. And it can restrike if Iran tries to recreate its facilities. These are all capabilities Israel probably lacks -- although several factors may have eased its may have eased its penetration and refueling problems, including Israel's quasi-rapprochement with

Turkey, Syria's civil war, and Iraq's problems in getting advanced fighters and weapons from the US.

The US has also said that an Iranian nuclear force is "unacceptable." Like the word "no," however, "unacceptable" is far more difficult to define in practice than in the dictionary. Preventive strikes by either the US or Israel can trigger a far more intensive Iranian nuclear effort, withdrawal from the NNPT with claim the act is "defensive," and a wide range of low level military acts in the Gulf or effort to use proxies and surrogates in Lebanon, Iraq, and the Gaza. Sustaining even a major US strike requires sustain support from the Arab Gulf states for restrikes, as well as willingness to counter Iranian asymmetric and even missile strikes.

US rhetoric about refusing to rely on "containment" is inherently absurd since the US would have to rely on containment after preventive strikes and has no credible options to invade Iran or force Iranian regime change on its own. The question then arises as to whether the US can create a serious form of the "extended deterrence", which Secretary Clinton offered the Arab Gulf states and region, with or without preventive strikes since any reliance on missile defense alone would be credible or sufficient. It is whether the US meant nuclear or just precision conventional "extended deterrence," and how that guarantee would evolve if Iran deployed nuclear armed missiles and forces.

In balance, bad as the risks and uncertainties are, the US might have to carry out preventive strikes if Iran crossed two of the potential red lines listed earlier: testing an actual nuclear device, and arming its missiles with an untested nuclear warhead. The other options: fissile grade enrichment, "cold" or passive nuclear weapons testing, and creation of new dispersed or sheltered facilities with more advance centrifuges, are now too close to what has already happened and would present massive problems in terms of US credibility given the US false alarms in Iraq. The US cannot afford to be seen as over-reacting and neither can its allies.

At the same time, the US cannot underreact as well. If some argue that Iran should learn from Libya, the US should definitely learn from North Korea. Brazil, South Africa and Argentina are not the models for dealing with Iran. Once Iran has become an active military power, it is likely to move forward toward more and more nuclear weapons, boosted and thermonuclear weapons designs, and combinations of launch on warning, launch under attack and then dispersed and shelter forces. Pressure from Israel, Saudi (and possibly Turkish) nuclear and missile forces will add to the resulting arms race, as will the US need to constantly upgrade any forces for "extended deterrence."

- The most "quiet" or discrete extended deterrence option would be nuclear armed, submarine or surface launched cruise missiles backed with the deployment of conventionally armed cruise or ballistic missiles with terminal guidance systems capable of point attacks on Iran's most valuable civil and military assets.
- The most decisive extended deterrence options would be the equivalent of the combination of Pershing II and GLCMs that were land based, had US operating crews both deep inside the Arab Gulf and other regional states and in or near key

major cities, and had both nuclear and precision conventional warheads. Iran would be faced with the inability to strike at key Arab population centers without striking at US forces and still see mobile US nuclear armed forces in reserve. It also could not use conventional warheads without facing a more accurate and reliable US strike force in return.

- The US could work with key Arab allies and the GCC to create the same kind of layered defenses against missiles and rockets being developed in Israel, and – as is suggested later -- use the South Korean model to help create layered defenses in the gulf, allowing an indirect form of cooperation between Israel and the Gulf states without overt ties or relations.

As is the case with India and Pakistan, it also is important to think the unthinkable in terms of what a nuclear war in the region might become. Even today, it is possible to think of some Iranian covert nuclear attack on Israel or a Gulf state using a gun device hidden in a ship – or less credibly – given to a proxy like the Hezbollah. The end result of an attack on Israel might well be nuclear ground bursts on Iranian cities – a far great "existential threat" to Iran than the kind of attack Iran could launch again Israel during the first years of its nuclear forces. And, the situation is scarcely likely to get better as all of the current and potential nuclear powers affecting the nuclear balance steadily increase their capabilities over the years and decades ahead.

