



RESEARCH NOTES

THE WASHINGTON INSTITUTE FOR NEAR EAST POLICY



Deterring an Iranian Nuclear Breakout

MICHAEL EISENSTADT

Deterring Iran from developing or acquiring nuclear weapons will remain the core imperative driving U.S. policy toward the Islamic Republic in the years to come.¹ This will be true whether or not ongoing nuclear diplomacy with Tehran leads to a long-term agreement to limit its nuclear program.

Public debate about what constitutes a “good” long-term deal with Tehran has focused mainly on ways to constrain Iran’s *declared* fissile-material production capabilities, in order to keep the Islamic Republic a year or more from a breakout (the time it would take Iran to amass sufficient fissile material for one nuclear device).² The United States deems one year sufficient time to organize a diplomatic or military response.³

Monitoring Iran’s declared facilities is a vital task because a number of proliferators, including Pakistan, South Africa, and North Korea, have used known sites to produce weapons-usable fissile material. But a breakout using declared facilities is probably *not* the most likely scenario, nor is it the scenario that will most severely test International Atomic Energy Agency (IAEA) monitoring capabilities, U.S. intelligence, or the political resolve of the United States and the international community.

Rather, it is an Iranian breakout using *undeclared* facilities that poses the greatest threat and challenge: several other countries (including Iraq and Syria) have taken this route, and Iran’s long record of undeclared activities in violation of its IAEA, and possibly Nuclear Nonproliferation Treaty (NPT), obligations provides special reason for concern.⁴ For instance, Iran has

- engaged in the undeclared and illicit procurement of sensitive nuclear-relevant technologies since the mid-1980s—activities that continue to this day;⁵
- conducted undeclared experiments related to centrifuge and laser enrichment and the separation of plutonium, and attempted to build undeclared facilities capable of producing fissile material at Natanz and Arak (revealed in 2002) and at Fordow (revealed in 2009);⁶
- engaged in weapons-related research-and-development work prior to 2003 and perhaps after, and refused to clarify concerns regarding possible military dimensions of its nuclear program.⁷

Likewise, Iran has a record of noncompliance with its own voluntary commitments, IAEA obligations,

Michael Eisenstadt is the Kahn Fellow and director of the Military and Security Studies Program at The Washington Institute. The author extends his thanks to Christopher Bidwell, Gary Samore, Mark Scheland, and Henry Sokolski for their comments on an earlier draft of this paper, and to Ian Duff and Omar Mukhlis for their invaluable research assistance, though he is solely responsible for any errors of fact or interpretation.

and UN Security Council resolutions.⁸ For more than a decade, it has denied the IAEA access to personnel, documents, and sites or facilities needed to resolve several outstanding issues—in particular, those related to possible military dimensions of its program—and it has rejected the legality of a half-dozen Security Council resolutions passed since 2006 that, *inter alia*, required it to suspend enrichment- and reprocessing-related activities.

It is therefore prudent to assume that Tehran may well continue to engage in undeclared activities and to violate its commitments and obligations if it believes it can do so without getting caught, or without paying an unacceptable price—even if it concludes a long-term nuclear deal with the P5+1, as the five permanent Security Council members and Germany are known.⁹

To deter Iran from building or acquiring a nuclear device in violation of its NPT obligations, Washington will need to convince Tehran that it would not only get caught but also suffer unacceptable consequences: the United States would reimpose or ratchet-up sanctions, launch a destabilizing soft-warfare campaign against the regime, or, even use military force to destroy its nuclear program.

Deterring Iran from attempting a clandestine breakout could, however, prove more difficult than many experts believe:¹⁰ detecting a carefully planned breakout attempt on a timely basis could be very challenging, and Iran may believe that even if it does get caught, the price it will pay will not be “unacceptable.”

Yet, deterring a clandestine breakout may be the best way to ensure Iranian nuclear restraint, since a breakout using undeclared facilities might not be discovered until well on—if at all—while an attempted breakout using declared facilities would be discovered almost immediately. Furthermore, Tehran would probably block access to undeclared facilities involved in an attempted breakout. This would leave the international community uncertain of how much progress Iran had made toward building a bomb and lend a heightened sense of urgency to such a crisis as well as heightened potential for escalation.

Detecting a Clandestine Breakout

Iran has two potential paths to a clandestine breakout: (1) an indigenous clandestine weapons program or (2) the surreptitious acquisition of fissile material or nuclear weapons from a foreign supplier such as North Korea.

An indigenous clandestine weapons program might be organized around a small enrichment facility or plutonium-production reactor and separation facility that could be difficult to detect, given possible constraints on inspections and the inherent limitations of even the most sensitive monitoring technologies and the most effective intelligence services.¹¹ However, unless Iran were to build an entire clandestine fuel cycle—a major undertaking that might be hard to hide—it would have to rely on its declared program for the raw materials needed for clandestine fissile-material production. Major diversions from its declared program would probably be detected.¹²

Alternatively, Iran might try to circumvent constraints on and foreign scrutiny of its program by purchasing fissile material or nuclear weapons from a foreign supplier—most likely North Korea. In such a scenario, it would probably prefer to purchase fissile material that it would weaponize on its own, rather than depend on a foreign weapon design of unknown reliability. Alternatively, it might build a fissile-material production facility overseas, which it could operate unilaterally or in conjunction with a foreign partner. In either scenario, the transfer of fissile materials from abroad would be very difficult to detect, and could enable Iran to amass a small arsenal very quickly. The big unknowns are whether North Korea (or another proliferator) would be willing to transfer fissile material to Iran, and whether another country would allow Iran to establish a fissile-material production facility on its soil.

That said, Iran’s preferred way forward is one of slow, incremental progress rather than a rapid “dash” to the bomb that would increase the risk of detection, and of a military response by its enemies. The Islamic Republic’s nuclear program is not a crash program: it has been ongoing for nearly thirty years,

due in part to Tehran's innate caution, and the regime's culture of strategic patience.¹³ This is why Tehran may be willing to settle for a deal with the P5+1 that entails certain constraints but preserves a breakout capability. At any rate, the major constraints spelled out in the U.S. fact sheet for the framework agreement reached with Tehran are expected to last ten to fifteen years—not an exceedingly long period in the context of a program that is now three decades old and a nation that is the embodiment of a six-thousand-year-old civilization. And Iran might find ways to circumvent these constraints before then.

Iran's near-term goal may be to hedge, by having its status as a nuclear-threshold state confirmed and legitimized through a long-term agreement, while preserving a breakout capability. This would confer on Tehran many of the benefits of being a nuclear weapons state, without the potential risks and costs the latter could entail. It would provide Iran with a virtual nuclear deterrent, since the United States and others would tread lightly whenever tensions flared with Iran, for fear that it might use such tensions as a pretext to abandon the long-term accord or attempt a breakout. It is therefore quite possible that Iran will accommodate itself to its status as a nuclear threshold state for the indefinite future, although *the temptation to pursue a clandestine breakout will be ever present* and could be strengthened by changes in the factional balance of power in Tehran, the regional threat environment, or Iran's assessment of the risk of attempting a breakout.

Iran's long-term aspirations to Great Power status will almost certainly impel it to eventually develop a nuclear arsenal of some sort. This is the only plausible explanation for past and perhaps ongoing weapons-design work.¹⁴ Should Iran go ahead with its declared plans to create an industrial-scale nuclear infrastructure, whether following the failure of nuclear negotiations with the P5+1 or after the principal constraints imposed by a long-term accord expire ten to fifteen years hence, it will become even more difficult to detect a clandestine program against the background 'noise' created by these expanded activities.

DETECTING CLANDESTINE FACILITIES. Iran's initial attempts to create an undeclared fissile material production capability centered on small, medium, and large facilities. The enrichment facility at Natanz was built to accommodate 50,000 centrifuges capable of producing sufficient enriched uranium for 25 to 30 weapons a year, while the enrichment facility at Fordow was built to accommodate 3,000 centrifuges capable of producing 1 to 2 bombs a year (in each case, using first-generation centrifuges).¹⁵ Both were built underground to make them difficult to detect and bomb. The small 40MW research reactor at Arak, which is still under construction, was designed to produce enough plutonium for 1 to 2 bombs a year.

By contrast, facilities associated with a future clandestine program would likely be small and inconspicuous, and the pace of operation slow and deliberate, to limit telltale signatures. This would increase the odds that if an undeclared facility were discovered early on, Tehran could explain it away as an innocuous civilian structure.

A long-term accord that permits Iran to continue centrifuge R&D work and to master more efficient centrifuge designs could enable Iran to build small clandestine enrichment facilities that would be difficult to detect. For this reason, centrifuge R&D work must be highly circumscribed in a long-term deal. This is a major drawback of the current framework agreement, as described in the official U.S. fact sheet.¹⁶ Moreover, if this provision is allowed to stand as part of a long-term accord, it is more likely to undermine confidence than to build it, as Iranian centrifuge R&D successes will stoke concerns regarding the latter's ability to create a clandestine enrichment program.