Israel would have no reason to limit the scale of its retaliation, and outside states would have no strategic reason to urge such restraint. The outside world may need Iranian oil – although that is now questionable given developments in shale oil and gas and other sources of energy and liquid fuels. No one needs Iranians and no one needs an Iranian regime with any chance of recovering nuclear capability.

Horrible as a nuclear exchange of any kind could be in humanitarian terms, the grim logic of strategic realism does not place any restraints on Israeli retaliatory attacks on Iran. As for Saudi Arabia and extended deterrence, the US has to consider the tradeoff between all of the risks and costs of preventive strikes and the costs and risks of nuclear exchanges or the use of extended deterrence if the US does not act. Arms control negotiations, sanctions, clearly defined redlines and public analysis of the cost to Iran of a nuclear exchange are all interim steps that might eliminate the need for preventive strikes, *but some red lines are deadlines and make it time to act*.

North Korea: Shutting the Nuclear Barn Door

North Korea presents a very different set of problems: a case in which a country has already proliferated in limited terms by conducting three nuclear tests, is rebuilding its reactors in ways that will give it more plutonium, and has openly displayed a major centrifuge facility for obtaining fissile material for uranium weapons.

- The official view of the US intelligence community is that North Korea has not yet been successful in getting high yields from its fission devices. Its initial tests produced only very low yields. The third test on February 12, 2013 seems to have produces a yield of only "several kilotons" to 6-7 kilotons, versus 12-20 kilotons

for the first US weapons.[3] This would present serious problems for the regime in terms of targeting anything but city-sized targets at long missile ranges, given the combined uncertainties surrounding the reliability of both the warhead and North Korean missiles, and the reliability and accuracy of North Korean systems overall.

- North Korea may not have the ability to build small warheads and bombs – although this seems to be a subject of dispute within the US intelligence community and outside exports; for instance, ISIS estimates that, "it should not come as a surprise to the international community that North Korea may now have the capability to explode a miniaturized nuclear device. ISIS (and key members of the U.S. intelligence community) have assessed for some time that North Korea likely has the capability to miniaturize a nuclear weapon for its 800 mile range Nodong missile. Although more information is needed to make a sound assessment, this test could, as North Korea has stated, demonstrate this capability. ISIS has also assessed that North Korea still lacks the ability to deploy a warhead on an ICBM, although it shows progress at this effort. North Korea would need to conduct missile flight tests with a re-entry vehicle and mock warhead, increase the explosive yield of the warhead, possibly requiring its further miniaturization, and improve the operational reliability of the warhead and missile."[4]

- It seems clear that it does not have boosted or thermonuclear weapons production capabilities, but there is no way to predict when or if it might acquire these. Again, ISIS estimates that, "North Korea does not appear to have detonated a more sophisticated nuclear device, such as a thermonuclear device. Before the test, concern was expressed by some analysts that North Korea could test a more advanced nuclear weapon. The data from this test so far indicate that this is not the case. One important question is whether the nuclear test used only plutonium or involved highly enriched uranium either alone or in combination with plutonium."[5]

- There is no clear way to estimate North Korea's stocks of Plutonium. ISIS has estimated that, "North Korea had produced a total plutonium stockpile of between 46 and 64 kilograms, of which 28-50 kilograms could be in separated form and usable in nuclear weapons. It estimated in 2007 that North Korea would have the following stocks after its first nuclear test. There have since been two other tests, illustrating the difficulty in making such estimates. Current estimates may or may not take account of North Korea's third test but give enough Plutonium to make up to six weapons:[6,7]

  Suspected Military Stocks of Fissile Material, end of 2003

  - **Unirradiated Plutonium: 15-40 kg**
  - **Highly Enriched Uranium (HEU): Unknown**
  - **Number of Weapons: 2-9**

- North Korea has publically stated that it is refueling its 5 MWe reactor at Yongbyon and is building a new 50-100 MWe there, as well as a 200 MWe

reactor at Taechon.[8] It displayed a large centrifuge facility at Yongbyon in 2010 that could give it uranium fissile material for its weapons as well as fuel its reactors to make more plutonium. However, experts indicate the capacity of this facility is still limited: "…North Korea announced on April 2 that it would restart its nuclear facilities, including its 5-megawatt nuclear reactor in Yongbyon, north of the capital, which had been disabled and mothballed since an agreement in October 2007**.**…North Korea's nuclear arsenal is severely limited by a lack of fissile materials – plutonium or highly enriched uranium (HEU) – to fuel its bombs. Despite its recent threats, North Korea does not yet have much of a nuclear arsenal because it lacks fissile materials and has limited nuclear testing experience. In the long term, it's important to keep it that way; otherwise North Korea will pose a much more serious threat. So, it is important that they don't produce more fissile materials and don't conduct more nuclear tests. The Kim Jong-un regime has already threatened to conduct more tests, and with this announcement they are telling the world that they are going to make more bomb fuel… They also need more bomb fuel to conduct more nuclear tests."[9]

- North Korea has deployed its own version of the Scud B with a nominal range of 186 miles and Scud C with a range of 310 miles. It has four longer range systems in development that include the Nodong (620 miles?), Taepodong-1 (900+ miles), Musudan (1,680-2,100 miles), and Taepodong-2 (2,500-3,700 miles).[10]

  A recent CRS analysis notes that,

  > "A DNI report to Congress says that 'North Korea has short and medium range missiles that could be fitted with nuclear weapons, but we do not know whether it has in fact done so.' North Korea has several hundred short-range Scud-class and medium-range No-Dong-class ballistic missiles, and is developing an intermediate range ballistic missile. The Taepo-Dong-2 that was tested unsuccessfully in July 2006 would be able to reach the continental United States if it becomes operational. DNI assessed in 2008 that the Taepo-Dong-2 has the potential capability to deliver a nuclear-weapon-sized payload to the United States, but that absent successful testing the likelihood of this is low. A launch of a Taepo-Dong-2 missile as part of a failed satellite launch in April 2009 traveled further than earlier unsuccessful launches but still did not achieve a complete test. An April 2012 launch of a Taepo-Dong-2 (called the Unha-3 by North Korea) also failed in the first stage. The December 2012 launch of a Taepo-Dong-2 (Unha-3) was North Korea's first successful launch of a satellite into space. However, putting a satellite into orbit, while moving North Korea technically to its goal, does not translate into a reliable missile. Further testing would be required."[11]

Where Iran officially denies that it has a nuclear weapons program, North Korea has talked about nuclear strikes on the US long before it even has a credible capability to launch them and makes no secret of the threat it poses to its neighbors. It also clearly is set on a course where it will steadily deploy nuclear-armed missiles and aircraft with progressively longer ranges, higher yields, and more accuracy and reliability over time. It

will exploit any failure to match these forces, and there is no clear way to estimate how a mature and survivable nuclear force would affect North Korean uses of force at lower levels or its perceptions of risk.

Once again, it is important to think about the consequences of North Korea going from a token or no serious nuclear force to even a limited capability to strike the US matched by a serious capability to strike at South Korea or Japan and develop enough weapons for a serious tactical or theater nuclear strike capability. There is no way to calculate North Korea's willingness to take nuclear risks and the fact its threats and strategic rhetoric are extreme does not mean its actions will be. The fact remains, however, that it is the only power that openly threatens nuclear war and whose strategic leadership is openly uncertain enough to raise serious questions about its judgment and restraint.

US options are limited by the fact that North Korea has a powerful – if cautious and sometimes restraining – protector in China. It is far harder for the United States to talk about preventive strikes after the fact and in the face of Chinese desire to keep a buffer state between it and the US. US options are also affected by the fact that any deployment of US nuclear forces or extended deterrence that focuses on North Korea will be seen by China as a potential threat.

At the same time, the US faces the reality that the risks of a growing North Korean nuclear force – coupled to a large stock of chemically armed bombs and missiles and possible biological weapons – mean it cannot simply let a key ally like South Korea bear a one-sided threat or leave Japan in the position where it, too, has no balancing force. While arms control options are not impossible, it is also all too clear that that they offer even less chance of success than negotiations with Iran.