Compared to other types of enrichment plants, centrifuge enrichment facilities are more difficult to find because they are smaller and have relatively modest electrical requirements. Accordingly, they produce few visual, infrared, or other signatures,¹⁷ though spinning centrifuges may generate electromagnetic radiation or leak radioactive effluent into the environment.¹⁸ Detection of these, however, is possible only at short distances—from a few hun-

dred meters to a few kilometers—and might be even more difficult if efforts have been made to shield and contain the facility.¹⁹

Iran might also eventually try to build undeclared laser enrichment facilities. It has previously demonstrated an interest in laser enrichment and has reportedly not answered all IAEA questions about its past work in this area.²⁰ The cost, size, and power requirements of a laser enrichment plant are potentially a fraction of those of a centrifuge enrichment facility, and it would therefore be harder to detect. Lasers would therefore be an ideal choice for a proliferator like Iran, if it could master the technical challenges involved.²¹ For now, this is considered a long-term concern, as Iran's laser enrichment program has focused on less-promising techniques such as molecular laser isotope separation (MLIS) and atomic vapor laser isotope separation (AVLIS). But, in 2012, the U.S. Nuclear Regulatory Commission approved the construction in the United States of the world's first laser enrichment plant using a highly classified proprietary technique known as separation of isotopes by laser excitation (SILEX), the only method considered suitable for production-scale enrichment.²² The knowledge that it can be done is likely to inspire Iran to devote additional efforts to investigating this enrichment path.²³

Finally, Iran could, in extremis, use its nuclear reactor at Bushehr as a source of plutonium for weapons. Although Bushehr is not ideally suited for the purpose, a single fuel-load could produce enough plutonium for dozens of nuclear weapons. And even as reactor-grade plutonium is not ideal for bomb making—heat and radioactivity make it difficult and dangerous to work with, while its isotopic composition makes for an inefficient and unreliable weapon—the United States demonstrated the military utility of reactor-grade plutonium in a 1962 underground nuclear explosive test.²⁴ Thus, during a crisis or war, Iran could divert spent fuel from the reactor's cooling pond to a clandestine processing facility where plutonium would be separated and prepared for use in a weapon.²⁵

The U.S. intelligence community's record in tracking clandestine nuclear weapons programs has been decidedly mixed. While it has been very successful in detecting such programs, it has often failed to correctly assess their status, identify proliferation paths (especially when multiple or nontraditional paths have been taken), locate key facilities, or track the activities of proliferation supplier networks.²⁶ For instance:

- The United States had suspected for well over a decade that North Korea had a uranium enrichment program but did not learn about its centrifuge plant at Yongbyon until the plant was shown to a delegation of former U.S. officials in 2010.²⁷
- The United States did not learn about the reactor that North Korea was building in Syria until it was close to completion in 2007.²⁸
- The U.S. intelligence community did not become aware until nearly four years later that Iran had apparently suspended its “structured” weaponization program in 2003.²⁹
- The United States did not learn about Iran's enrichment plants at Natanz and Fordow until several years after work on each had commenced—albeit several years before each became operational.³⁰
- Prior to the 1991 Gulf War, the international community was unaware of the full extent and advanced status of Iraq's nuclear program, which IAEA inspectors uncovered after the war.³¹
- While South Africa had long been suspected of having a weapons program, the 1993 announcement that it had produced a half-dozen nuclear devices was the first confirmation of this fact for the United States.³²
- The A. Q. Khan network operated for more than a decade and assisted Libya, North Korea, Iran, and possibly others before initial steps were taken to disrupt and dismantle the network in 2001.³³

Moreover, a recent Defense Science Board study of nuclear monitoring and verification technologies concluded that “the technologies and processes designed for current treaty verification and inspections are inadequate to future monitoring realities” such as “identifying small or nascent [nuclear] programs.”³⁴ This seems to imply that creative proliferators would enjoy an advantage in the cat and mouse game they are playing with the United States and the international community.

There are a number of things that the international community can do, however, to level the playing field with Iran and further reduce the chances of its violating its NPT obligations without getting caught:

POSSIBLE MILITARY DIMENSIONS. Resolving open questions about the possible military dimensions (PMD) of Iran’s nuclear program would likely render any monitoring regime in Iran more effective, for three reasons: (1) If Iran believed it got away with violating its NPT obligations once before without having to acknowledge the fact, it might try to do so again in the future. (2) Acquiring a detailed understanding of Iran’s past weapons work will help determine which personnel, facilities, and sites need to be closely monitored, and how to best structure an effective monitoring regime for Iran. (3) An acknowledgment by Tehran of such past activities—even in a way that allows it to save face—will strengthen the P5+1’s hand in negotiations over intrusive monitoring arrangements by clearly demonstrating the need for them. The ultimate lifting of sanctions as part of a long-term nuclear accord should be contingent on Iran’s answering the IAEA’s questions about PMD, and providing access to personnel, documents, and facilities necessary for the agency to make an assessment about the peaceful nature of Iran’s nuclear program.

MONITORING AND ENVIRONMENTAL SAMPLING. The inspection and monitoring regime underpinning a long-term nuclear accord with Iran must be the most intrusive of any in the world. It should incorporate the IAEA Additional Protocol (AP) while going beyond its provisions, as they proved

inadequate when Iran voluntarily adhered to them between December 2003 and February 2006.³⁵ As former CIA director General Michael Hayden stated in testimony before Congress, “Absent an invasive inspection regime, with freedom to visit all sites on short notice, American intelligence cannot provide adequate warning of Iranian nuclear developments.”³⁶

Iranian officials have long stated that they are willing to build confidence through greater nuclear “transparency.” Indeed, President Hassan Rouhani, in his acceptance speech after being elected president, said, “Our nuclear programmes are completely transparent, but we are ready to show greater transparency.”³⁷ In practice, however, Tehran has pushed back against enhanced monitoring arrangements. It insists on seeing the Additional Protocol as a voluntary option and has repeatedly rejected efforts to establish it as an obligation, describing such efforts as evidence of a discriminatory double standard applied to Iran, and an abuse of authority by the IAEA. Thus, in its fact sheet on the framework agreement, Tehran stated that its implementation of the AP would be “voluntary” and “temporary” (terms that in fact describe its approach to just about all the provisions in the proposed accord). Tehran’s refusal to accept these transparency measures on an indefinite, if not permanent, basis will pose major challenges to any future efforts to deter a clandestine breakout.

If the restrictions and monitoring arrangements described in the U.S. fact sheet on the framework agreement are eventually incorporated into a long-term accord and implemented as intended, Iran will have a very hard time creating clandestine fuel-cycle-related facilities for as long as the arrangements remain in effect (ten to fifteen years for most), while any effort to use declared facilities for a breakout would likely be detected within one to two weeks. Inspectors will be able to monitor and access the supply chain that supports Iran’s nuclear program, regularly visit all fuel-cycle-related facilities, and have what amounts to anytime, anyplace authority to look for undeclared facilities. Facilities capable of producing fissile material at Natanz,

Fordow, and Arak will be restricted to limit their ability to produce fissile material, while stocks of enriched uranium and spent reactor fuel will be shipped out of the country. The parameters include most of the provisions called for by nuclear proliferation specialists,³⁸ although some have highlighted areas for improvement.³⁹

If this assessment sounds too good to be true, it probably is. Iran has already stated that enriched uranium will not be sent out of the country,⁴⁰ that IAEA inspectors will not have access to military facilities,⁴¹ and that all sanctions should be lifted immediately upon conclusion of the agreement.⁴² The stockpiling of enriched uranium—even in dilute form—would vitiate much of the purpose of the accord. Denial of access to military facilities could create no-go zones in which Iran could engage in undeclared activities and build clandestine facilities. And the immediate lifting of sanctions would instantly reduce the international community's leverage over Iran, greatly diminishing its ability to ensure Iranian compliance with its commitments. Finally, just as Iran continues to hinder investigation of possible military dimensions of its nuclear program by denying the IAEA access to personnel, documents, and facilities, it may, over time, try to further constrain the IAEA in order to reduce the efficacy of a possible long-term agreement.

For this reason, the IAEA must be granted broad authority in a long-term agreement to conduct wide-area environmental sampling to detect possible clandestine facilities in Iran. Indeed, this is one of the IAEA's most powerful tools for detecting undeclared activities. According to a former IAEA official who served in its Department of Safeguards and as an inspector in Iraq in the 1990s:

Nuclear forensics have achieved such extraordinary sensitivities that it is virtually impossible to sanitize radioactively contaminated surfaces or to avoid the detection of leakages of radioactive airborne or liquid discharges. For example, analysis of environmental samples—airborne particulate matter, water, deposited or sedimented materials—

is capable of detecting the presence of uranium down to a few millionth, billionth, billionth parts of a gram. However, even with such sensitivities, it has to be recognized that the concentration of any environmental contamination reduces inversely and nonlinearly with the distance from the point of release. The actual reduction would be a function of terrain and the prevailing meteorological conditions.⁴³

Thus, environmental sampling enabled the IAEA to detect North Korean deception regarding reprocessing activities at its Yongbyon reactor (1992);⁴⁴ to detect traces of high-enriched uranium on used Pakistani centrifuges that Iran had obtained from the A. Q. Khan procurement network (2004);⁴⁵ and to detect traces of chemically processed natural uranium at the former site of Syria's al-Kibar reactor, which had been destroyed in an Israeli airstrike, undermining Syria's claims that the site had no connection to a nuclear program (2008).⁴⁶ The United States should advertise this record of success to convince Tehran that it will be caught if it attempts a breakout.

That said, the expense associated with environmental sampling is likely to limit its use to location-specific campaigns at sites of concern.⁴⁷ And because the minute quantities of effluent that may leak from a well-run fissile-material production facility may travel only short distances after release into the environment, wide-area environmental sampling is not a panacea or a substitute for unfettered on-site inspections, or other more traditional monitoring techniques.

EXPLOITING CYBER FEARS. U.S. and friendly intelligence services, probably with the help of disaffected Iranians, have succeeded in uncovering past undeclared nuclear activities in Iran. The realization that its program has been repeatedly penetrated by foreign intelligence services likely unnerved Tehran, and induced it to act with greater caution.

To deter Iran from resuming large-scale undeclared activities, Washington should reinforce the fear of again being caught cheating. To this end, Washington should build on the shock created by

Stuxnet to convince Tehran that America's cyber spying capabilities render Iran's nuclear activities transparent to the United States and its partners. And Washington should selectively disclose to the media details about a number of game-changing military programs now under way that could enable the United States and its allies to penetrate closed computer networks for intelligence purposes, obviating the need for intelligence operatives to physically introduce spyware into the networks.⁴⁸

As Iran develops increasingly sophisticated cyber defenses and cyber capabilities of its own, however, it is possible that foreign cyber spying will eventually become less effective, and hence less of a concern for Tehran. Accordingly, the deterrent value of America's cyber advantage is likely to wane—at least until new foreign cyber surprises force Tehran to once again readjust its risk calculus.⁴⁹

DETECTING NUCLEAR TRANSFERS. An even greater monitoring challenge would be posed by the transfer to Iran of fissile material or a nuclear weapon from a nuclear weapons state—the most likely, and perhaps only current candidate being North Korea. Detecting and tracking sensitive technology and weapons transfers has proven extremely challenging in the past, and is likely to be even more so in the future. And while UN Security Council Resolution 1874 provides the international community with authorities to inspect North Korean maritime traffic on the high seas or in ports to check for proscribed cargo, political considerations ensure that this is extremely unlikely to happen unless reliable intelligence provides “probable cause.”⁵⁰

The United States and its allies need to be able to detect the transport of fissile material or a nuclear device to Iranian ports. Given the relatively short distances at which penetrating radiation from a nuclear weapon may be detected (tens of meters for gamma radiation, scores of meters for neutron radiation emanating from an unshielded device or weapon, and much less for a shielded weapon), the detection of fissile material or a nuclear weapon by technical means would pose severe challenges.⁵¹ To

this end, the United States should consider, if it is not already doing so, unconventional methods of employing radiation monitors in the Persian Gulf and the Pacific: aboard yachts or other civilian pleasure craft; on unattended floating sensors clandestinely emplaced at the mouth of Iranian and North Korean harbors; and on unattended ground sensors emplaced at Iranian and North Korean airfields. In addition, portal monitoring for radiation sources should be carried out at official border-crossing points and ports of entry in neighboring states.⁵²

The shielding of radioactive cargoes could defeat such methods, however, and other intelligence capabilities will be needed to provide early warning and to cue radiation monitors or maritime boarding parties. The United States, however, will need to be both very good and very lucky to succeed. Detecting the transfer of fissile material or a nuclear device by air or sea will likely remain a critical weakness of any monitoring effort in Iran.

Unacceptable Consequences?

From the outset, Iran has pursued a policy of nuclear ambiguity to obfuscate its intentions and thereby forestall a strong, unified international response to its nuclear program. These efforts ultimately failed, and Iran found itself heavily sanctioned. And it has taken a cautious, incremental approach with its nuclear program to avoid provoking an Israeli or American military response, an effort that, by contrast, has thus far succeeded.⁵³

Iran's policy of nuclear ambiguity complicated efforts to impose stiff UN Security Council and multilateral sanctions against it. Absent unambiguous proof of a weapons program, many countries were reluctant to cut off business with a key oil producer or to pass Security Council resolutions that could potentially be used to justify the use of force. Eventually, the United States succeeded because of a focused, sustained effort to make its case and use its economic weight to compel key states to choose between trading with the United States or Iran.

This same dynamic would likely shape the international response to an Iranian violation of a long-term nuclear accord or an attempt to break out from the NPT. Barring a brazen, overt violation, it will likely be difficult to mobilize international support for the reimposition of sanctions that most countries did not enthusiastically embrace in the first place. Most countries would likely urge that a compliance crisis be resolved without the cost and inconvenience of reimposing sanctions.

Likewise, for more than thirty years, the United States has sought to avoid conflict with Iran, eschewing military responses to hostile acts that Tehran facilitated or was involved in, such as the 1983 Marine barracks bombing in Beirut, the 1996 Khobar Towers bombing in Saudi Arabia, and the 2011 Iranian plot to assassinate the Saudi ambassador to the United States. And in the past two decades, Iran has crossed at least a half-dozen U.S. and Israeli nuclear redlines of varying significance, often without eliciting a meaningful response by either.⁵⁴ Israel and the United States will therefore be no more enthusiastic about taking military action against Iran in the future than they were in the past.

Thus, Tehran may reason that it has nothing to lose by trying to “sneak out” or “creep out” of the NPT. And given the widespread belief among Iranian officials that Iran is a rising power that is now calling the shots in four Arab capitals (Beirut, Damascus, Baghdad, and Sana)⁵⁵ and that is laying the foundations for a new Iranian empire,⁵⁶ Tehran may be emboldened to try.

For this reason, Washington must convince Tehran that if it attempts a nuclear breakout, the United States will reimpose and/or ratchet up sanctions,⁵⁷ launch a destabilizing ‘soft warfare’ campaign against the Islamic Republic and, if need be, use military force to destroy its nuclear program.

SNAP-BACK SANCTIONS. Iran remains, for now, under unprecedented unilateral and multilateral sanctions, assembled through years of painstaking diplomacy, which have finally brought it to the negotiating table. Due to the leverage they provide, it is vital that a nuclear accord preserve the option of

reimposing sanctions, should Iran violate the terms of an agreement or attempt a nuclear breakout.

Sanctions should therefore be suspended rather than lifted. Indeed, the U.S. fact sheet states that the framework agreement provides for the suspension of sanctions once Iran fulfills its commitments, although Iran’s Supreme Leader, Ali Khamenei, has said that all sanctions must be lifted the day an agreement is reached.⁵⁸ In the event of a violation, meanwhile, allies would likely have practical disagreements as to what degree of snap-back would be merited by a given violation. A consensus on this issue needs to be reached by the P5+1 and other key states ahead of time, although this will be difficult. Russia, for instance, rejects the idea of the automatic reimposition of sanctions in the event of a violation, and believes that, in this case, the Security Council should vote on the matter once again.⁵⁹ Moreover, as sanctions are lifted, Iran may sign oil and other contracts with key countries on concessionary terms in order to give them an economic incentive to oppose the reimposition of sanctions.

Israeli threats against Iran’s nuclear program, which were so instrumental in obtaining European and international support for sanctions in the past, may not be credible in the future. Israel is seen by many as having repeatedly cried wolf, and its military threats against Iran’s nuclear program have lost their efficacy.

Sanctions were effective because swing oil producers such as Saudi Arabia were able to compensate for the loss of Iranian oil during a period of soft international demand. Such conditions might not exist in the future, however, and the reimposition of sanctions on Iran’s oil sector might entail economic costs that the United States, or at least some of its allies, might be unwilling to pay.

Finally, while many Iranians continue to suffer the effects of sanctions, Iran has adjusted reasonably well on a macro level,⁶⁰ and it is likely to do whatever it can to further reduce its vulnerability should sanctions be reimposed in the future. Thus, it will probably continue with reforms that sanctions made essential, but which remain desirable

for other reasons. The reimposition of sanctions may therefore not yield the benefits they did the first time around.

For all these reasons, the threat of reimposing sanctions might not have the deterrent value currently attributed to it. While snap-back sanctions are an essential element of any effort to deter an Iranian nuclear breakout, it would be prudent to not rely on them too heavily. Other measures must be considered when attempting to alter Tehran's calculus regarding the risks and costs of a breakout.

SOFT WARFARE. If Washington is to deter an Iranian nuclear breakout, it must understand the worldview of the Islamic Republic's leaders in order to threaten what they value most. Because the Supreme Leader and those around him came to power through a revolution that has experienced episodic bouts of domestic unrest, survival remains their foremost concern, and counterrevolution their greatest fear.

Thus, senior Iranian officials believe that foreign-inspired soft warfare—efforts to inculcate foreign ideas, values, and ideologies in order to undermine the strength, legitimacy, and social cohesion of the Islamic Republic—is a greater threat to the regime's survival than a foreign military strike or invasion.⁶¹ In a 2003 television address, Supreme Leader Khamenei explained the reason for this fear, echoing the frequent warnings of Ayatollah Ruhollah Khomeini of a “cultural invasion”:

More than Iran's enemies need artillery, guns and so forth, they need to spread cultural values that lead to moral corruption...If they arouse sexual desires [and] spread unrestrained mixing of men and women, and if they lead youth to behavior to which they are naturally inclined by instincts, there will no longer be any need for artillery and guns against that nation.⁶²

It is for this reason that Mohammad Ali Jafari, commander-in-chief of Iran's Islamic Revolutionary Guard Corps (IRGC), stated on several occasions that the 2009 “sedition” against the country—that is, the popular protests spearheaded by the Green Movement following that year's

elections—“was much more dangerous than the [eight-year] imposed war” with Iraq.⁶³ The threat from within is seen as much greater than the threat from without.

The reason for these fears is not hard to discern. While Iran's topography and geographic depth pose significant obstacles to an invasion, its population is unprotected against the foreign “cultural invasion” that Ayatollahs Khomeini and Khamenei railed against. Each and every citizen is susceptible to subversive messages that enter the country via the Internet, radio, and satellite television. This is why the regime has tried to create strategic depth in the information domain by erecting Internet firewalls, jamming foreign news broadcasts, and creating a national Internet, and why it devotes so much effort to Islamizing the education system and indoctrinating the general population. Foreign, un-Islamic cultural and ideological influences are Tehran's worst nightmare.

This is a vulnerability that Washington should use to pressure Tehran. It faces several challenges, however, in doing so. First, it is much easier to do harm than good through crude or maladroit information and influence activities, and depending on the context against which a breakout attempt occurs, there might be significant public support within Iran, on nationalistic or national security grounds, for such a move by the regime. In these circumstances, U.S. messaging might not find a receptive audience.⁶⁴ Second, most of America's soft power resides in the private sector—its popular and consumer culture, Hollywood, its information technology sector, and its higher education system—and cannot be effectively mobilized by the U.S. government to serve as an instrument of U.S. foreign policy.

Yet to the degree that the United States seeks to promote its values and advance its interests by routinely seeking to expand contacts between peoples, foster the free exchange of ideas and information, and open markets to American cultural and commercial products, it creates informal networks and lines of communication that could be used for official messaging during a nuclear crisis.

To this end, the United States should more actively encourage the private sector to build bridges with Iranian civil society. In many cases, private organizations already have missions that would serve U.S. purposes: news outlets want to get information out; universities want to encourage contact, scholarly exchange, and debate; entertainment companies want to provide types of music and images that the people want but the regime hates.⁶⁵ On this count, the U.S. government is already encouraging the private sector to find ways to help Iranians circumvent limits on their ability to get news and to communicate with each other, but it should do more. Such efforts could help facilitate U.S. government communication with the Iranian people in the event of a nuclear crisis with Iran.⁶⁶

Thus far, the Obama administration has avoided playing on Tehran's fears that outside powers are exploiting domestic tensions to pressure the regime. It has by and large avoided actions that could be perceived as meddling in Iran's internal affairs, presumably because it believes such efforts would undermine attempts to engage Tehran, revive memories of the U.S. intervention in 1953 to remove Prime Minister Muhammad Mossadeq, and might be mistaken for efforts to achieve regime change.