This leaves the US with a number of alternatives, none of which offer the prospect of lasting stability, but all of which are very similar to the options the US might use against Iran and would put pressure on both North Korea and China:

- Turn to China – for reasons analyzed in more depth in the following sections – and say the US will offer extended nuclear deterrence to Japan and South Korea unless China can persuade North Korea to halt and roll back its nuclear programs. It could confront China and aid South Korea with two major options:
    - The most "quiet" or discrete extended deterrence option would be nuclear armed submarine- or surface-launched cruise missiles backed with the deployment of conventionally armed cruise or ballistic missiles with terminal guidance systems capable of point attacks on North Korea's most valuable civil and military assets.
    - The most decisive extended deterrence options would be the equivalent of the combination of Pershing II and GLCMs that were land based, had US operating crews both deep inside South Korea and in or near its major cities, and had both nuclear and precision conventional warheads. North Korea would be faced with the inability to strike at key South Korean population centers without striking at US forces and still see mobile US

nuclear armed forces in reserve. It also could not use conventional warheads without facing a more accurate and reliable US strike force in return.

- The US could work with South Korea to create the same kind of layered defenses against missiles and rockets being developed in Israel, and use the South Korean model to help create layered defenses in the Gulf, allowing an indirect form of cooperation between Israel and the Gulf states without overt ties or relations.

As is the case in the Gulf, the US does not have to support proliferation by either South Korea or Japan. Experts may argue the timing, but none argue over South Korean and Japanese capability in building long range missiles and nuclear weapons, and doing so with minimal – if any – testing. In fact, South Korea would already have nuclear weapons if the US had not pressed South Korea to not go ahead and reached an agreement with South Korea back in 1975. [12]

As for missiles, South Korea announced in October 2012 that it was extending the range of its missile systems in response to North Korea's efforts. As a report by the Arms Control Association noted, [13]

> South Korea announced on Oct. 7 (2012) it had reached an agreement with the United States that will allow Seoul to extend the range of its ballistic missiles to 800 kilometers with a 500-kilogram payload, an increase the governments of both countries say is necessary to counter the growing threat posed by North Korea's ballistic missiles.
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> Under a 2001 agreement with the United States, South Korea was limited to developing ballistic missiles with ranges of no more than 300 kilometers with a 500-kilogram payload. That agreement increased South Korea's ballistic missile range from the 180-kilometer restriction that the two parties had negotiated in 1979. Under the new guidelines, South Korea will be able to target any site in North Korea from anywhere in its own territory.
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> … in an Oct. 7 press briefing, White House spokesman Jay Carney described the extension as a "prudent, proportional, and specific response" that is designed to improve South Korea's "ability to defend" against North Korea's ballistic missiles… In the Oct. 18 e-mail, the State Department official dismissed the possibility that the new South Korean missile guidelines would have an adverse effect on the MTCR, saying that the extension will have "no implications for other countries' missile-related export behavior" and that it does "not impact the export control commitments" to which South Korea agreed when it joined the MTCR.
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> …The North Korean Foreign Ministry responded to Seoul's announcement in an Oct. 10 statement saying that the United States "discarded its mask of deterring" missile proliferation by supporting South Korea's increased missile ranges and killed efforts to restrain the development of long-range missile launches on the Korean peninsula.

The US can put pressure on both North Korea and China in ways that would allow several years for negotiation while not seriously opposing South Korea in any way that would bind or sanction its ally. While Japan is far less likely to take a decision to go nuclear, particularly in the near-term, the US could decide that the Missile Technology Control Regime had essentially outlived its usefulness – binding the US without binding China – and encourage Japan to create precision strike conventional missiles as well as missile defenses.

This would confront both North Korea and China with the reality that once such a Japanese force was created, Japan could quickly arm them with nuclear weapons if it came under increasing North Korean or Chinese pressure. Such options would give the US, South Korea, and Japan growing leverage to pressure China to restrain North Korea as well as deter and contain the expansion of Chinese nuclear forces.

In fact, one way to put pressure on China would be to start a dialogue that could be either official or think tank, including discussions of both missile defense and extended deterrence, and encourage South Korea and Japan to surface the nuclear option. If this succeeded in pushing China into far more decisive pressure on North Korea, there would be no need for either extended deterrence or South Korean or Japanese nuclear forces.

Moreover, such options could be used to lever Chinese restraint in transferring missile technology to Iran. There also is no reason that the US, South Korea and Japan could not offer quid pro quos in terms of incentives for a North Korean roll back, including some formal agreement on all sides for a local weapons of mass destruction free zone and economic incentives to a more open North Korea.

At the same time, for all the reasons discussed below, the US may have to tacitly encourage South Korean and Japanese creation of at least precision guided conventional missile forces and possibly nuclear forces as a local regional counterbalance to the Chinese nuclear effort. This is scarcely a desirable option, or one that can easily be kept stable, but North Korea is only part of the problem and the US should not passively allow itself to be trapped into a Chinese-US nuclear relationship. It should be clear to China that it faces other potential nuclear powers if China's nuclear forces grow too much and are even indirectly linked to Chinese pressure on maritime and island disputes in the Pacific.

China: The Ghost in the Zero Option

Finally, it is time to take a much harder look at the broader interaction between China's nuclear and missile programs and the overall balance of nuclear forces. Quite frankly, it is both incompetent and intellectually dishonest to decouple China's expanding nuclear and missile forces from the US and Russian strategic and theater nuclear balance and to pretend that cuts in US nuclear forces are not connected to the future mix of Chinese and North Korean nuclear forces and how they interact with the forces (or non-forces) of South Korea and Japan.

Edition after edition of the Department of Defense report on Chinese military power has described the changes in Chinese missile forces. The 2012 edition notes,[14]

> "The PLA Second Artillery Corps is modernizing its short range ballistic missile force by fielding advanced variants with improved ranges and payloads. It is also acquiring and fielding greater numbers of conventional medium-range ballistic missiles (MRBMs) to increase the range at which it can conduct precision strikes against land targets and naval ships, including aircraft carriers, operating far from China's shores beyond the First island chain. Similarly, China continues to produce large numbers of advanced ground launched cruise missiles capable of standoff, precision strikes.

> "By 2015, China will also field additional road-mobile DF-31A (CSS-10 Mod 2) intercontinental ballistic missiles (ICBMs) and enhanced, silo-based DF-5 (CSS-4) ICBMs.
>
> "… China continues investments in its land-based ballistic and cruise missile programs. It is developing several variants of offensive missiles, upgrading older systems, forming additional units, and developing methods to counter ballistic missile defenses.
>
> "The PLA is acquiring large numbers of highly accurate, domestically built cruise missiles, and has previously acquired large numbers of Russian ones. These include the domestically produced, ground-launched CJ-10 land-attack cruise missile (LACM); the domestically produced ground- and ship-launched YJ-62 anti-ship cruise missile (ASCM); the Russian SS-N-22/SUNBURN supersonic ASCM, which is fitted on China's SOVREMENNY-class guided missile destroyers; and the Russian SS-N-27B/SIZZLER supersonic ASCM on China's Russian-built KILO-class diesel-powered attack submarines.
>
> "By October 2011, the PLA had deployed between 1,000 and 1,200 SRBM to units opposite Taiwan. In the past year, China has fielded new SRBM systems, added additional missile brigades in southeastern China, and upgraded the lethality of its existing SRBM force by introducing variants with improved ranges, accuracies, and payloads.
>
> "During comments to the media in 2011, China confirmed it is developing an anti-ship ballistic missile (ASBM), based on a variant of the DF-21 (CSS-5) medium-range ballistic missile (MRBM). Known as the DF-21D (CSS-5 Mod 5), this missile is intended to provide the PLA the capability to attack large ships, particularly aircraft carriers, in the western Pacific Ocean. The assessed range of the DF-21D exceeds 1,500 km, and the missile is armed with a maneuverable warhead."

No similar unclassified discussion has taken place of the growing expert debate over the size and nature of the Chinese nuclear weapons stockpile raised in studies by Phillip Karber and others. Estimates ranged from 80 to 2,000 weapons in 2005, and some now put the total at 300-400 while others claim levels of 1,800 to over 3,000. There are also debates over delivery systems, some crediting China with a major cruise missile as well as a ballistic missile force.

This debate takes on a very different meaning when there is talk of reducing US and Russian stockpiles to zero and the US has already reduced its nuclear weapons holds from a reported peak of 31,255 to less than 5,000, and under 2,500 strategic warheads. The Arms Control Association, for example, provided the following estimate in late 2012:[15]

- **China:** About 240 total warheads.
- **France:** Fewer than 300 operational warheads.