While such concerns may be understandable in the current context, it is arguable whether such restraint would be prudent should Iran attempt a nuclear breakout, when the synergy created by efforts to exploit domestic fissures, combined with external economic and military pressures, could be just what is needed to facilitate a diplomatic solution to the crisis that would almost certainly ensue. In such an eventuality, the United States should be prepared to wage a soft warfare campaign against Tehran consisting of psychological operations and covert action.⁶⁷ Elements of such a campaign might consist of efforts to

- debunk the Islamic Republic's nuclear narrative by underscoring how Tehran's violation of its NPT obligations demonstrated the

hollowness of the Supreme Leader's fatwa against the development, stockpiling, and use of nuclear weapons, and jeopardized the security and well-being of the Iranian people, in order to advance the personal ambitions of an autocratic clerical-military clique;

- highlight the potential economic costs to the Iranian people of the reimposition of sanctions and the isolation of Iran;
- criticize the Islamic Republic's human rights record, especially violations of the rights of political prisoners, women, and ethnic minorities, while championing the cause of individuals detained by the regime;
- disseminate information regarding corruption among well-connected clerics, politicians, and IRGC officers and their children, and highlight how much money the Islamic Republic spends abroad to fuel conflicts in Syria, Lebanon, Gaza, Iraq, and Yemen at the expense of the needs of the Iranian people, the reputation of the Iranian nation, and Iran's standing among other Muslim communities and the world's democracies;
- discredit the Islamic Republic's "democratic" processes by exposing how it depends on electoral manipulation, publicizing how it stacks the deck in favor of its preferred candidates and against those not deemed sufficiently loyal to the system, and documenting the regime's transformation into an authoritarian theocracy backed by the IRGC.

Finally, Washington should devote more resources to helping the Iranian people counter regime cyber surveillance and circumvent government firewalls so that they can stay in contact with the Iranian diaspora, and obtain factual news about developments in Iran from independent news sources—thereby undermining the hegemony of official government news outlets.

THE MILITARY OPTION. Iran has been invaded and occupied by ancient Macedonians, Arabs, Mongols,

and modern Europeans, and the fear of invasion remains an important factor in explaining the policies of the Islamic Republic. After the U.S. invasion of Afghanistan in 2001 and Iraq in 2003, Tehran was sufficiently concerned that it was “next in line” that it suspended its “structured” nuclear weapon R&D effort, presumably to avoid giving its enemies a reason to attack. But these fears eventually faded once the United States became mired in long and costly wars in Iraq and Afghanistan, and with the election of a U.S. president (Barack Obama) committed to reducing America’s role in the Middle East. And while Iran regularly conducts military exercises that deal with potential invasion scenarios, it does not actually appear greatly concerned about such an eventuality at this time.

What of an Israeli or U.S. preventive strike against Iran’s nuclear infrastructure? Tehran has evinced less concern about the former because Israel can do only limited damage to its nuclear program or to conventional military targets—although an Israeli attack might be useful for Iranian politicians intent on reinvigorating the spirit of the Islamic Revolution and riding a nationalist backlash. For this reason, the threat of an Israeli strike in itself has limited deterrent value vis-à-vis Tehran. Having cried wolf for so long, Israeli threats are no longer taken very seriously by Tehran, which probably worries more about the possibility that an Israeli strike could eventually draw the United States into a conflict with Iran.

A U.S. strike could do great damage to Iran’s nuclear infrastructure as well as to numerous military and leadership targets. But Tehran does not see it as an existential threat to the Islamic Republic, and Iran no longer seems to believe that the United States would use force against it.⁶⁸

Having eschewed, for three decades now, the use of force in response to Iran-sponsored terrorism, the United States suffers from a credibility deficit with respect to the Islamic Republic. Both Democratic and Republican administrations have contributed to this state of affairs, although senior Obama administration defense officials have compounded the problem by publicly dismissing the

efficacy of military action against Iran.⁶⁹ The president further complicated matters by renegeing in September 2013 on prior threats to strike at Syria if it used chemical weapons, and by his tendency to couch threats toward Iran in language that conveys more ambivalence than resolve, sending mixed messages to both adversaries and allies. Thus, in warning Iran against attempting a nuclear breakout, he has stated that “I...don’t, as a matter of sound policy, go around advertising exactly what our intentions are. But I think both the Iranian and the Israeli governments recognize that when the United States says it is unacceptable for Iran to have a nuclear weapon, we mean what we say.”⁷⁰

Likewise, statements by senior administration officials that the alternative to a nuclear deal with Iran is war may convey the impression that, if forced to choose, the United States would ultimately rather live with an Iranian bomb than take military action to avert such an eventuality.⁷¹ In this way, U.S. policy may unintentionally tempt Iran to test President Obama’s redline, and to render more likely the very outcome it is trying to avert.

For these reasons, repeated claims by President Obama that “all options are on the table” are now greeted with derision by senior Iranian military officials.⁷² Tehran may no longer believe that it would face unacceptable consequences if it got caught attempting a nuclear breakout. To be viable, however, a long-term agreement must be backstopped with the credible threat of force. And for that to occur, the U.S. must remedy its credibility deficit.

REESTABLISHING U.S. CREDIBILITY. To sell an Iranian deal at home and to ensure its viability once concluded, President Obama needs to address this credibility deficit—lest Tehran test the limits of a deal by selective compliance or by attempting a slow-motion breakout. Here, Tehran’s assessment of the mettle and character of the president and the mood of the American people are more important than its perception of American military power.⁷³ Accordingly, steps to enhance the flexibility and responsiveness of forward-deployed U.S. forces will

not do much to alter Tehran's threat perception, without a change in its perceptions of U.S. resolve.

As a first step, then, U.S. officials should commit, going forward, to "do no harm." The president should avoid statements that the alternative to a nuclear deal is war with Iran; these raise questions about America's commitment to its nuclear redline. Washington must also take steps to undo thirty years of U.S. policy that has taught Tehran that it can engage in proxy warfare against the United States without risking a military response. To do so, Washington must demonstrate through word and deed that it will no longer tolerate actions by Tehran that it tolerated in the past, and that while continuing to engage Tehran, it will be increasingly tolerant of risk in its dealings with the Islamic Republic.⁷⁴ After all, Tehran has not shown much concern that its regional activities and over-the-top anti-American propaganda might undermine nuclear negotiations with the United States. So Washington should demonstrate that it will push back against destabilizing Iranian actions that harm U.S. interests in the region, even while striving for a long-term nuclear deal.

To this end, the United States should interdict Iranian arms transfers to its proxies and allies, which violate the arms-export ban contained in UN Security Council Resolution 1747, in accordance with authorities granted in Resolution 1929. (In this regard, recent steps by the U.S. Navy to interdict Iranian arms shipments to the Houthis in Yemen, and to escort U.S.-flagged vessels through the Strait of Hormuz after the *MV Maersk Tigris* was diverted by Iranian naval vessels to an Iranian port, are a good start.)⁷⁵ It should ensure that the new Security Council resolution envisioned in the U.S. parameters for a long-term accord retains these authorities. And it should more systematically target the IRGC's Qods Force with financial designations—including key facilitators, front companies, and financial institutions that enable its activities.⁷⁶

Likewise, because Tehran has invested significant resources and prestige in its efforts to ensure the survival of Syria's Bashar al-Assad regime—

whose policies are a driver of regional instability—the United States should ensure that the regime remains under pressure and uncertain of its grip over areas it controls. The United States should ramp up its support for what remains of the moderate opposition in Syria in order to maintain pressure on Assad, discourage more fighters from gravitating to Jabhat al-Nusra and the Islamic State of Iraq and al-Sham (ISIS), and win back former Free Syrian Army fighters who had defected to better-resourced extremist groups.

Furthermore, the president must tend to and strengthen the nuclear redline he has drawn, which states that the United States will use all necessary means to prevent Iran from getting the bomb.⁷⁷ He must frequently remind Tehran that his nuclear redline still stands, and use absolutely unambiguous language in discussing the consequences of violating this redline. Strategic communication, however, is 20 percent words and 80 percent action, and actions are needed to make such a threat credible.⁷⁸

Paradoxically, actions to bolster these threats will generally be more effective if they are subtle and calculated to play on Tehran's paranoia,⁷⁹ although there is a time and a place for both subtlety and directness when communicating threats. Subtle actions include shadowy activities to push back against Iranian regional policies and roll back Iranian influence, and unheralded military measures that indicate Washington is preparing in earnest to respond to an Iranian breakout, rather than high profile overt activities that could cause Tehran to dig in its heels in order to save face. Moreover, high-profile threats could engender a backlash by members of the Iranian public, and by Americans and P5+1 members who believe the military instrument has no role to play in diplomacy.

To this end, the United States should conduct exercises that demonstrate the offensive potential of U.S. forces in the region. Thus far, in its dealings with Iran, the United States has emphasized deterrence by denial. But it also needs to emphasize its ability to deter through punishment, lest Tehran conclude that it can effectively manage risk

in its dealings with the United States.⁸⁰ Thus, while missile-defense and mine-countermeasure exercises are necessary elements of an effective deterrence policy toward Iran, they are not sufficient; it is also necessary to conduct and advertise exercises that simulate long-range strike operations and the projection of power deep into hostile territory.⁸¹

The United States should also hold exercises involving B-2 bombers, which can carry the 30,000-pound Massive Ordnance Penetrator (MOP), and should encourage media reports that highlight ongoing military preparations.⁸² It should likewise continue to publicize major milestones in the fielding and deployment of the upgraded MOP, which was developed to deal with Iran's deep-underground uranium-enrichment facility at Fordow.⁸³

Further, Washington should signal that its response to an attempted breakout would not necessarily be predictable or symmetrical in nature. Thus, it might not target just Iran's nuclear infrastructure but also entities essential to the regime's survival, further confounding Tehran's ability to manage risk, should it engage in nuclear brinkmanship. For instance, it could target the IRGC, which is believed to play a key role in Iran's nuclear program, and which is also responsible for ensuring the regime's survival.

Finally, to bolster its nuclear redline with Iran, Washington should seek to create a consensus among the P5+1 and other allies regarding redlines and the consequences for Iran of crossing them, including

- failure to grant timely access to persons, documents, or facilities;
- failure to inform the IAEA of a decision to build new nuclear facilities (as required by the modified Code 3.1 of its Safeguards Agreement);
- production of high-enriched uranium, separation of plutonium, or diversion of nuclear material;

- weapons R&D; or
- withdrawal from the NPT before the IAEA has drawn conclusions about the exclusively peaceful nature of its nuclear program.

The P5+1 should have this consensus enshrined in a UN Security Council resolution adopted under Article 42 (which authorizes the use of force) of Chapter VII of the UN charter. (The Iranian fact sheet regarding the long-term accord calls for a resolution adopted under Article 41, however, which would authorize only diplomatic and economic pressures in the event of a violation.⁸⁴) Such a preventive resolution would put the onus on Tehran for the consequences of its actions.⁸⁵

Conclusions

Deterring, detecting, and responding effectively to an attempted Iranian nuclear breakout would likely prove more challenging than expected. The United States has a poor record of stopping determined proliferators who were not close allies and could not be enticed to abandon their nuclear ambitions through arms transfers and security guarantees—states such as India, Pakistan, North Korea, and now perhaps Iran. Moreover, the United States has generally prioritized avoidance of war over its nuclear nonproliferation commitments. This was certainly the case regarding the Soviet Union, China, and North Korea; it remains to be seen whether this will be the case with Iran.

The U.S. invasion of Iraq—justified in part by concerns about nuclear proliferation—is the exception that proves the rule, as America's post-invasion hangover makes another preventive war over weapons of mass destruction less likely, at least for the foreseeable future. Moreover, President Obama's failure to enforce his redline against Syria's use of chemical weapons and his tepid language in conveying his nuclear redline vis-à-vis Iran may have raised questions in the minds of both friends and enemies regarding the Obama administration's willingness to use force to prevent the Islamic Republic from getting the bomb.

The Obama administration, and perhaps its successors, may likewise prove averse to taking the kinds of steps needed to make deterrence credible in Tehran's eyes, for fear these steps might spur tension and conflict with Iran. This will be true whether or not the P5+1 forges a long-term nuclear deal with Iran. The United States needs to strike a better balance, however, between efforts to achieve a less fraught relationship with Tehran and efforts to deter a nuclear breakout.

A "good" long-term nuclear accord with Iran—however one defines that—is a necessary but not sufficient condition for success when it comes to preventing an Iranian breakout. Just as important is the psychological environment and political context in which it occurs. The most intrusive monitoring arrangements, the most far-reaching constraints, and the most skillfully crafted UN resolutions will not ensure the success of a long-term agreement if Washington fails to convince Tehran that if it attempts a breakout, it will be caught, and will pay a very high price.

The foregoing assessment raises the possibility that Washington may be failing in this regard, and that barring a sustained effort to alter Tehran's perceptions and expectations, Iran will be tempted to test, and perhaps violate, a long-term nuclear accord. The failure to ensure the credibility of deterrent threats for fear of undermining a nuclear deal and scuttling prospects for a rapprochement could, ironically, jeopardize both; excessive restraint

may well ensure the very outcome that Washington is trying to avoid.

Finally, while the decision to delink nuclear negotiations from concerns over Iran's regional behavior might well facilitate the conclusion of a long-term agreement, it is also likely to complicate efforts to nurture and sustain an accord. Tensions deriving from Iranian regional activities, and inattention due to crises elsewhere, could stymie implementation of a deal and jeopardize its long-term viability—much as political neglect and tensions between the United States and North Korea in other areas ultimately undermined their 1994 nuclear accord and paved the way for a North Korean bomb.⁸⁶ Ensuring the successful implementation of a long-term deal over the span of several decades will pose major challenges and require ongoing engagement with Iran, tending to the credibility of Washington's nuclear redline, and the management of tensions deriving from Iranian regional activities. Should a long-term nuclear deal not be reached, the challenges are likely to be greater and to come sooner, as the domestic politics of both parties and Iran's regional ambitions will make it hard to avoid increased tensions and escalation. In either scenario (deal, or no deal), achieving core U.S. objectives vis-à-vis Iran will require a credible deterrent to prevent an Iranian nuclear breakout; getting this piece right will be key to the success of U.S. policy toward Iran in the coming years.

NOTES

1. Jeffrey Goldberg, “Obama to Iran and Israel: ‘As President of the United States, I Don’t Bluff,’” *Atlantic*, March 2, 2012, <http://www.theatlantic.com/international/archive/2012/03/obama-to-iran-and-israel-as-president-of-the-united-states-i-dont-bluff/253875/>. Chelsea J. Carter, “Obama: Iran More than a Year Away from Developing Nuclear Weapon,” CNN, March 15, 2013, <http://www.cnn.com/2013/03/14/world/meast/israel-obama-iran/>.
2. Olli Heinonen, “Iran’s Nuclear Breakout Time: A Fact Sheet,” *PolicyWatch* 2394 (Washington Institute for Near East Policy, March 28, 2015), <http://www.washingtoninstitute.org/policy-analysis/view/irans-nuclear-breakout-time-a-fact-sheet>.
3. Though some analysts believe more time would be needed to orchestrate a response to a major violation of an accord. See Michael Hayden, Olli Heinonen, and Ray Takeyh, “The Iran Time Bomb,” *Washington Post*, March 22, 2015, http://www.washingtonpost.com/opinions/a-one-year-time-bomb-on-iran/2015/03/22/14cc497e-cdbc-11e4-8c54-ffb5ba6f2f69_story.html.
4. For detailed summaries of Iran’s past violations of its IAEA and possibly NPT obligations, see David Albright, “Iran’s Noncompliance with Its International Atomic Energy Agency Obligations,” testimony, House Subcommittee on the Middle East and North Africa, Committee on Foreign Affairs, March 24, 2015, <http://docs.house.gov/meetings/FA/FA13/20150324/103097/HHRG-114-FA13-Wstate-AlbrightD-20150324.pdf>; Paul K. Kerr, *Iran’s Nuclear Program: Tehran’s Compliance with International Obligations*, Report R40094 (Congressional Research Service, April 28, 2014), <http://fas.org/sgp/crs/nuke/R40094.pdf>.
5. Daniel Salisbury and Ian J. Stewart, *Valves for Arak Proliferation Case Study Series*, Project Alpha Centre for Science and Security Studies (London: King’s College, August 22, 2014), https://www.acsss.info/proliferation/item/download/34_c795708a3c32ab020a57fb940d4fc1c1; Ian J. Stewart and Nick Gillard, *Sabotage? Iranian Exhibition Gives Insights into Illicit Procurement Methods and Challenges*, Project Alpha Centre for Science and Security Studies (London: King’s College, September 8, 2014), <https://www.acsss.info/proliferation/item/347-sabotage-iranian-exhibition-gives-insights-into-illicit-procurement-methods-and-challenges>.
6. Iran has vowed to build ten more underground facilities like the one at Fordow, and while it recently claimed that it has done preliminary site surveys for five of the additional enrichment plants it announced, work has not yet gone forward on these. International Atomic Energy Agency, *Implementation of the NPT Safeguards Agreement and Relevant Provisions of Security Council Resolutions in the Islamic Republic of Iran*, February 20, 2014, p. 4, <https://www.iaea.org/sites/default/files/gov2014-10.pdf>.
7. David Albright, “Time Is Short for Iran to Address IAEA’s Nuclear Weapon Concerns,” ISIS report (Institute for Science and International Security, August 1, 2014), <http://isis-online.org/isis-reports/detail/time-is-short-for-iran-to-address-iaeas-nuclear-weapon-concerns/8>; Joby Warrick, “Iran May Have Continued Weapons Research after 2003, IAEA Chief Says,” *Washington Post*, April 8, 2013, http://www.washingtonpost.com/world/national-security/iran-may-have-continued-weapons-research-iaea-chief-says/2013/04/08/0021a9e0-a066-11e2-82bc-511538ae90a4_story.html; IAEA Board of Governors, *Implementation of the NPT Safeguards Agreement and Relevant Provisions of Security Council Resolutions in the Islamic Republic of Iran*, November 8, 2011, <https://www.iaea.org/sites/default/files/gov2011-65.pdf>.
8. For detailed summaries of Iran’s past violations, see David Albright, “Iran’s Noncompliance with Its International Atomic Energy Agency Obligations,” testimony, House Subcommittee on the Middle East and North Africa, Committee on Foreign Affairs, March 24, 2015, <http://docs.house.gov/meetings/FA/FA13/20150324/103097/HHRG-114-FA13-Wstate-AlbrightD-20150324.pdf>; Paul K. Kerr, *Iran’s Nuclear Program: Tehran’s Compliance with International Obligations*, Report R40094 (Congressional Research Service, April 28, 2014), <http://fas.org/sgp/crs/nuke/R40094.pdf>.
9. Patrick Clawson and Mehdi Khalaji, “What Difference Would an Iran Deal Make?” *PolicyWatch* 2339 (Wash-

- ington Institute for Near East Policy, November 25, 2014), <http://www.washingtoninstitute.org/policy-analysis/view/what-difference-would-an-iran-deal-make>; Patrick Clawson and Mehdi Khalaji, *How Iranians Might React to a Nuclear Deal*, Policy Focus 136 (Washington DC: Washington Institute, 2014), <http://www.washingtoninstitute.org/policy-analysis/view/how-iranians-might-react-to-a-nuclear-deal>.
10. Robert Einhorn, "Deterring an Iranian Nuclear Breakout," *New York Times*, February 26, 2015, <http://www.nytimes.com/2015/02/27/opinion/deterring-an-iranian-nuclear-breakout.html>.
 11. For more on the challenges associated with detecting small, clandestine facilities, see Anthony Fainberg, *Strengthening IAEA Safeguards: Lessons from Iraq* (Center for International Security and Arms Control, Stanford University, April 1993). Regarding the extraordinary sensitivity of current environmental-sampling techniques and their limitations, see D. L. Donohue and R. Zeisler, "Behind the Scenes: Scientific Analysis of Samples from Nuclear Inspections in Iraq," *IAEA Bulletin*, no. 1 (1992): pp. 25–32; Gary Dillon, "Wide Area Environment Sampling in Iran," in *Falling Behind: International Scrutiny of the Peaceful Atom*, ed. Henry D. Sokolski (Army War College Strategic Studies Institute, February 2008), pp. 85–98, <http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubID=841>.
 12. Jofi Joseph, "Verification Measures for a Final Deal," *Iran Matters*, June 3, 2014, <http://iranmatters.belfercenter.org/blog/verification-measures-final-deal>; Robert Einhorn, "Preventing a Nuclear-Armed Iran: Requirements for a Comprehensive Nuclear Agreement," Arms Control and Non-Proliferation Series Paper 10 (Washington DC: Brookings Institution, March 2014), pp. 22–23, <http://www.brookings.edu/~media/research/files/papers/2014/03/31-nuclear-armed-iran-einhorn/31-nuclear-armed-iran-einhorn-pdf.pdf>.
 13. Michael Eisenstadt, *What Iran's Chemical Past Tells Us about Its Nuclear Future*, Research Note 17 (Washington DC: Washington Institute, 2014), http://www.washingtoninstitute.org/uploads/Documents/pubs/Research-Note17_Eisenstadt2.pdf; Michael Eisenstadt, *The Strategic Culture of the Islamic Republic of Iran: Operational and Policy Implications*, MES Monographs 1 (Marine Corps University, August 2011), p. 12, <http://www.washingtoninstitute.org/uploads/Documents/opeds/4e60ff471079a.pdf>.
 14. IAEA Board of Governors, *Implementation of the NPT Safeguards Agreement and Relevant Provisions of Security Council Resolutions in the Islamic Republic of Iran*, November 8, 2011, <https://www.iaea.org/sites/default/files/gov2011-65.pdf>.
 15. David Albright and Cory Hinderstein, "Iran, Player or Rogue?" *Bulletin of the Atomic Scientists* (September–October 2003), pp. 52–58. Iran claims that it had intended to declare these plants to the IAEA, and that therefore they were not clandestine. It did so in the latter case once it became clear that the United States was about to reveal the plant's existence.
 16. U.S. Department of State, "Parameters for a Joint Comprehensive Plan of Action regarding the Islamic Republic of Iran's Nuclear Program," media note, April 2, 2015, <http://www.state.gov/t/pa/prs/ps/2015/04/240170.htm>.
 17. Houston G. Wood, Alexander Glaser, and R. Scott Kemp, "The Gas Centrifuge and Nuclear Weapons Proliferation," *Physics Today*, (September 2008): p. 43; U.S. Congress, Office of Technology Assessment, *Environmental Monitoring for Nuclear Safeguards*, OTA-BP-ISS-168 (Washington DC: U.S. Government Printing Office, September 1995), <http://ota.fas.org/reports/9518.pdf>; Anthony Fainberg, *Strengthening IAEA Safeguards: Lessons from Iraq*, Center for International Security and Arms Control (Stanford University, April 1993), pp. 20–41.
 18. B. Habib, "Estimation of the Electromagnetic Radiation Emitted from a Small Centrifuge Plant," *Science & Global Security* 15, no. 1 (2007), pp. 31–47; Office of Technology Assessment, *Technologies Underlying Weapons of Mass Destruction* (Washington DC: U.S. Government Printing Office, 1993), p. 163.
 19. Anthony Fainberg, *Strengthening IAEA Safeguards: Lessons from Iraq* (Center for International Security and Arms Control, Stanford University, April 1993), pp. 20–41.
 20. See David Albright and Serena Kelleher-Vergantini: *Lashkar Ab'ad: Iran's Unexplained Laser Enrichment Capa-*

- bilities, ISIS Imagery Brief (Institute for Science and International Security, July 29, 2013), http://isis-online.org/uploads/isis-reports/documents/Lashkar_Abad_29July2013.pdf; and *Update on Lashkar Ab'ad: Iran's Laser Enrichment Capabilities*, ISIS Imagery Brief, February 24, 2014, <http://isis-online.org/isis-reports/detail/update-on-lashkar-abad-irans-laser-enrichment-capabilities/8>.
21. Brian Dodson, "Lasers Point to the Future of Uranium Enrichment," *Gizmag*, November 5, 2013, <http://www.gizmag.com/silex-laser-enrichment-uranium/29460/>.
 22. Fredrik Dahl, "New Laser Technology Stirs Nuclear Bomb Proliferation Fears," Reuters, October, 11 2012, <http://www.reuters.com/assets/print?aid=USL6E8L988020121011>.
 23. According to Azriel Lorber, the knowledge that something can be done is often a powerful spur to technological innovation. *Ready for Battle: Technological Intelligence on the Battlefield* (London: Rowman & Littlefield, 2015), p. 145.
 24. Victor Gilinsky, Marvin Miller, and Harmon Hubbard, *A Fresh Examination of the Proliferation Dangers of Light Water Reactors* (Nonproliferation Policy Education Center, October 22, 2004), <http://npolicy.org/article.php?aid=172>; J. Carson Mark, "Explosive Properties of Reactor-Grade Plutonium," *Science and Global Security*, no. 17 (2009): 170–185, <http://www.princeton.edu/sgs/publications/sgs/archive/17-2-3-Mark-vonHip-Lyman.pdf>; U.S. Department of Energy, "Additional Information concerning Underground Nuclear Weapon Test of Reactor-Grade Plutonium," fact sheet, <https://www.osti.gov/opennet/forms.jsp?formurl=document/press/pc29.html>.
 25. For what it would take to build a jury-rigged clandestine processing plant, see D. E. Ferguson, "Simple, Quick Processing Plant," Oak Ridge National Laboratory, intra-laboratory correspondence, August 30, 1977, http://www.npolicy.org/article_file/Simple_Quick_Processing_Plant_Culler.pdf.
 26. Keith A. Hansen, "Intelligence and Nuclear Proliferation: Lessons Learned," *Proliferation Papers* 38 (Institut Français des Relations Internationales, Summer 2011), pp. 21–43.
 27. Sigfried S. Hecker, "What I Found in North Korea: Pyongyang's Plutonium Is No Longer the Only Problem," *Foreign Affairs*, December 9, 2010, <http://www.foreignaffairs.com/articles/67023/siegfried-s-hecker/what-i-found-in-north-korea>.
 28. "Background Briefing with Senior U.S. Officials on Syria's Covert Nuclear Reactor and North Korea's Involvement," April 24, 2008, <http://fas.org/irp/news/2008/04/odni042408.pdf>; Richard B. Cheney, *In My Time: A Personal and Political Memoir* (New York: Simon & Schuster, 2011), pp. 465–473.
 29. Greg Miller, "Iran Halted Nuclear Push in 2003, U.S. Now Says," *Los Angeles Times*, December 4, 2007, <http://articles.latimes.com/2007/dec/04/world/fg-iran4>.
 30. Mark Fitzpatrick, *Iran's Nuclear, Chemical, and Biological Capabilities: A Net Assessment* (International Institute for Strategic Studies, 2011), p. 17; Paul Brannan, *New Satellite Image Further Narrows Fordow Construction Start Date*, ISIS report (Institute for Science and International Security, November 18, 2009), <http://isis-online.org/isis-reports/detail/new-satellite-image-further-narrows-fordow-construction-start-date/8>.
 31. On the eve of the 1991 Gulf War, the U.S. military's master target list carried only two nuclear targets in Iraq, but after the war IAEA inspectors discovered sixteen main nuclear facilities, and a total of more than twenty sites. Thomas A. Keaney and Eliot A. Cohen, *United States Air Force Gulf War Air Power Survey Summary Report* (Washington DC: U.S. Government Printing Office, 1993), p. 123.
 32. Frank V. Pabian, "South Africa's Nuclear Weapon Program: Lessons for U.S. Nonproliferation Policy," *Nonproliferation Review* (Fall 1995): pp. 1–19, <http://cns.miis.edu/npr/pdfs/31pabian.pdf>.
 33. David Albright, Paul Brannan, and Andrea Scheel Stricker, "Detecting and Disrupting Illicit Nuclear Trade after A. Q. Khan," *Washington Quarterly* (April 2010): pp. 85–106, http://csis.org/files/attachments/130828_Detecting%20and%20Disrupting%20Nuclear%20Trade.pdf.
 34. Defense Science Board, *Assessment of Nuclear Monitoring and Verification Technologies* (January 2014), <http://www>.

- acq.osd.mil/dsb/reports/NuclearMonitoringAndVerificationTechnologies.pdf.
35. Pierre Goldschmidt, *IAEA Safeguards: Dealing Preventively with Non-Compliance* (Washington DC: Carnegie Endowment for International Peace, July 12, 2008), http://belfercenter.ksg.harvard.edu/publication/18456/iaea_safeguards.html.
 36. Gen. Michael V. Hayden (Ret.) “Examining What a Nuclear Iran Deal Means for Global Security,” testimony, House Committee on Foreign Affairs, November 20, 2014, <http://docs.house.gov/meetings/FA/FA13/20141120/102758/HHRG-113-FA13-Wstate-HaydenM-20141120.pdf>.
 37. “Iran Vote: Rouhani Vows Transparency on Nuclear Issue,” BBC News Middle East, June 17, 2013, <http://www.bbc.com/news/world-middle-east-22940220>.
 38. Pierre Goldschmidt, *IAEA Safeguards: Dealing Preventively with Non-Compliance* (Washington DC: Carnegie Endowment for International Peace, July 12, 2008), http://belfercenter.ksg.harvard.edu/publication/18456/iaea_safeguards.html; Robert Einhorn, *Preventing a Nuclear-Armed Iran: Requirements for a Comprehensive Nuclear Agreement*, Arms Control and Non-Proliferation Series Paper 10 (Brookings Institution, March 2014), pp. 22–23, <http://www.brookings.edu/~media/research/files/papers/2014/03/31-nuclear-armed-iran-einhorn/31-nuclear-armed-iran-einhorn-pdf.pdf>; Olli Heinonen, *The Iranian Nuclear Programme: Practical Parameters for a Credible Long-Term Agreement* (London: Henry Jackson Society, November 2014), <http://henryjacksonsociety.org/wp-content/uploads/2014/11/The-Iranian-Nuclear-Programme-online.pdf>; Christopher A. Bidwell and Orde F. Kittrie, *Verification Requirements for a Nuclear Agreement with Iran*, Nuclear Verification Capabilities Independent Task Force of the Federation of American Scientists (September 2014), pp. 15–16, <http://fas.org/wp-content/uploads/2014/09/verification-requirements-for-a-nuclear-agreement-with-iran-sept-2014.pdf>.
 39. David Albright, Andrea Stricker, Serena Kelleher-Vergantini, and Houston Wood, “P5+1/Iran Framework: Needs Strengthening” (Institute for Science and International Security, April 11, 2015), http://www.isisnucleariran.org/assets/pdf/Assessment_of_Iran_Nuclear_Framework_April_11_2015-final.pdf.
 40. David E. Sanger and Michael R. Gordon, “Iran Backs Away from Key Detail in Nuclear Deal,” *New York Times*, March 29, 2015, http://www.nytimes.com/2015/03/30/world/middleeast/iran-backs-away-from-key-detail-in-nuclear-deal.html?_r=0.
 41. Ali Akbar Dareini, “Iran’s Revolutionary Guard Says No to Inspections of Military Sites under Any Nuclear Deal,” Associated Press, April 19, 2015, <http://www.usnews.com/news/world/articles/2015/04/19/iran-guard-rejects-inspection-of-military-sites>.
 42. Thomas Erdbrink and David E. Sanger, “Iran’s Supreme Leader Says Sanctions Must Lift when Nuclear Deal Is Signed,” *New York Times*, April 9, 2015, <http://www.nytimes.com/2015/04/10/world/middleeast/iran-khame-nei-rouhani-nuclear-agreement.html>.
 43. Gary Dillon, “Wide Area Environment Sampling in Iran,” in *Falling Behind: International Scrutiny of the Peaceful Atom*, ed. Henry D. Sokolski (Army War College Strategic Studies Institute, February 2008), pp. 92–93, <http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubID=841>.
 44. Mohamed ElBaradei, *The Age of Deception: Nuclear Diplomacy in Treacherous Times* (New York: Metropolitan Books, 2011), pp. 38–47.
 45. Craig Smith, “Alarm Raised over Quality of Uranium Found in Iran,” *New York Times*, March 11, 2004, <http://www.nytimes.com/2004/03/11/international/middleeast/11NUKE.html>.
 46. IAEA Board of Governors, “Implementation of the IAEA Safeguards Agreement in the Syria Arab Republic,” GOV/2010/11, February 18, 2010, <https://www.iaea.org/sites/default/files/gov2010-11.pdf>.
 47. W. Bush, G. af Ekenstam, J. Janov, E. Kuhn, and M. Ryjinski, *IAEA Experience with Environmental Sampling at Gas Centrifuge Enrichment Plants in the European Union*, IAEA-SM-367/10/04, http://www.armscontrolwonk.com/file_download/138/2004-iaea-experience.pdf; Gary Dillon, “Wide Area Environment Sampling in Iran,” in *Falling Behind: International Scrutiny of the Peaceful Atom*, ed. Henry D. Sokolski (Army War College Strategic Studies

- Institute, February 2008), p. 95, <http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubID=841>.
48. Zachary Fryer-Biggs, “DoD Looking to ‘Jump the Gap’ into Adversaries’ Closed Networks,” *Defense News*, January 15, 2013, <http://archive.defensenews.com/article/20130115/C4ISR01/301150010/DoD-Looking-8216-Jump-Gap-8217-Into-Adversaries-8217-Closed-Network>.
 49. Mark Clayton, “Cyber-War: In Deed and Desire, Iran Emerging as a Major Power,” *Christian Science Monitor*, March 16, 2014, <http://www.csmonitor.com/World/Passcode/2014/0316/Cyber-war-In-deed-and-desire-Iran-emerging-as-a-major-power>; Stuart McClure, *Operation Cleaver* (Cylance, December 2014), http://www.cylance.com/assets/Cleaver/Cylance_Operation_Cleaver_Report.pdf; Nart Villeneuve, Ned Moran, Thoufique Haq, and Mike Scott, *Operation Saffron Rose 2013* (FireEye, May 13, 2014), <https://www.fireeye.com/blog/threat-research/2014/05/operation-saffron-rose.html>.
 50. Daniel Wertz and Ali Vaez, *Sanctions and Nonproliferation in North Korea and Iran: A Comparative Analysis*, FAS Issue Brief (Federation of American Scientists, June 2012), pp. 7–8, 13–15.
 51. For more on the challenges associated with detecting nuclear weapons, see Steve Fetter et al., “Detecting Nuclear Warheads,” *Science & Global Security* 1 (1990): pp. 225–302; Steve Fetter and Frank von Hippel, “The Black Sea Experiment: Measurements of Radiation from a Soviet Warhead,” *Science & Global Security* 1 (1990): pp. 323–327; S. T. Belyaev et al., “The Use of Helicopter-Borne Neutron Detectors to Detect Nuclear Warheads in the USSR-U.S. Black Sea Experiment,” *Science & Global Security* 1 (1990): pp. 328–333.
 52. During the Cold War, the U.S. Navy reportedly ran a clandestine program in which yachts and pleasure craft were fitted with sensors that could detect radiation emitted by nuclear weapons aboard Soviet warships transiting the Bosphorus in Turkey. The boats, manned by foreign crews in civilian clothes, would draw alongside the Soviet warships as they passed through the strait to allow the sensors to take a reading. See Jeffrey T. Richelson, “Task Force 157: The U.S. Navy’s Secret Intelligence Service, 1966–77,” *Intelligence and National Security* 11, no. 1 (January 1996): pp. 116–119. Such a capability would be useful for dealing with the possibility of clandestine transfer of a nuclear device by sea. Likewise during the Cold War, U.S. agents in East Germany reportedly planted clandestine radiation monitors along railway lines leading to the Soviet Union to verify the withdrawal of nuclear-tipped missiles from East Germany, in accordance with the Intermediate-Range Nuclear Forces (INF) Treaty signed in December 1987. Milt Bearden and James Risen, *The Main Enemy: The Inside Story of the CIA’s Final Showdown with the CIA* (New York: Random House, 2003), p. 387.
 53. Michael Eisenstadt, “Rolling Back Tehran’s Veil of Nuclear Ambiguity,” *PolicyWatch* 1836 (Washington Institute for Near East Policy, August 2, 2011), <http://www.washingtoninstitute.org/policy-analysis/view/rolling-back-tehrans-veil-of-nuclear-ambiguity>.
 54. Matthias Kuntzel, “America’s Shifting ‘Red Lines’ on Iran’s Nuclear Ambitions: A Wedge Issue in U.S.-Israel Relations,” *Israel Journal of Foreign Affairs* VII, no. 1 (2013): pp. 37–44, <http://www.israelcfr.com/documents/7-1/7-1-5-MatthiasKuntzel.pdf>; Graham Allison, “Red Lines in the Sand: Israel’s Credibility Problem on Iran,” *ForeignPolicy.com*, October 11, 2012, <http://foreignpolicy.com/2012/10/11/red-lines-in-the-sand/>.
 55. “Sanaa Is the Fourth Arab Capital to Join the Iranian Revolution,” *Middle East Monitor*, September 27, 2014, <https://www.middleeastmonitor.com/news/middle-east/14389-sanaa-is-the-fourth-arab-capital-to-join-the-iranian-revolution>.
 56. Ali Younesi, “Advisor to Iranian President Rohani: Iran Is an Empire, Iraq Is Our Capital,” Special Dispatch 5991 (Middle East Media Research Institute, March 9, 2015), <http://www.memri.org/report/en/print8471.htm>.
 57. Snap-back sanctions if suspended under a long-term deal, or ratchet them up if no deal had been concluded.
 58. Thomas Erdbrink and David E. Sanger, “Iran’s Supreme Leader Says Sanctions Must Lift when Nuclear Deal Is Signed,” *New York Times*, April 9, 2015, <http://www.nytimes.com/2015/04/10/world/middleeast/iran-khame-nei-rouhani-nuclear-agreement.html>.

59. “Sequence, Degree of Lifting of Sanctions Major Iran Talks Obstacles—Ryabkov,” SputnikNews.com, April 23, 2015, <http://sputniknews.com/politics/20150423/1021298236.html>.
60. Kevan Harris, “Iran’s Political Economy under and after the Sanctions,” *Monkey Cage* (blog), *Washington Post*, April 23, 2015, <http://www.washingtonpost.com/blogs/monkey-cage/wp/2015/04/23/irans-political-economy-under-and-after-the-sanctions/>; Kenneth Katzman, *Iran Sanctions*, Report RS20871 (Congressional Research Service, April 21, 2015), <https://fas.org/sgp/crs/mideast/RS20871.pdf>; Patrick Clawson, “Iran Adapts to Sanctions in the Absence of New Measures,” testimony, *Senate Committee on Banking, Housing, and Urban Affairs*, January 27, 2015, <http://www.washingtoninstitute.org/policy-analysis/view/iran-adapts-to-sanctions-in-the-absence-of-new-measures>.
61. Karim Sadjadpour, *Reading Khamenei: The World View of Iran’s Most Powerful Leader* (Washington DC: Carnegie Endowment for International Peace, 2008), pp. 17–19, http://carnegieendowment.org/files/sadjadpour_iran_final2.pdf; Michael Eisenstadt, *The Missing Lever: Information Activities against Iran*, Policy Note 1 (Washington DC: Washington Institute, March 2010), <http://www.washingtoninstitute.org/policy-analysis/view/the-missing-lever-information-activities-against-iran>.
62. Karim Sadjadpour, *Reading Khamenei: The World View of Iran’s Most Powerful Leader* (Washington DC: Carnegie Endowment for International Peace, 2008), p. 17.
63. “IRGC Chief Warns of Cultural Threats,” Press TV, June 9, 2010, <http://edition.presstv.ir/detail/129769.html>. See also Jafari’s statements in Will Fulton, “Iran News Round Up,” *AEI Iran Tracker*, February 28, 2013, <http://www.irantracker.org/iran-news-round-february-28-2013>.
64. See, for instance, the polling data presented by Ebrahim Mohseni at a workshop titled “Understanding Iranian Public Opinion,” Stimson Center, October 17, 2012, <http://www.stimson.org/events/understanding-iranian-public-opinion/>; and Ebrahim Mohseni, Nancy Gallagher, and Clay Ramsay, *Iranian Attitudes on Nuclear Negotiations: A Public Opinion Study* (Center for International and Security Studies, University of Maryland, September 2014), http://worldpublicopinion.org/pipa/articles/2014/iranian_attitudes_on_nuclear_negotiations__final__091614.pdf.
65. As it now stands, efforts by Tehran to restrict the flow of information to its people have hindered, but failed to halt, online communications. See, for instance, David Holmes, “State of Censorship: How Iran Censors the Internet (and How Its Citizens Get around It),” *PandoDaily*, November 12, 2013, <http://pando.com/2013/11/12/state-of-censorship-how-iran-censors-the-internet-and-how-its-citizens-get-around-it/>. Indeed, some ministers see the regime fighting a losing battle. Michael Pizzi, “Iran Government Minister: Media Bans May Seem ‘Laughable’ in 5 Years,” *Aljazeera America*, December 19, 2013, <http://america.aljazeera.com/articles/2013/12/19/iranian-ministermediabansmayseemlaughablein5years.html>.
66. Dion Nissenbaum and Jeffrey Sparshott, “U.S. Eases Tech Exports to Help Iranian Dissenters,” *Wall Street Journal*, May 30, 2013, <http://www.wsj.com/articles/SB1000142412788732441260457851553175176068>; Joby Warrick, “Obama Administration to Help Iranians Beat Government Censors,” *Washington Post*, May 30, 2013, http://www.washingtonpost.com/world/national-security/obama-administration-to-help-iranians-beat-government-censors/2013/05/30/94db07b4-c96c-11e2-9245-773c0123c027_story.html.
67. Max Boot and Michael Doran, “Department of Dirty Tricks: Why the United States Needs to Sabotage, Undermine, and Expose Its Enemies in the Middle East,” *ForeignPolicy.com*, June 28, 2013, <http://foreignpolicy.com/2013/06/28/department-of-dirty-tricks/>.
68. Fars News Agency, “Supreme Leader: Enemies Never Dare to Attack Iran,” July 8, 2014, <http://english.farsnews.com/newstext.aspx?nn=13930417000213>. Thomas Erdbrink, “Iran’s Leader Says Obama Has Removed Military Option,” *New York Times*, June 4, 2014, <http://www.nytimes.com/2014/06/05/world/middleeast/ayatollah-ali-khamenei-sees-change-in-west-point-speech.html>.
69. See, for instance, U.S. Department of Defense, “Remarks by Secretary of Defense Leon E. Panetta at

- the Saban Center,” news transcript, December 2, 2011, <http://www.defense.gov/transcripts/transcript.aspx?transcriptid=4937>; and Gen. Martin Dempsey, interview by Fareed Zakaria, CNN Global Public Square, February 19, 2012, <http://transcripts.cnn.com/TRANSCRIPTS/1202/19/fzgps.01.html>.
70. Jeffrey Goldberg, “Obama to Iran and Israel: ‘As President of the United States, I Don’t Bluff,’” *Atlantic*, March 2, 2012, <http://www.theatlantic.com/international/archive/2012/03/obama-to-iran-and-israel-as-president-of-the-united-states-i-dont-bluff/253875/>. Likewise, in warning Syria in August 2012 not to use chemical weapons, President Obama stated that there would be “enormous consequences” and that the use of CW would “change my calculations significantly.”
71. Jeffrey Goldberg, “White House Official: Nuclear Deal Is Best Way to Avoid War with Iran,” *Atlantic*, March 4, 2015, <http://www.theatlantic.com/international/archive/2015/03/white-house-official-nuclear-deal-is-best-way-to-avoid-war-with-iran/386806/>.
72. See the comments by Armed Forces Deputy Chief of Staff Brig. Gen. Masoud Jazayeri quoted in Arash Karami, “Mr. Obama: We Have Our Options on the Table, Too,” *Iran Pulse*, Al-Monitor, March 18, 2013, <http://iran-pulse.al-monitor.com/index.php/2013/03/1586/mr-obama-we-have-our-options-on-the-table-too/>.
73. Therese Delpech, *Nuclear Deterrence in the 21st Century* (Santa Monica, CA: RAND, 2012), p. 87.
74. There is an academic debate regarding the degree to which failures to credibly deter a given adversary or other adversaries in the past may adversely affect the ability to deter a given adversary in the present. Some believe such failures do have an effect, while others believe that an adversary’s perceptions of an actor’s resolve and the military balance in the here and now are the decisive factors. In the case of the U.S.-Iran relationship, it is hard to avoid the conclusion that three decades of experience have influenced Iran’s risk calculus vis-à-vis the United States. For a list of the major works on this topic, see Daniel W. Drezner, “Ten Things to Read about Reputation in International Relations,” *Foreign Policy*, May 27, 2009, http://drezner.foreignpolicy.com/posts/2009/05/27/ten_things_to_read_about_reputation_in_international_relations.
75. Dion Nissenbaum, “U.S. Moves to Stem Iran Arms Flow to Yemen,” *Wall Street Journal*, April 12, 2015, <http://www.wsj.com/articles/u-s-wants-to-block-iran-from-arming-yemens-houthi-rebels-1428868461>; Tom Vanden Brook, “Iran Convoy Turns Away from Yemen, U.S. Ship Returns to Gulf,” *USA Today*, April 25, 2015, <http://www.usatoday.com/story/news/world/2015/04/25/iran-yemen-weapons/26367493/>; Hendrick Simoes, “Navy Warships Accompany 4 U.S.-Flagged Vessels in Strait of Hormuz,” *Stars and Stripes*, May 1, 2015, <http://www.stripes.com/news/middle-east/navy-warships-accompany-4-us-flagged-vessels-in-strait-of-hormuz-1.343610>.
76. Colin Kahl, Raj Pattani, and Jacob Stokes, *If All Else Fails: The Challenges of Containing a Nuclear-Armed Iran* (Washington DC: Center for a New American Security, May 2013), pp. 45–46, http://www.cnas.org/files/documents/publications/CNAS_IfAllElseFails.pdf.
77. Jeffrey Goldberg, “Obama to Iran and Israel: ‘As President of the United States, I Don’t Bluff,’” *Atlantic*, March 2, 2012, <http://www.theatlantic.com/international/archive/2012/03/obama-to-iran-and-israel-as-president-of-the-united-states-i-dont-bluff/253875/>.
78. Lindsey J. Borg, *Communicating with Intent: The Department of Defense and Strategic Communication* (Cambridge: Harvard University and the Center for Information Policy Research, February 2008), http://pirp.harvard.edu/pubs_pdf/borg/borg-i08-1.pdf.
79. Ervand Abrahamian, “The Paranoid Style in Iranian Politics,” *Frontline: Tehran Bureau*, PBS, August 27, 2009, <http://www.pbs.org/wgbh/pages/frontline/tehranbureau/2009/08/the-paranoid-style-in-iranian-politics.html>; Ahmad Ashraf, “Conspiracy Theories,” *Encyclopaedia Iranica*, <http://www.iranicaonline.org/articles/conspiracy-theories>.
80. For instance, in explaining the deployment of additional forces to the region in 2012, a senior Defense Department official said, “The message to Iran is, ‘Don’t even think about it.’ Don’t even think about closing the strait. We’ll clear the mines. Don’t even think about sending your fast boats out to harass our vessels or commercial

- shipping. We'll put them on the bottom of the Gulf." But such an approach permits Iran to decide what kinds of losses it is willing to incur in order to achieve an objective, and thus by enabling it to calibrate risk, it may effectively lower the threshold for action by Iran. Thom Shanker, Eric Schmitt, and David E. Sanger, "U.S. Adds Forces in Persian Gulf, a Signal to Iran," *New York Times*, July 3, 2012, <http://www.nytimes.com/2012/07/03/world/middleeast/us-adds-forces-in-persian-gulf-a-signal-to-iran.html?pagewanted=all>.
81. Maj. Sonny A. Thompson Jr., "Deterrence by Denial: The Efficacy of U.S. Missile Defense in the Persian Gulf as a Deterrent against the Iranian Regional Missile Threat" (master's thesis, U.S. Army Command and General Staff College, 2011), <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA547467>; Col. Eddie Boxx, "Countering the Iranian Missile Threat in the Middle East," *PolicyWatch* 1991 (Washington Institute for Near East Policy, October 18, 2012), <http://www.washingtoninstitute.org/policy-analysis/view/countering-the-iranian-missile-threat-in-the-middle-east>.
 82. The ideal report of this sort would not look like an authorized disclosure but rather like a leak by concerned officials seeking to prevent an unwanted war. See, for instance, Nick Hopkins, "Britain Rejects U.S. Request to Use UK Bases in Nuclear Standoff with Iran," *Guardian*, October 25, 2012, <http://www.guardian.co.uk/world/2012/oct/25/uk-reject-us-request-bases-iran>.
 83. Tony Capaccio, "Boeing's 30,000-Pound Bunker-Buster Improved, U.S. Says," *Bloomberg News*, January 14, 2013, <http://www.bloomberg.com/news/2013-01-14/boeing-s-30-000-pound-bunker-buster-improved-u-s-says.html>.
 84. Payam Mohseni, "Translation of Iranian Fact Sheet on the Nuclear Negotiations," Iran Matters (blog), Belfer Center, April 3, 2015, <http://iranmatters.belfercenter.org/blog/translation-iranian-factsheet-nuclear-negotiations>.
 85. James F. Jeffrey, "How a UN Resolution Can Generate Confidence in an Iran Nuclear Deal," *PolicyWatch* 2388 (Washington Institute for Near East Policy, March 17, 2015), <http://www.washingtoninstitute.org/policy-analysis/view/how-a-un-resolution-can-generate-confidence-in-an-iran-nuclear-deal>; Pierre Goldschmidt, "Nuclear Prevention and Red Lines: The Case of Iran," paper prepared for the IISS-CFR workshop *The Iranian Nuclear Challenge: Reassessing the Options*, London, March 22–23, 2010, http://carnegieendowment.org/files/goldschmidt_red_lines_iran.pdf.
 86. Robert L. Gallucci and Joel S. Wit, "North Korea's Real Lessons for Iran," *New York Times*, April 10, 2015, http://www.nytimes.com/2015/04/11/opinion/north-koreas-real-lessons-for-iran.html?_r=0.