- **Russia:** Approximately 1,499 deployed strategic warheads… The Federation of American Scientists estimates Russia has another 1,022 nondeployed strategic warheads and approximately 2,000 tactical nuclear warheads. Additional thousands are awaiting dismantlement.
- **United Kingdom:** Fewer than 160 deployed strategic warheads, total stockpile of up to 225.
- **United States:** Approximately 5,113 nuclear warheads… including tactical, strategic, and nondeployed weapons**.** According to the latest official New START declaration, the United States deploys 1,722 strategic nuclear warheads on 806 deployed ICBMs, SLBMs, and strategic bombers… The Federation of American Scientists estimates that the United States' nondeployed strategic arsenal is approximately 2,800 warheads and the U.S. tactical nuclear arsenal numbers 500 warheads. Additional warheads are retired and await dismantlement.

The practical problem for the US – as has been discussed earlier – is not only to assess the overall nuclear balance in strategic terms and how China's development affect its strategic forces, but the overall balance in Asia, and particularly involving the Koreas, Japan, Taiwan, and Southeast Asia.

The US should not overreact to China's actions. China is becoming a major global power and its nuclear forces will expand. The US should not, however, underreact, fail to assess Chinese nuclear weapons developments as openly and transparently as it assesses its other military actions, or somehow talk about zero options as if the nuclear arms race in Asia was not now more important in terms of deterrence and warfighting risks than the nuclear balance with Russia and in Europe. To do so is not simply intellectually dishonest, it is intellectually absurd: a clear case of unthinking about the thinkable.

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[1] Hans M. Kristensen and Robert S. Norris, "Indian nuclear forces," 2012, *Bulletin of the Atomic Scientists*, 14 July 2012, www.openbriefing.org/issuedesks/nuclearissues/indian-nuclear-forces-2012/

[2] Hans M. Kristensen, Robert S. Norris, "Pakistan's nuclear forces, 2011," *Bulletin of the Atomic Scientists July/August 2011 vol. 67 no. 4 91-99, http://bos.sagepub.com/content/67/4/91.full.*

[3] Mary Beth Nikitin, North Korea's Nuclear Weapons: Technical Issues, Congressional research Service, RL34256, April 3, 2013, http://www.fas.org/sgp/crs/nuke/RL34256.pdf.

[4] David Albright and Andrea Stricker, "ISIS Statement on North Korean Nuclear Test," February 12, 2013, http://isis-online.org/isis-reports/detail/isis-statement-on-north-korean-nuclear-test/10. Also see David Albright, "North Korean Miniaturization," 38 North, February 13, 2013, http://38north.org/2013/02/albright021313/.

[5] David Albright and Andrea Stricker, "ISIS Statement on North Korean Nuclear Test," February 12, 2013, http://isis-online.org/isis-reports/detail/isis-statement-on-north-korean-nuclear-test/10.

[6] http://isis-online.org/country-pages/northkorea

[7] "A key factor in assessing how many weapons North Korea can produce is whether North Korea needs to use more or less material than the IAEA standards of 8 kg of Pu and 25 kg for HEU per weapon. The amount of fissile material used in each weapon is determined by the design sophistication. There is no reliable public information on North Korean nuclear weapons design.

In all, estimates of North Korea's separated plutonium range between 30 kg and 50 kg, with an approximate 5 kg to 6 kg of this figure having been used for the October 2006 test and an additional amount probably used in the May 2009 test…This amounts to enough plutonium for approximately five to eight nuclear weapons, assuming 6 kg per weapon. Taking the nuclear tests into account, North Korean could possess plutonium for four to seven nuclear weapons. A 2007 unclassified intelligence report to Congress says that "prior to the test North Korea could have produced up to 50 kg of plutonium, enough for at least a half dozen nuclear weapons" and points out that additional plutonium is in the fuel of the Yongbyon reactor… North Korea claimed to have reprocessed that fuel in the summer of 2009 (see below).

Questions arise in determining how much plutonium North Korea produced between 2003, when the IAEA monitors were kicked out of the country and the seals were broken at Yongbyon, and 2007, when international monitoring resumed. A South Korean Defense Ministry white paper from December 2006 estimated that North Korea had made 30 kg of weapons-grade plutonium in the previous three years, potentially enough for five nuclear bombs. The white paper also concurred with U.S. estimates that North Korea's total stockpile of weapons-grade plutonium was 50 kg.

…. The accounting issue was further complicated when North Korea reportedly declared a lower number of 37 kg of separated plutonium in its declaration under the Six-Party Talks. No agreement has been reached on verifying the amount of plutonium stocks through inspections (see discussions on declaration, verification below). In January 2009, an American scholar who had visited Pyongyang said the North Koreans told him that 30.8 kg amount had been "weaponized," possibly meaning that the separated plutonium might now be in warheads. The DPRK officials also told him that they would not allow for warheads to be inspected."

Mary Beth Nikitin, North Korea's Nuclear Weapons: Technical Issues, Congressional research Service, RL34256, April 3, 2013, http://www.fas.org/sgp/crs/nuke/RL34256.pdf.

[8] Mary Beth Nikitin, North Korea's Nuclear Weapons: Technical Issues, Congressional research Service, RL34256, April 3, 2013, http://www.fas.org/sgp/crs/nuke/RL34256.pdf.

[9] Bulletin Staff, "Interview with Siegfried Hecker: North Korea complicates the long-term picture," Bulletin of the Atomic Scientists, April 5, 2013, http://www.thebulletin.org/web-edition/features/interview-siegfried-hecker-north-korea-complicates-the-long-term-picture. An earlier ISIS analysis noted that, "Dr. Siegfried Hecker of Stanford University released a report on November 21, 2010 detailing his recent visit to the Yongbyon nuclear site in North Korea. Hecker describes his visit to a building containing 2,000 gas centrifuges located on the site of the fuel fabrication facility at Yongbyon dedicated, according to his hosts, to producing low enriched uranium (LEU). He notes that the building is approximately 120 meters long and has a blue roof. ISIS assesses that this building can be seen in a November 4, 2010 DigitalGlobe satellite image in figure 1 below. Hecker also noted that the building had been repurposed, as he had visited this building in 2008 at which time it did not contain centrifuges (figure 2 shows the same building in February of 2007). Figure 3 shows the location of the plant relative to the entire Yongbyon site.

In an October 2010 report, ISIS assessed that "the data support that North Korea has the

capability of building, at the very least, a pilot plant," of gas centrifuges, with a pilot plant defined as between 500 and 1,000 centrifuges. If there are 2,000 centrifuges installed at the Yongbyon site, that number is greater but consistent with the ISIS finding, and thus not completely unexpected. Nonetheless, learning of the existence of this plant is extremely significant, and the new information requires deep study. It is also true that a centrifuge plant does not exist in a vacuum. It is still unknown where North Korea researches, develops, and manufactures centrifuges. David Albright and Paul Brannan, "Satellite Image Shows Building Containing Centrifuges in North Korea," ISIS Reports, November 21, 2010, http://isis-online.org/isis-reports/detail/satellite-image-shows-building-containing-centrifuges-in-north-korea/.

[10] Based upon an unclassified estimate in the New York Times web page: "In Focus: North Korea's Nuclear Threats," Updated April 12, 2013, http://www.nytimes.com/interactive/2013/04/12/world/asia/north-korea-questions.html?_r=0.

[11] Mary Beth Nikitin, North Korea's Nuclear Weapons: Technical Issues, Congressional research Service, RL34256, April 3, 2013, http://www.fas.org/sgp/crs/nuke/RL34256.pdf.

[12] Barbara Demick, "South Korea experimented with highly enriched uranium / Incident could complicate arms talks with North," *Los Angeles Times*, September 3, 2004. http://www.sfgate.com/politics/article/South-Korea-experimented-with-highly-enriched-2728185.php.

[13] Kelsey Davenport, "South Korea Extends Missile Range," *Arms Control Today*, November 2012, http://www.armscontrol.org/act/2012_11/South-Korea-Extends-Missile-Range.

[14] Department of Defense, *Military and Security Developments Involving the People's Republic of China 2012*, May 2012, http://www.defense.gov/pubs/pdfs/2012_CMPR_Final.pdf, pp. 7-8, 21-22.

[15] http://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat.