Separating Fact from Fiction in the Debate over Drone Proliferation

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In the last decade and a half, the use of unmanned aerial vehicles (UAVs), "drones," has become commonplace.[1] In response to the terrorist attacks of September 11, 2001, the United States launched its first armed drone strike in Afghanistan in November of that year. The strike missed its intended target—Mullah Akhund, the Taliban's number three in command—but killed several others. A year later, the United States used an armed drone to strike suspected al-Qaida members in Yemen, including Qa'id Salim Sinan al Harithi, who was thought to have plotted the attack against the USS *Cole* in 2000, which had killed seventeen U.S. sailors. Since then, U.S. drone strikes have grown in both geographic scope and number, extending to Pakistan in 2004 and Somalia in 2007, and increasing from about 50 total counterterrorism strikes from 2001 to 2008 to about 450 from 2009 to 2014.[2] U.S. Secretary of Defense Leon Panetta once understandably referred to drones as "the only game in town" in terms of stopping al-Qaida.[3]

Although the United States has been the most prolific user of combat drones, several other countries have employed them as well, including Iraq, Israel, Nigeria, Pakistan, and the United Kingdom. Almost a dozen states, including China, Iran, and Saudi Arabia, reportedly now possess armed drones, and many others—including India—are racing to acquire them. The spread of armed drones has ignited considerable debate among scholars and policy-

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1. For the purposes of this article, we refer to UAVs and drones interchangeably, leaving aside debates over terminology.
2. Data from New America Foundation, http://securitydata.newamerica.net/drones/pakistan-analysis.html. See also Stephanie Carvin, "The Trouble with Targeted Killing," *Security Studies*, Vol. 21, No. 3 (2012), pp. 529–555; and Julia Macdonald and Jacquelyn Schneider, "Presidential Risk Orientation and Force Employment Decisions: The Case of Unmanned Weaponry," *Journal of Conflict Resolution*, forthcoming.
3. Noah Shactman, "CIA Chief, 'Drones "Only Game in Town" for Stopping Al Qaeda,'" *Wired*, May 19, 2009, https://www.wired.com/2009/05/cia-chief-drones-only-game-in-town-for-stopping-al-qaeda/.

makers about the consequences of armed and unarmed drone proliferation for international and regional security.

One camp views drones as an important, even transformative, military technology. Many within this camp caution that drones lower the costs of using force to the point of making war too easy and therefore more likely.[4] Additionally, because drones have a variety of commercial applications and because drone exports are increasing, those in this camp generally believe that militarily-relevant drones will spread very quickly.[5] Drone proliferation, therefore, is both inevitable and highly consequential for the international security environment. In contrast, a second camp views drones as a nontransformative technology that replicates capabilities that many modern militaries already possess.[6] In addition, analysts in this camp contend that the technological requirements of sophisticated drones are beyond the reach of many countries.[7] Consequently, drone proliferation is relatively insignificant for regional and international security.

This article assesses the consequences of current-generation drone proliferation, concluding that both of the above perspectives are misguided. Examining the effects of UAVs in six different contexts—counterterrorism, interstate conflict, crisis onset and deterrence, coercive diplomacy, domestic control and repression, and use by nonstate actors for the purposes of terrorism—we show that, although current-generation drones will introduce some unique capabilities into conflicts around the world, they are unlikely to produce the dire consequences that some analysts fear. In particular, drone proliferation carries

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4. See, for example, Micah Zenko, "Reforming U.S. Drone Strike Policies" (Washington, D.C.: Council on Foreign Relations, 2013), http://www.cfr.org/wars-and-warfare/reforming-us-drone-strike-policies/p29736; Michael J. Boyle, "The Race for Drones," *Orbis*, Vol. 59, No. 1 (2015), pp. 76–94, at p. 78; Peter W. Singer, "Do Drones Undermine Democracy?" *New York Times*, January 21, 2012, http://www.nytimes.com/2012/01/22/opinion/sunday/do-drones-undermine-democracy .html; and Adam N. Stulberg, "Managing the Unmanned Revolution in the U.S. Air Force," *Orbis*, Vol. 51, No. 2 (March 2007), pp. 251–265.
5. Patrick Tucker, "Every Country Will Have Armed Drones within 10 Years," *Defense One*, May 6, 2014, http://www.defenseone.com/technology/2014/05/every-country-will-have-armed-drones-within-ten-years/83878/.
6. See, for example, Charli Carpenter and Lina Shaikhouni, "Don't Fear the Reaper: Four Misconceptions about How We Think about Drones," *Foreign Policy*, June 7, 2011, http://foreignpolicy.com/2011/06/07/dont-fear-the-reaper/; Megan Braun, "Predator Effect: A Phenomenon Unique to the War on Terror," in Peter L. Bergen and Daniel Rothenberg, eds., *Drone Wars: Transforming Conflict, Law, and Policy* (Cambridge: Cambridge University Press, 2014), pp. 253–284; Mark Moyar, "Drones—An Evolution, Not a Revolution, in Warfare," *Strategika*, January 2014, pp. 11–13; and Lynn E. Davis et al., "Armed and Dangerous? UAVs and U.S. Security" (Santa Monica, Calif.: RAND Corporation, 2014).
7. Andrea Gilli and Mauro Gilli, "The Diffusion of Drone Warfare? Industrial, Organizational, and Infrastructural Constraints: Military Innovations and the Ecosystem Challenge," *Security Studies*, forthcoming.

potentially significant consequences for counterterrorism operations and domestic control in authoritarian regimes. Drones lower the costs of using force by eliminating the risk that pilots will be killed, making some states—especially democracies, which may be especially casualty sensitive—more likely to carry out targeted attacks against suspected militants. In addition, using drones could provide autocratic leaders with a new tool to bolster their domestic regime security.[8]

Yet, in general, current-generation drones are likely to have a minimal impact on interstate relations. Armed or advanced unarmed drones are unlikely to provoke international crises or incite regional instability. In addition, current-generation drones offer little utility for coercion against other governments. Contrary to the conventional wisdom, moreover, drones might enhance security in disputed border regions by providing states with a greater ability to monitor contested regions persistently at lower cost. Monitoring can help to reassure states that potential adversaries are not attempting to change the status quo through force. The limited significance of current-generation drones in interstate contexts beyond monitoring stems from a key technological limitation: drones currently in operation are vulnerable to air defense systems, so they are much less likely to be effective when operating in hostile airspace.[9]

The stakes in the debate about drone proliferation are significant. For example, if drone proliferation is inherently dangerous, the United States should be leery of other states acquiring drones, especially armed drones. The United States should therefore attempt to limit drone proliferation, including through its own exports. Such a policy might reduce drone proliferation, but it could have adverse consequences for the U.S. industrial base, while causing Washington to miss opportunities to build capacity among allies. Alternatively, if current-generation drones are no different from, and less capable than, other comparable conventional military technologies, the United States should be less concerned with the effect of drone proliferation on the regional and international security environment.

The article proceeds as follows. First, we contextualize the drone debate by discussing ongoing trends in drone proliferation. Second, we describe in more detail the core arguments made by the two camps concerning the military and political effects of drones. Third, we lay out our main claim that the reality is

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8. See Matthew Fuhrmann and Michal C. Horowitz, "Droning On: Explaining the Proliferation of Unmanned Aerial Vehicles," *International Organization*, forthcoming.

9. As described below, the monitoring advantages of drones are likely to come from operating in a state's own airspace or in contested regions where states do not generally use force, not from operating in an adversary's airspace.

more complicated than either of these two perspectives suggests. Fundamentally, current-generation drone proliferation will likely have heterogeneous consequences, being more influential in the context of counterterrorism and intrastate conflict than interstate conflict. In the fourth section, we argue that the consequences of drone proliferation could change dramatically with technological advancements over time. We conclude by identifying some of the national security implications for the United States.

Trends in Drone Proliferation

Unmanned aircraft have a rich history in world politics.[10] The 1849 Italian War of Independence and the American Civil War, for example, featured the use of unmanned balloons. In World War I, the United States tested the Kettering Bug, a "self-flying aerial torpedo" that, driven by wind, released its bomb onto the target. The war ended, however, before the aircraft became operational.[11] During World War II, the United Kingdom and the United States developed target drones, and Germany commissioned a project to develop an unmanned vehicle for combat, which resulted in the V-1. The V-1, however, was more of an early cruise missile than a drone.[12] The 1960 U-2 incident, in which American pilot Francis Gary Powers was shot down over the Soviet Union, catalyzed further work on drones to try to reduce the vulnerability of pilots.[13] The United States used Firebee UAVs to conduct frequent surveillance missions during the Vietnam War, and Israel used drones in the 1982 Lebanon War to locate targets that piloted aircraft later destroyed.[14] The United States deployed the unarmed Predator for surveillance in the 1990s Balkans war, but moved to arm the aircraft only after the September 11 attacks, when it deployed Predators with Hellfire missiles in Afghanistan.[15]

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10. Michael Hastings points to a history of remote surveillance dating to the U.S. Civil War. See Hastings, "The Rise of the Killer Drones: How America Goes to War in Secret," *Rolling Stone*, April 16, 2012, http://www.rollingstone.com/politics/news/the-rise-of-the-killer-drones-how-america-goes-to-war-in-secret-20120416.
11. Jimmy Stamp, "Unmanned Drones Have Been around since World War I," *Smithsonian.com*, February 12, 2013, http://www.smithsonianmag.com/arts-culture/unmanned-drones-have-been-around-since-world-war-i-16055939/?no-ist.
12. Sarah E. Kreps, *Drones: What Everyone Needs to Know* (Oxford: Oxford University Press, 2016).
13. Thomas P. Ehrhard, *Air Force UAVs: The Secret History* (Arlington, Va.: Mitchell Institute Press, 2011).
14. Mary Dobbing and Chris Cole, *Israel and the Drone Wars: Examining Israel's Production, Use, and Proliferation of UAVs* (Oxford: Drone Wars UK, January 2014), p. 8, https://dronewarsuk.files.wordpress.com/2014/01/israel-and-the-drone-wars.pdf.
15. Ehrhard, *Air Force UAVs*.

Although the Predator and its successor, the Reaper, are armed and can travel long distances at medium altitude to strike targets, most drones fielded by militaries around the world are tactical and unarmed; they can fly for only a few hours at a time and are designed exclusively to provide local surveillance data.[16] Of the nearly ninety countries that now have military drones of some kind, the majority do not yet possess armed and advanced drones. Still, the number of states with those capabilities is growing. According to Matthew Fuhrmann and Michael Horowitz, by the end of 2014, twenty-seven countries possessed "advanced" drones, defined as UAVs that can stay in the air for at least twenty hours, operate at an altitude of at least 16,000 feet, and have a maximum takeoff weight of at least 1,320 pounds.[17] In addition, seven countries possessed armed drones, and nearly two dozen others had programs in place to acquire a lethal UAV capability. Advanced unarmed and armed drones continued to spread internationally in 2015 and 2016. The United States agreed to arm Italy's previously unarmed Reapers; it also agreed to sell unarmed Reapers to Spain and the Netherlands; and several European states began a new joint armed drone program that seems more likely to succeed than prior joint efforts.[18]

In 2015, Iraq, Nigeria, and Pakistan used armed drones in combat for the first time—against domestic insurgents.[19] All three of these states acquired their armed drones from China, a country that has solidified its role as a global provider of armed drones.[20] In addition, after using unarmed surveillance

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16. Avery Plaw, Matthew S. Fricker, and Carlos R. Colon, *The Drone Debate: A Primer on the U.S. Use of Unmanned Aircraft* (Lanham, Md.: Rowman and Littlefield, 2015), p. 7.

17. Fuhrmann and Horowitz, "Droning On."

18. Defense Security Cooperation Agency, ed., "The Netherlands—MQ-9 Reapers" (Washington, D.C.: Defense Security Cooperation Agency, 2015), http://www.dsca.mil/sites/default/files/mas/netherlands_14-55.pdf; Esteban Villarejo, "Spain Eyes Offer of Reaper, Heron," *Defense News*, September 11, 2015, http://www.defensenews.com/story/defense/air-space/isr/2015/09/11/spain-eyes-offer-reaper-heron/72057400/; Tom Kington and Pierre Tran, "New Effort at European UAV Raises Hopes," *Defense News*, May 23, 2015, http://www.defensenews.com/story/defense/air-space/isr/2015/05/23/france-germany-italy-uav-male-design-study/27545807/; and Jonathan Marcus, "China Helps Iraq Military Enter Drone Era," *BBC News*, October 12, 2015, http://www.bbc.com/news/world-middle-east-34510126.

19. Usman Ansari, "Pakistan Surprises Many with First Use of Armed Drone," *Defense News*, September 10, 2015, http://www.defensenews.com/story/defense/air-space/strike/2015/09/08/pakistan-surprises-many-first-use-armed-drone/71881768/.

20. Marcus, "China Helps Iraq Military Enter Drone Era"; W.J. Hennigan, "A Fast Growing Club: Countries that Use Drones for Killing by Remote Control," *Los Angeles Times*, February 22, 2016; "Pakistan's Indigenous Armed Drone Conducts First Night-time Strike," *Express Tribune*, October 22, 2015; Zachary Keck, "Pakistan Seeks Chinese Drones?" *Diplomat*, May 20, 2014, http://thediplomat.com/2014/2005/pakistan-seeks-chinese-drones/; Jeffrey Lin and P.W. Singer, "Chinese Drones Soon Flying over Saudi Arabia," *Popular Science*, April 29, 2014, http://www.popsci.com/blog-network/eastern-arsenal/chinese-drones-soon-flying-over-saudi-arabia; and

drones in Kashmir and witnessing Pakistan's use of armed drones, India sought armed UAVs from the United States.[21] It also reached a deal with Israel to acquire the Heron, a drone capable of conducting air strikes.[22]

The capabilities of current-generation armed drones vary considerably. Most armed UAVs lack the capabilities of the U.S. Predator or Reaper, which, combined with data processing and logistical capacity, give the United States the ability to conduct drone strikes around the world. Other armed drones, such as variants of the Chinese CH-3 or Wing Loong, may lack global positioning system (GPS) integration or over-the-horizon strike capabilities, and thus have limited reach. In addition, an armed CH-3 can reportedly remain in the air for about six hours, or less than half as long as the U.S. Reaper can, and its range is just 250 kilometers. Moreover, it can carry only two missiles, or half of the payload of the Reaper.[23]

Even less capable armed drones have military relevance, however. Consider the Pakistani Buraaq, which many analysts believe is a variant of China's CH-3, the same system used by Nigeria. The Pakistan government's intended use for this platform is either within Pakistan or against India, so the platform's relatively short endurance and range are less limiting than they might be for the United States, whose stated operational demands are more expansive. Additionally, in combination with other military assets, including manned aircraft, a country can extend the "reach" of its drones even without GPS integration.

Unarmed, short-range drones may have military relevance as well; they can increase a state's monitoring abilities and provide greater situational awareness. Because most interstate disputes occur between neighbors, states' primary security concerns often involve surveillance or limited military actions across relatively shorter distances. Armed and unarmed drones without global reach are thus sufficient for most national military requirements.

In sum, militarily relevant drones are spreading widely, though the most advanced drones remain beyond the reach of many countries, a trend that likely will continue in the short term. The logistical challenges for longer-range drone operations are daunting even for a country such as the United States.

Sarah Kreps, "China Swooping In on Military Drone Market," *CNN*, April 1, 2016, http://www.cnn.com/2016/04/01/opinions/china-drone-sales-kreps/.
21. Claire Groden, "India Is Beefing Up Its Combat Drone Bench," *Fortune*, November 10, 2015, http://fortune.com/2015/11/10/india-combat-drones/.
22. Ankit Panda, "India Wants Its New Armed Israeli Drones Fast," *Diplomat*, September 28, 2015, http://thediplomat.com/2015/09/india-wants-its-new-armed-israeli-drones-fast/.
23. China's CH-4, however, is more capable than the CH-3.

Given these challenges, it is unlikely that many states will use drones the way the United States sometimes does for global strike operations.

Two Narratives on Drone Proliferation

What are the implications, if any, of drones and drone proliferation for the international security environment? Two competing narratives dominate debates about drone proliferation, with cleavages emerging based on divergent assumptions about the inherent nature of the technology. We sketch the core arguments here to illustrate the competing claims. Our discussion reflects the broad contours of the debate, but it is important to note that arguments lumped in the same camp may be analytically distinct.

A TRANSFORMATIVE TECHNOLOGY

Many analysts and policymakers argue that drones will transform warfare in the twenty-first century. Scholars and journalists in this camp routinely describe drones as a revolutionary military technology. As Adam Stulberg wrote in 2007, "It is now conventional wisdom that we stand at the dawning of the unmanned aerial vehicle (UAV) revolution in military affairs."[24] More recently, Amy Zegart stated: "Drones are going to revolutionize how nations and nonstate actors threaten the use of violence."[25]

From the above perspective, drones are revolutionary because they lower the costs of using military force. In his annual report on extrajudicial, summary, or arbitrary executions, United Nations special rapporteur Christof Heyns noted that "drones make it not only physically easier to dispatch long-distance and targeted armed force, but the proliferation of drones may lower social barriers in society against the deployment of lethal force and result in attempts to weaken the relevant legal standards."[26] Drones change decision-making because they do not inherently risk the life and limb of the user.[27] States with armed drones can conduct strikes without risking the lives of their pilots. This capability is particularly useful when governments fear the domes-

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24. Stulberg, "Managing the Unmanned Revolution in the U.S. Air Force," p. 251.
25. Amy Zegart, "The Coming Revolution of Drone Warfare," *Wall Street Journal*, March 18, 2015, http://www.wsj.com/articles/amy-zegart-the-coming-revolution-of-drone-warfare-1426720364.
26. Christof Heyns, "Report of the Special Rapporteur on Extrajudicial, Summary, or Arbitrary Executions," United Nations General Assembly, 68th sess., September 13, 2013, p. 5, http://www.un.org/en/ga/search/view_doc.asp?symbol=A/68/382.
27. For an interesting assessment of this phenomenon with regard to George W. Bush and Barack Obama, see Macdonald and Schneider, "Presidential Risk Orientation and Force Employment Decisions."

tic political or diplomatic consequences of taking military action that could result in casualties. Moreover, drone strikes often involve secrecy and therefore shield leaders from domestic blowback. As U.S. President Barack Obama said in May 2013, the typical decisionmaking barriers to the use of force become eroded when using drones because they do not attract "the public scrutiny that a troop deployment invites."[28]

By lowering the political threshold for using force, this argument suggests, drones make states more willing to deploy their military assets. Military deployments, in turn, make the use of lethal force more likely. Proponents of this view (though not necessarily of the uses of force themselves) cite the prevalence of U.S. drone strikes in countries such as Pakistan, Somalia, and Yemen, arguing that the United States would have used military force less frequently in these countries if it did not have drones at its disposal.[29] Lowering the threshold for military deployments also includes the use of unarmed drones such as surveillance aircraft that may be more likely to transgress an adversary's airspace because they can do so at a lower cost. The second-order effect of deploying even unarmed surveillance drones is that other countries may be more willing to shoot down drones than manned aircraft, which some analysts worry could cause tense situations to escalate.[30]

Some analysts therefore conclude that drones will be destabilizing for the security environment. As Michael Boyle argues, "[T]he race for this technology is resetting the terms of global competition and quietly altering the rules of the game for many long-simmering conflicts and rivalries."[31] In this view, drone proliferation has mostly undesirable consequences for international security, and the rapid diffusion of armed and advanced drones around the globe may exacerbate this destabilizing tendency.[32] Drones are the tip of the spear for the spread of robotics writ large, a commercially driven enterprise that renders

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28. Jason Koebler, "Obama: Administration Saw Drone Strikes as 'Cure-All' for Terrorism," *U.S. News*, May 23, 2013, http://www.usnews.com/news/articles/2013/05/23/obama-administration-saw-drone-strikes-as-cure-all-for-terrorism.
29. Zenko, "Reforming U.S. Drone Strike Policies."
30. Kelley Sayler, "A World of Proliferated Drones: A Technology Primer" (Washington, D.C.: Center for a New American Security, 2015), http://www.cnas.org/sites/default/files/publications-pdf/CNAS%20World%20of%20Drones_052115.pdf.
31. Boyle, "The Race for Drones," p. 78.
32. Davis et al., "Armed and Dangerous?" http://www.rand.org/content/dam/rand/pubs/research_reports/RR400/RR449/RAND_RR449.pdf; Sayler, "A World of Proliferated Drones"; Samuel J. Brannen, "Sustaining the U.S. Lead in Unmanned Systems: Military and Homeland Considerations through 2025" (Washington, D.C.: Center for Strategic and International Studies, International Security Program, 2014), http://csis.org/files/publication/140227_Brannen_UnmannedSystems_Web.pdf; and Rachel Stohl, Rosa Brooks, and John P. Abizaid, "Recommendations and Report of the Tasks Force on U.S. Drone Policy" (Washington, D.C.: Stimson Cen-

many key components of drones as fundamentally dual-use technologies.[33] Although many countries may find state-of-the-art armed drones hard to operate, continuing technological advances eventually will make it easier for them to do so, just as they have with other military technologies, such as combat aircraft. For all of these reasons, armed drone proliferation is an important international security issue from this perspective.

JUST ANOTHER PLATFORM

A second camp questions whether current-generation drones will transform how states conduct military operations, and whether UAVs will fundamentally increase the mobility or destructive power of armed forces.[34] Drones can be used to carry out targeted strikes, but states may also carry out targeted killings through other means, such as manned F-16 strikes or, in the case of the raid that ended with the death of Osama bin Laden, Special Operations forces. In this view, UAVs are just another platform that militaries may employ to achieve an objective.[35] As Canada's chief of staff, Gen. Thomas Lawson, said in 2013: "If a kinetic round is propelled toward a confirmed enemy for strategic purposes by a rifle, by an artillery piece, by an aircraft manned, or an aircraft unmanned, any of those that end up with a desired effect is a supportable point of view."[36]

Scholars and policymakers in this camp suggest that the policy of targeted killing is more important than the technology used to carry out strikes. Charli Carpenter, for example, argues that, to the extent that one is concerned about drone strikes violating international law, the problem is U.S. policy.[37] Drones are merely the delivery system, which could just as easily be a soldier or manned aircraft. Some current and former policymakers have expressed a similar view. In his memoirs, former U.S. Secretary of Defense Panetta states: "[T]o call our campaign against Al Qaeda a 'drone program' is a little like calling

ter, 2014), http://www.stimson.org/sites/default/files/file-attachments/recommendations_and _report_of_the_task_force_on_us_drone_policy_second_edition.pdf.

33. Michael C. Horowitz, "The Looming Robotics Gap: Why America's Global Dominance in Military Technology Is Starting to Crumble," *Foreign Policy*, May 5, 2014, http://foreignpolicy.com/ 2014/2005/2005/the-looming-robotics-gap/.

34. Moyar, "Drones—An Evolution, Not a Revolution, in Warfare," p. 13.

35. Plaw, Fricker, and Colon, *The Drone Debate*, p. 305.

36. Quoted in Micah Zenko and Sarah Kreps, "Limiting Armed Drone Proliferation" (Washington, D.C.: Council on Foreign Relations, 2014), p. 8, http://www.cfr.org/drones/limiting-armed-drone-proliferation/p33127.

37. Charli Carpenter, "Parsing the Anti-Drone Debate," *Duck of Minerva*, November 12, 2013, http://duckofminerva.com/2013/11/parsing-the-anti-drone-debate.html. See also Braun, "Predator Effect."

World War I a 'machine gun program.' Technology has always been an aspect of war . . . what is most crucial is not the size of the missile or the ability to deploy it from thousands of miles away" but how the munitions are used.[38] In 2012 Gen. Norton Schwartz, chief of staff of the U.S. Air Force, stated that "if it is a legitimate target, then I would argue that the manner in which you engage that target, whether it be close combat or remotely, is not a terribly relevant question."[39] What militaries do, in this view, is more significant than how they do it. Drones themselves are not especially unique, even if the way in which the United States has employed this technology after the September 11 attacks is novel.

Proponents of this perspective point out that current-generation drones have significant technological limitations, which we discuss in greater detail below. Because they fly at low altitudes and slow speeds, for instance, drones are highly vulnerable to enemy air defenses. In light of these limitations, drones have little utility in interstate disputes—especially compared to technologies such as nuclear weapons. As the authors of a 2014 RAND report put it, "By themselves, armed UAVs do not win wars, and wars can be won without them."[40] Drones may have aided U.S. operations against the Taliban, for instance, but they have not helped the United States achieve a decisive victory.

According to those in this camp, given the technological limitations discussed above, the effects of drone diffusion on the international security environment are likely to be modest. In addition, some scholars question the notion that armed drones will spread at a rapid rate. Andrea Gilli and Mauro Gilli, for instance, argue that armed drones are expensive and difficult to buy, build, and operate.[41] Referencing the massive logistical support that the United States requires to conduct drone strikes—including forward operating bases in far-flung places in Central Asia and the Horn of Africa[42]—they argue that few other countries will be able to acquire and use armed drones as expansively.[43] This is yet another reason that concerns about the consequences of drone proliferation are overblown, these scholars contend.

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38. Leon Panetta with Jim Newton, *Worthy Fights: A Memoir of Leadership in War and Peace* (New York: Penguin, 2014), p. 388
39. Quoted in Zenko and Kreps, "Limiting Armed Drone Proliferation," p. 8.
40. Davis et al., "Armed and Dangerous?" p. 15.
41. We do not engage in depth the debate about the relative cost of current-generation drones because of the lack of significant apples-to-apples comparisons on relative costs across multiple countries. As time progresses, researchers will be better able to resolve this debate.
42. Ty McCormick, "U.S. Operates Drones from Secret Bases in Somalia," *Foreign Policy*, July 2, 2015, http://foreignpolicy.com/2015/2007/2002/exclusive-u-s-operates-drones-from-secret-bases-in-somalia-special-operations-jsoc-black-hawk-down/.
43. Gilli and Gilli, "The Diffusion of Drone Warfare?"

The Advantages and Limitations of Drones

Neither of the above perspectives is complete. Those who argue that drones are transformative overlook important operational limits. The more dismissive view, by contrast, fails to appreciate how removing pilots from aircraft changes the decisionmaking calculus of using drones versus manned alternatives. Missing from the current debate about the consequences of drone proliferation is a realistic understanding of what today's drones can and cannot do. Accurately capturing the capabilities of current-generation drones is critical to understanding how drones may (or may not) change military affairs or world politics more generally. We take up this task in the following sections.

WHY DRONES ARE NOT A SILVER BULLET

Some observers may view drones as a panacea for many national security challenges that could involve the use of force. Current-generation drones have at least five serious limitations, however. First, as noted previously, drones fly significantly slower than manned aircraft (the cruise speed of an F-16 is about six times that of a Reaper). One U.S. Air Force general therefore described even the most advanced current-generation drones as "useless in a contested environment"[44] (i.e., in a scenario where the United States is fighting an adversary with air defenses). Countries with anti-air defense systems are well positioned to shoot down the slow-moving drones. Hamas discovered this in 2014 when it flew what it referred to as an armed drone—though it was very rudimentary—into Israel, only to have the drone shot down.[45]

Second, the data link that connects drones to remote pilots creates a potential vulnerability, because it introduces the risk of jamming, hacking, and spoofing.[46] Smaller drones must be linked by radio to their controllers, and the data links can be easily jammed and disabled. One study showed how hackers could mimic GPS signals and fool the navigation systems.[47] Cyber attacks could cause a drone, at the least, to be unable to calculate its position,

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44. Dave Majumdar, "Air Force Future UAV Roadmap Could Be Released as Early as Next Week," *USNI News*, November 13, 2013, http://news.usni.org/2013/2011/2013/air-force-future-uav-roadmap-released-early-next-week.

45. Bill Chappell, "Israel Shoots Down Drone as Clash with Hamas Continues," *NPR*, July 14, 2014, http://www.npr.org/sections/thetwo-way/2014/2007/2014/331321398/israel-shoots-down-drone-as-clash-with-hamas-continues.

46. Note, however, that this risk exists for fifth-generation fighters such as the F-35 that also rely heavily on electronics.

47. Aliya Sternstein, "How to Hack a Military Drone," *Defense One*, April 29, 2015, http://www.defenseone.com/technology/2015/04/how-hack-military-drone/111391/.

allowing it to be brought down fairly easily. Responding to these vulnerabilities, the U.S. Defense Department has developed a software program designed to prevent the hacking of drone control and navigation systems.[48]

Third, current-generation drones do not possess air-to-air capabilities or countermeasures. The U-2, a manned reconnaissance platform, has sophisticated countermeasures to defend against Russian-made air defense systems such as the S-300. The Global Hawk, the unmanned equivalent, lacks these countermeasures.[49] Upgrades that would bring the Global Hawk's air defense system to a level of rough parity with the U-2s would cost $1.9 billion over ten years, reducing the hourly-usage-cost advantage of the Global Hawk over the U-2.[50]

Fourth, UAVs duplicate many of the features of other systems that advanced militaries already possess, including fighters, helicopters, and other related systems. Thus, in only a limited number of operational circumstances do drones provide unique operational capacity. For example, even though the use of Hellfire missiles by the Reaper receives considerable media attention, the manned Apache helicopter fires more Hellfire missiles per year than any other platform in the U.S. military. In general, helicopters, ballistic missiles, and manned aircraft can perform many of the same functions as current-generation armed drones, and they are less vulnerable to anti-air defense systems. China's manned JH-7, for example, is more maneuverable and able to defend itself than the CH-4 armed drone. Additionally, compared to the CH-4, the JH-7 has a much larger payload and holds heavier bombs. The U.S. manned A-10 is more effective for close air support—eliminating ground troops at close range—than the MQ-9 Reaper, because it flies low and is reinforced with titanium to protect it from ground fire.[51]

Fifth, the ubiquitous deployment of drones in a conventional conflict is potentially limited by the difficulty of retaining pilots to guide them.[52] Operators

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48. Ibid.
49. "U-2 Has the Edge over Global Hawk," *Aviation Week and Space Technology*, March 10, 2014, http://aviationweek.com/awin/u-2-has-edge-over-global-hawk.
50. This includes a camera that has a wider panorama than the sensors that are currently on the Global Hawk as well as an airborne electro-optical sensor that can survey seven parts of the spectrum. See Seth Robson, "Air Force Plans Drone Upgrade to Replace U-2 Planes," *Stars and Stripes*, March 15, 2014, http://www.stripes.com/news/air-force-plans-drone-upgrade-to-replace-u-2-planes-1.272289.
51. Christian Davenport, "The F-35 vs. the A-10 Warthog, Head-to-Head in Close-Air Support," *Washington Post*, August 27, 2015, https://www.washingtonpost.com/news/checkpoint/wp/2015/08/27/as-it-fights-for-its-life-the-a-10-will-face-off-against-the-f-35-in-close-air-support-test/.
52. It is important to note, however, that this is an organizational problem rather than one inherent to the military technology.

sit behind consoles for long shifts, putting in thirteen to fourteen hour days and logging about three to four times as many flight hours as pilots of manned aircraft, about 900–1,100 compared to 200–300 flight hours per year.[53] The long hours in front of a console create a "mix of boredom, loneliness, and stress,"[54] sometimes resulting in high levels of post-traumatic stress as operators develop a sense of familiarity with the targets whom they may be responsible for killing. Thus, despite having been trained at rates far higher than fighter and bomber pilots combined, drone pilots have left the service at three times the rate of those operating manned aircraft. As a result, the U.S. Government Accountability Office reported in 2014 that the Air Force had only 85 percent of the drone pilots needed to carry out its missions.[55] In 2015, the figure dropped to 65 percent,[56] with about 1,000 active-duty pilots. One source suggests that although the U.S. Air Force trains 180 drone pilots a year, it loses another 240 to attrition.[57] If these challenges exist for the United States, the country with the most extensive pilot training system in the world, they very likely exist for others as well.

THE UNIQUE FEATURES OF DRONES

Despite their limitations, drones can still have important battlefield consequences. Indeed, the perspective that suggests that drones are just another platform, substitutable with manned airborne or ground equivalents, glosses over some key advantages of drones. As discussed earlier, one obvious benefit is that drones operate without a pilot in the cockpit. States with armed drones can conduct strikes without risking the lives of their forces, thus minimizing casualties. At the same time, current-generation drones—manned and unmanned—operate most effectively in permissive airspace, where there is a relatively low risk of being shot down.

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53. Deborah Lee James and Mark A. Welsh III, "State of the Air Force Press Briefing by Secretary James and General Welsh in the Pentagon Briefing Room" (Washington, D.C.: U.S. Department of Defense, January 15, 2015), http://www.defense.gov/News/News-Transcripts/Transcript-View/Article/606995.

54. James Dao, "Drone Pilots Are Found to Get Stress Disorders Much as Those in Combat Do," *New York Times*, February 22, 2013, http://www.nytimes.com/2013/02/23/us/drone-pilots-found-to-get-stress-disorders-much-as-those-in-combat-do.html.

55. United States Government Accountability Office, "Actions Needed to Strengthen Management of Unmanned Aerial System Pilots" (Washington, D.C.: United States Government Accountability Office, 2014), http://www.gao.gov/products/GAO-14-316, p. 17.

56. Jeff Schogol, "Air Force Raises Monthly Incentive Pay for Drone Pilots," *Air Force Times*, January 16, 2015, http://www.airforcetimes.com/story/military/2015/01/15/more-pay-for-drone-pilots/21829659/.

57. Brendan McGarry, "Fewer Than 10 Drone Pilots to Receive $1,500 Monthly Bonus This Year," *Military.com*, February 13, 2015, http://www.military.com/daily-news/2015/02/13/fewer-than-10-pilots-to-receive-monthly-bonus-incentive.html.

The reduction in casualty risk afforded by UAVs nonetheless has implications for the way in which many actors—especially in democracies—think about the use of military force. Precisely because drones reduce the cost of war in terms of casualties, they risk creating a sense of distance from the conflict, which the philosopher Immanuel Kant warned could remove important checks on the use of force.[58] As Kant put it, "[I]f the consent of the citizens is required in order to decide that war should be declared . . . nothing is more natural than that they would be very cautious in commencing such a poor game, decreeing for themselves all the calamities of war. Among the latter would be: having to fight, having to pay the costs of war from their own resources."[59] As scholars who study the constraints faced by democracies in war observe, when citizens bear the direct burdens of war, in part through incurring casualties, they pressure leaders to be more selective about the wars that they fight.[60]

The use of drones remains popular among the U.S. public, allowing it to conduct counterterrorism strikes without producing U.S. military casualties. Levels of support in the United States for U.S. use of UAVs from 2011 to 2014 hovered around 65 percent.[61] Given the responsiveness of democratic legislatures to public attitudes,[62] reducing the risk to soldiers may also loosen legislative constraints on the use of force. With foreign interventions, in general, Congress has incentives to grant the executive latitude in deciding when to use force. The reason is simple: legislators receive little credit for foreign policy actions that go well and get the blame for those that do not.[63] Congressional opposition has therefore been limited to isolated cases of members who are concerned not with the overall policy but rather with the prospect of the

58. John Kaag and Sarah Kreps, "Drones and Democratic Peace," *Brown Journal of World Affairs*, Vol. 19, No. 2 (Spring/Summer 2013), pp. 1–13.
59. Immanuel Kant, *Perpetual Peace*, Lewis White Beck, trans. (Indianapolis: Boss-Merrill, 1957).
60. Dan Reiter and Allan C. Stam, *Democracies at War* (Princeton, N.J.: Princeton University Press, 2002); and T. Clifton Morgan and Sally Howard Campbell, "Domestic Structure, Decisional Constraints, and War: So Why Kant Democracies Fight?" *Journal of Conflict Resolution*, Vol. 35, No. 2 (June 1991), pp. 187–211.
61. Sarah Kreps, "Flying under the Radar: A Study of Public Attitudes towards Unmanned Aerial Vehicles," *Research & Politics*, Vol. 1, No. 1 (April/June 2014), p. 107. On a related issue, public opinion and autonomous weapons, see Michael C. Horowitz, "Public Opinion and the Politics of the Killer Robots Debate," *Research & Politics*, Vol. 3, No. 1 (2016), pp. 1–8.
62. James A. Stimson, Michael B. MacKuen, and Robert S. Erikson, "Dynamic Representation," *American Political Science Review*, Vol. 89, No. 3 (September 1995), pp. 543–565.
63. Kenneth A. Schultz, "Tying Hands and Washing Hands; The U.S. Congress and Multilateral Humanitarian Intervention," in Daniel W. Drezner, ed., *Locating the Proper Authorities: The Interaction of Domestic and International Institutions* (Ann Arbor: University of Michigan Press, 2003), pp. 105–142.

United States using drones to target its own citizens. Senator Rand Paul cited the potential of drones to target U.S. citizens in attempting to delay the confirmation of John Brennan as director of central intelligence in 2013 with a parliamentary procedure known as the filibuster, arguing that Americans should first be found guilty of a crime before being executed.[64]

Second, and perhaps more significantly, drones have operational advantages, because they allow for sustained and persistent flights over potential targets. The existing U.S. arsenal of armed drones—primarily the Predator and Reaper—can remain aloft, fully loaded with munitions, for more than fourteen hours, compared with four hours or fewer for F-16 fighter jets and A-10 ground attack aircraft.[65] Naval air platforms such as the F-18 E/F have an effective mission time of slightly more than two hours.[66] These systems can be refueled in the air, but that requires more resources and does not address the fundamental constraint arising from the limits of human endurance.

These advantages could be magnified in some next-generation systems. For example, the efficient electronic motors and long wingspan of the SolarEagle, a solar-powered drone that Boeing and the Defense Advanced Research Projects Agency are developing, will allow the aircraft to remain in the air for five years, making it a possible replacement for satellites that are costly to both develop and maintain.[67] Next-generation armed UAVs at the high end, such as the U.S. Navy's recently scrapped Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS) program, could have flight times ranging from six to twelve hours, though they could have air-to-air refueling capabilities and be able to carry a weapons load similar to that of an F-18.[68]

The ability of UAVs to "loiter," to fly slowly over a small area, offers clear advantages in terms of identifying and engaging targets. Greater endurance enhances situational awareness, such that UAV pilots can more carefully verify

64. Jim Michaels, "Rand Paul Filibustering Brennan Nomination to Lead CIA," *USA Today*, March 7, 2013, http://www.usatoday.com/story/news/politics/2013/03/06/brennan-nomination-nears-senate-vote/1967709/.
65. Sarah Kreps, "Ground the Drones? The Real Problem with Unmanned Aircraft," *Foreign Affairs*, December 4, 2013, https://www.foreignaffairs.com/articles/2013-12-04/ground-drones.
66. Federation of American Scientists, "F/A-18 Hornet" (Washington, D.C.: Federation of American Scientists, April 25, 2000), http://fas.org/man/dod-101/sys/ac/f-118.htm; and Winslow Wheeler, "The MQ-9's Cost and Performance," *Time Magazine*, February 28, 2012, http://nation.time.com/2012/02/28/2-the-mq-9s-cost-and-performance/.
67. Darren Quick, "Boeing SolarEagle Solar-Powered UAV to Fly in 2014," *Gizmag*, September 16, 2010, http://www.gizmag.com/boeing-solareagle-solar-powered-uav/16399/.
68. Sam LaGrone, "Navy Conducts Successful Test of Aerial Refueling with X-47b, UCAS-D Program Ending," *USNI News*, April 22, 2015, https://news.usni.org/2015/04/22/navy-conducts-successful-test-of-aerial-refueling-on-x-47b-ucas-d-program-ending.

targets than an attack aircraft pilot with mere seconds to accomplish the same objective.[69] The ability to divert missiles launched from a UAV in response to changes on the ground, combined with the UAV's greater overall situational awareness, makes UAV strikes more likely to be accurate than strikes by alternative platforms at the same targets.[70]

Lastly, drones might reduce the diplomatic fallout associated with the use of force. In particular, drones allow the country flying them to maintain some semblance of diplomatic cover given that the pilots are thousands of miles away rather than directly flying overhead. Although countries such as Pakistan sometimes publicly protest about drones operating above their territory, such complaints are most likely displays of domestic political theater.[71] As a number of sources suggest, Pakistan has approved foreign drone strikes on its territory; indeed, the high frequency of such strikes suggests that at least tacit approval would have been essential.[72] Yet drones give the government conducting the strikes greater plausible deniability than alternatives such as ground forces, which require a considerable logistical footprint, or manned aircraft. The amount of diplomatic cover that drones provide obviously has limits—a CH-4 with a Chinese flag painted on its side is still a Chinese military platform—but the belief that drones provide some degree of diplomatic cover could make countries more likely to use them.

In sum, current-generation drones have unique political, operational, and diplomatic advantages, all else equal, and those advantages could make it easier for states to use force in some settings. These advantages point to an important corrective of the perspective that maintains that drones are just another platform and therefore do not in and of themselves shape how states are likely to consider using force.

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69. Davis et al., "Armed and Dangerous?" pp. 11–12.
70. Michael W. Lewis, "Drones: Actually the Most Humane Form of Warfare Ever," *Atlantic*, August 21, 2013, http://www.theatlantic.com/international/archive/2013/2008/drones-actually-the-most-humane-form-of-warfare-ever/278746/. The issue of drone strikes and civilian casualties is covered in more detail below.
71. Tim Craig, "Drone Kills Taliban Chief Hakimullah Mehsud; Pakistan Accuses U.S. of Derailing Peace Talks," *Washington Post*, November 2, 2013, https://www.washingtonpost.com/world/asia_pacific/pakistani-official-accuses-us-of-sabotage-as-drone-targets-taliban-leaders-in-northwest/2013/11/01/1463d0c2-431d-11e3-b028-de922d7a3f47_story.html.
72. Greg Miller and Bob Woodward, "Secret Memos Reveal Explicit Nature of U.S., Pakistan Agreement on Drones," *Washington Post*, October 24, 2013, https://www.washingtonpost.com/world/national-security/top-pakistani-leaders-secretly-backed-cia-drone-campaign-secret-documents-show/2013/10/23/15e6b0d8-3beb-11e3-b6a9-da62c264f40e_story.html.

The Strategic Consequences of Drone Proliferation

Given the preceding discussion, what are the strategic consequences of drone proliferation? It depends. Drones may be transformative in some contexts but not others. In this section, we assess the impact of drone proliferation in six contexts: (1) counterterrorism; (2) interstate conflict; (3) crisis onset and deterrence; (4) coercive diplomacy; (5) civil war and domestic conflict; and (6) operations by nonstate actors. Research on the strategic effects of military technology identifies these particular contexts as potentially salient.[73] We therefore focus our attention on them here, recognizing that they are by no means the only areas in which drones might matter.[74]

As the following analysis shows, the effects of drone proliferation are heterogeneous. Current-generation drones are likely to be consequential for counterterrorism and domestic conflict, but less transformative in most other settings.

COUNTERTERRORISM: HELPING TO KILL TERRORISTS IN UNCONTESTED AIRSPACE
The U.S. experience suggests that drones shape the way policymakers think about counterterrorism operations. Echoing the argument developed earlier, some members of the U.S. foreign policy establishment have indicated that the availability of drones has affected how they view the use of force. For example, former Secretary of Defense Robert Gates noted that drones cause leaders to view war as "bloodless, painless, and odorless," allowing them to take actions that would not be permissible were American casualties part of the calculation. As the *Washington Post* put it, Gates had come to see new technologies such as drones as providing an antiseptic form of warfare: "Remarkable advances in precision munitions, sensors, information and satellite technology and more can make us overly enamored with the ability of technology to transform the traditional laws and limits of war. . . . A button is pushed in Nevada and seconds later a pickup truck explodes in Kandahar . . . [war is seen as] kind of video game or action movie. . . . In reality, war is inevitably

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73. See, for example, Thomas C. Schelling, *Arms and Influence* (New Haven, Conn.: Yale University Press, 1966); Jason Lyall and Isaiah Wilson III, "Rage against the Machines: Explaining Outcomes in Counterinsurgency Wars," *International Organization*, Vol. 63, No. 1 (January 2009), pp. 67–106; and Todd S. Sechser and Matthew Fuhrmann, *Nuclear Weapons and Coercive Diplomacy* (Cambridge: Cambridge University Press, 2016).
74. An alternative might be analyzing drones operating in permissive versus denied airspace. Given the limited ability of current-generation drones to operate in denied environments, however, this is a task better left for future research.

tragic, inefficient and uncertain."[75] President Obama himself acknowledged that the ability of drone strikes to alleviate risks introduced by deploying ground forces had turned drones into a "cure-all for terrorism" for him and his national security team.[76]

Thus, the operational advantages of drones, including their precision and low risk to their operators, have made drones the platform of choice for some U.S. counterterrorism operations. In a 2012 Department of Justice memo, the Obama administration highlighted what it deemed to be a restrictive set of conditions under which it would engage in drone strikes. In this memo, the administration stated that it would order the killing of an individual who presented an "imminent threat" and if capture were not "feasible."[77]

According to data analyzed by Micah Zenko and Sarah Kreps, as of June 2014, fewer than 2 percent of the 473 non-battlefield targeted killings from 2002 to 2014 were conducted by ground raids or armed aircraft, with the remaining 98 percent by armed drones.[78] One reason to kill rather than capture a suspected terrorist is that arresting militants in the war zones and unstable areas where they are found is far more risky for U.S. forces than killing via an unmanned drone, for the reasons that Gates alludes to in his memoirs.[79] Another reason is that there may be political costs associated with capturing suspected militants. The Guantánamo Bay detention camp no longer accepts new detainees, and the process of trying suspected terrorists in U.S. civilian courts remains fraught from a domestic politics standpoint, with members of Congress from the president's own party resisting trials in their states or districts. Although some of the domestic political opposition is simply political theater, there are unresolved questions of safety and security concerning the logistics of transporting suspected terrorists. Against this backdrop, killing rather than capturing suspects has become a critical element of the United States' counterterrorism strategy.[80]

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75. Greg Jaffe, "Former Defense Secretary Gates Warns against Lure of Drone Warfare," *Washington Post*, October 23, 2013, https://www.washingtonpost.com/national/former-defense-secretary-gates-warns-against-lure-of-drone-warfare/2013/10/23/c5bdc734-3c2d-11e3-a94f-b58017bfee6c_story.html.
76. Barack Obama, "Remarks by the President at the National Defense University" (Washington, D.C.: White House, May 23, 2013), https://www.whitehouse.gov/the-press-office/2013/05/23/remarks-president-national-defense-university.
77. U.S. Department of Justice, "Lawfulness of a Lethal Operation Directed against a U.S. Citizen Who Is a Senior Operational Leader of Al-Qa'ida or an Associated Force," http://msnbcmedia.msn.com/i/msnbc/sections/news/020413_DOJ_White_Paper.pdf.
78. Zenko and Kreps, "Limiting Armed Drone Proliferation," p. 9.
79. Robert Gates, *Duty: Memoirs of a Secretary at War* (New York: Alfred A. Knopf, 2014).
80. Daniel Klaidman, *Kill or Capture: The War on Terror and the Soul of the Obama Presidency* (New York: Houghton Mifflin Harcourt, 2012).

The United States' experience is not necessarily unique. For example, the Israel Defense Forces use armed drones to target suspected militants in Syria,[81] Gaza,[82] and Sinai.[83] As with the United States, however, Israel is not forthcoming with details of its operations because of the military sensitivity of the strikes and the political sensitivity of diplomatic relationships that facilitate those strikes, such as with the Egyptian government with respect to strikes in the Sinai.[84]

The above evidence suggests that, particularly for democratic regimes, and perhaps for others as well, armed drones may lower the barriers for using force in a counterterrorism context where capture is unpalatable and adversaries are armed and dangerous but do not have sophisticated air defenses that can shoot down the low and slow-flying drones. This observation does not imply that using lethal drones is necessarily in the attacking state's national interest.[85] While a number of individuals argue that drones are useful for killing suspected terrorists,[86] critics of the U.S. drone policy argue that drone strikes may result in political blowback.[87] They could, for example, generate anti-American sentiment in the local population, potentially aiding terrorists' recruiting efforts.[88] Nonetheless, even critics acknowledge the tactical effectiveness of drone strikes in eliminating suspected militants,[89] and the U.S. experience highlights the tactical gains of targeting militants over potential strategic costs (blowback from using force). If the United States' use of drones to date is any indication, future drone proliferation is likely to mean a greater use of drones globally for targeting suspected terrorists.

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81. "Israeli Drone Strike in Syria Kills Two near Frontier: Hezbollah's Al-Manar TV," *Reuters*, July 29, 2015, http://www.reuters.com/article/us-mideast-crisis-syria-attack-idUSKCN0Q311T201 50729.

82. Amira Haas, "Clearing the Fog on Israeli Drone Use in Gaza," *Haaretz*, March 1, 2014, http://www.haaretz.com/israel-news/.premium-1.577283.

83. Ashraf Swilam, "Officials: Israeli Drone Strike Kills 5 in Egypt," *Washington Post*, August 9, 2013, https://www.washingtonpost.com/world/officials-israeli-drone-strike-kills-5-in-egypt/2013/08/09/75d3619c-0132-11e3-9711-3708310f6f4d_story.html.

84. David Schenker, "How the Israeli Drone Strike in the Sinai Might Backfire," *Atlantic*, August 13, 2013, http://www.theatlantic.com/international/archive/2013/2008/how-the-israeli-drone-strike-in-the-sinai-might-backfire/278628/.

85. For one assessment of targeted killing policies, see Carvin, "The Trouble with Targeted Killing."

86. Daniel Byman, "Why Drones Work: The Case for Washington's Weapon of Choice," *Foreign Affairs*, Vol. 92, No. 4 (July/August 2013), p. 32; and Patrick Johnston and Anoop Sarbahi, "The Impact of U.S. Drone Strikes on Terrorism in Pakistan," *International Studies Quarterly*, forthcoming.

87. See, for example, Michael J. Boyle, "The Costs and Consequences of Drone Warfare," *International Affairs*, Vol. 89, No. 1 (January 2013), pp. 1–29.

88. Audrey Kurth Cronin, "Why Drones Fail: When Tactics Drive Strategy," *Foreign Affairs*, Vol. 92, No. 4 (July/August 2013), p. 48.

89. Ibid.

INTERSTATE CONFLICT: LIMITED UTILITY IN CONTESTED AIRSPACE

While providing important new capabilities for counterterrorism operations, drones appear to be less valuable in conventional military campaigns against other states given their operational limitations—namely, that they fly low and slow and are susceptible to air defenses. Thus, in interstate conflicts where the adversary is likely to have sophisticated military capabilities, including the ability to shoot down aircraft, drones would be less valuable and be more likely to be employed in combination with other methods of using force in an overall campaign, rather than alone. For example, in the context of a U.S.-China or NATO-Russian engagement, where both China and Russia would have deployed sophisticated air defenses, current-generation drones would be less valuable for the United States than an F-22 that is faster and stealthier and therefore more likely to evade air defenses.

Similarly, drones have not been the platform of choice for the militaries operating in Syria in part because the operational limitations noted above create susceptibility to anti-air defenses. Although the conflict in Syria is an internationalized civil war rather than a typical interstate conflict, it nonetheless underscores the limitations of armed drones in contested airspace. In March 2015, Syria shot down a U.S. Predator and has also downed a Turkish RF-4E reconnaissance aircraft, likely with one of its SA-22 systems.[90] Unlike the tribal areas of Pakistan and Yemen, which lack robust air defense systems capable of bringing down a Reaper, Syria is thought to have hundreds of active surface-to-air missile sites (including advanced SAMS such as the SA-17 and SA-22) and several thousand man-portable air-defense systems that provide coverage of major cities and industrial centers. Air defense systems aside, other operational limitations have curtailed drone usage in Syria. For example, the United Kingdom's Reapers only have the ability to fire 18–20 pound Hellfire missiles, which may not be adequate to destroy certain targets, such as oil fields.

As a result, the United States and the United Kingdom have not relied on drones in Syria to the extent that they have elsewhere. Even after the British Parliament authorized the use of force in Syria on December 3, 2015, the Royal Air Force has generally used manned Tornadoes and Typhoons to conduct armed strikes.[91] The United States has used drones with greater frequency in Syria, but has relied mostly on manned platforms for strike missions: armed drones carried out about 875 of 3,800 air strikes (fewer than 25 percent) from

90. Chandler P. Atwood and Jeffrey White, "Syrian Air-Defense Capabilities and the Threat to Potential U.S. Air Operations" (Washington, D.C.: Washington Institute, May 23, 2014).
91. "Syria Air Strikes: RAF Tornado Jets Carry Out Bombing," *BBC News*, December 3, 2015, http://www.bbc.com/news/uk-34992032.

August 2014 to May 2015.[92] Several media outlets reported that the United States would increase the use of drone strikes conducted jointly by the CIA and Joint Special Operations Command against the Islamic State, making it a "significant escalation of the CIA's involvement in the war in Syria."[93]

To be clear, current-generation drones could have some value for wars that include conventional operations. Their limited capabilities, however, prevent them from being a "cure-all" for armed attacks in this context.[94] Indeed, drones are unlikely to fundamentally alter the way that states conduct warfare against adversaries with air defenses. Advanced current-generation drones may help militaries carry out some missions more effectively—especially with respect to surveillance, given the high ceiling of platforms such as the Global Hawk. Nevertheless, drones will probably not make a critical difference for winning or losing an interstate (or internationalized civil) war.[95]

CRISIS ONSET AND DETERRENCE: LOW RISK WITH POTENTIAL REWARD

Beyond the use of drones in ongoing military conflicts is the question of how UAV deployments may influence stability in contested regions of the world. Pessimists concerned about drone proliferation fear that states might take cross-border actions with fewer reservations if they can attack without placing their soldiers at risk. Such action could be particularly destabilizing in areas where countries are already prone to mistrust, such as the East China and South China Seas. Michael Boyle argues, for instance, "The risks of a conflict spiral arising from the shoot-down of the drone or an accident of some kind in the East China Sea are real and potentially dangerous."[96] Despite the technical limitations of armed drones, it is possible that a state might attempt to carry out drone strikes on an adversary's territory, potentially triggering a crisis if the UAV is shot down. It is more likely, however, that countries would use drones for persistent surveillance in a contested area. Indeed, this is a case where unarmed drones could carry significant, possibly salutary, implications for international security.

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92. David Axe, "Drones Take Over America's War on ISIS," *Daily Beast*, June 17, 2015, http://www.thedailybeast.com/articles/2015/06/17/the-war-on-isis-is-a-drone-war.html.

93. Greg Miller, "U.S. Launches Secret Drone Campaign to Hunt Islamic State Leaders in Syria," *Washington Post*, September 1, 2015, https://www.washingtonpost.com/world/national-security/us-launches-secret-drone-campaign-to-hunt-islamic-state-leaders-in-syria/2015/09/01/723b3e04-5033-11e5-933e-7d06c647a395_story.html.

94. Obama, "Remarks by the President at the National Defense University."

95. This point is consistent with one of the conclusions in Davis et al., "Armed and Dangerous?" p. 15.

96. Boyle, "The Race for Drones," p. 89.

Most international disputes arise from border disagreements,[97] where the primary risk of escalation stems from miscommunication and misinterpretation, rather than from a decision to change the status quo. In the maritime arena alone, there are more than 430 bilateral boundaries that are not governed by formal agreements.[98] States concerned with upholding their claims in these boundary areas might be especially drawn to using drones for persistent surveillance given the technology's superior endurance, and because states could "test the waters" with less risk than would be incurred with a manned equivalent.[99] Moreover, the ability to substitute robots for people might make countries more likely to deploy drones into contested regions and behave more assertively because the costs of losing drones seem lower.[100] If deployments move from close to the border to inside an adversary's territory, there is some risk of triggering an armed confrontation.

The deployment of drones could increase the risk of accidents and unintended clashes in this context. When one state deploys UAVs, the other side may not clearly understand whether the drones are intended for offensive or defensive purposes.[101] This uncertainty may cause a state to adopt worst-case thinking, potentially leading to a forceful response. The likelihood of using force increases insofar as a pilot knows that his or her actions would not result in another individual being killed. China, for example, is reported to have a policy of shooting down unannounced drones with surface-to-air missiles or fighter aircraft.[102] Compounding matters further, the rules of engagement for responding to drone incursions—whether and when to shoot down a drone that transgresses a state's borders—are currently ambiguous. This ambiguity could lead to mutual misunderstandings and further escalation of a crisis.

Consider, for example, the numerous incidents involving the U.S. and Chinese militaries in the last couple of decades that have spilled into the public sphere, including the EP-3 incident in 2001, the confrontation between a

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97. This observation is well established in international conflict research. See, for example, John A. Vasquez, "Why Do Neighbors Fight? Proximity, Interaction, or Territoriality," *Journal of Peace Research*, Vol. 32, No. 3 (August 1995), pp. 277–293; and John A. Vasquez, "The Probability of War, 1816–1992," *International Studies Quarterly*, Vol. 48, No. 1 (March 2004), pp. 1–27.
98. For more on maritime claims, see Central Intelligence Agency, *The World Factbook* (Washington, D.C.: Central Intelligence Agency, 2012), https://www.cia.gov/library/publications/the-world-factbook/fields/2106.html.
99. Zenko and Kreps, "Limiting Armed Drone Proliferation," p. 10.
100. Boyle, "The Race for Drones."
101. Robert Jervis, "Cooperation under the Security Dilemma," *World Politics*, Vol. 30, No. 2 (January 1978), pp. 167–214.
102. Olivia Geng, "The Chinese Military's Response to Unannounced Drones: Blow 'Em out of the Sky," *Wall Street Journal*, December 15, 2014, http://blogs.wsj.com/chinarealtime/2014/2012/2015/the-chinese-militarys-response-to-unannounced-drones-blow-em-out-of-the-sky/.

Chinese naval frigate and the USNS *Impeccable* in 2013, and the reported near miss between a U.S. surveillance plane and a Chinese fighter jet in 2014.[103] The spate of Russian air incursions into NATO airspace in the Baltic Sea region likewise underscores the potential for diplomatic incidents resulting from military deployments. During 2014, Russia conducted more than 400 patrols in the region, which corresponded with deteriorating relations with the West.[104] With the addition of long-range drones, the number of incursions into NATO airspace could significantly escalate as the costs of incursion decrease for Russia. The potentially destabilizing consequences could be more intense because of the unclear rules of engagement that attend the use of armed drones.[105]

The concerns outlined above certainly have merit. Still, it is important not to overstate the risk of drone deployments for regional or international stability. For example, none of the aforementioned incidents led to armed military engagement. On the contrary, emerging norms regarding the consequences of shooting down a drone, though clearly still in the early stages, suggest that states distinguish between the shooting down of manned and unmanned systems. Thus, even if there is an accident and a drone is brought down, it is less likely to trigger a crisis or military escalation than those in the pessimistic camp imply. For example, when Pakistan shot down an Indian surveillance drone in the Kashmir region in the summer of 2015 that it said strayed beyond the line of control, India did not escalate the long-simmering conflict to war.[106] Similarly, compare the muted international discussion when Turkey shot down a drone flying on its border with Syria in the fall of 2015 with the diplomatic crisis between Turkey and Russia that erupted when Turkey brought down a manned SU-24.[107] Countries appear to know that opponents will value drones differently from manned aircraft, and behave accordingly. Thus, drones carrying out surveillance and reconnaissance missions need not be destabiliz-

103. Armin Rosen, "That U.S.-China Near Miss in the South China Sea Is a Sign of Things to Come," *Business Insider*, August 22, 2014, http://www.businessinsider.com/the-us-china-near-miss-in-the-south-china-sea-2014-8.
104. Erik Pineda, "2 Signs Russia Remains Combat-Ready vs. U.S., NATO: Increased Baltic Sea Incursions and Relentless Naval Build-Up," *International Business Times*, December 10, 2014, http://www.ibtimes.com.au/2-signs-russia-remains-combat-ready-vs-us-nato-increased-baltic-sea-incursions-relentless-naval.
105. Zenko and Kreps, "Limiting Armed Drone Proliferation."
106. Katharine Houreld, "Pakistan Says It Shot Down Indian Drone near Disputed Border," *Reuters*, July 15, 2015, http://www.reuters.com/article/us-pakistan-drone-idUSKCN0PP1O620150715.
107. Neil MacFarquhar and Steven Erlanger, "NATO-Russia Tensions Rise after Turkey Downs Jet," *New York Times*, November 24, 2015, http://www.nytimes.com/2015/11/25/world/europe/turkey-syria-russia-military-plane.html.

ing. This may not always be the case, however, because the rules of engagement in this context are not yet clearly defined.

There are also reasons to think that using drones for surveillance could be stabilizing. Drones could give both sides in a dispute real-time information about the situation at lower cost, and with lower risk to personnel, than is possible at present. Countries can use drones deployed near or at their borders to surveil more persistently over contested areas or even over their adversaries' territory. Improved surveillance from persistent drone deployments could reduce the risk of conflict for two reasons. First, information provided by drones could reassure a state that its enemy is not planning to launch an attack, thus lowering the risk of destabilizing countermeasures.

Second, the existence of surveillance drones could decrease the ability of potential aggressors to conduct surprise attacks or covert activities. With the aid of surveillance drones, potential targets can take appropriate preparations if they observe military deployments. Drones, then, may be useful for deterrence by denial:[108] if the potential aggressor believes that the element of surprise is critical to operational success, and that drones flying near the border would give the other state adequate notice, it may be less likely to launch an attack. Both of these mechanisms could reinforce stability, even when their relative impact is small.

To illustrate, consider the dispute between China and Japan over the Senkaku Islands in the East China Sea. Japan currently maintains situational awareness mostly using satellites and manned maritime vessels. Japan could gain even better situational awareness if it had more robust unmanned systems in the air and on the sea. Although this type of capability would not make a conflict less likely in the case of a deliberate Chinese attempt to take the islands, it could help reassure Tokyo about Beijing's intentions (if China deployed similar capabilities at a longer standoff range, it might be similarly reassured). And, in a world where China would want to take the islands only if it could catch Japan unaware, Japanese surveillance drones might reduce the feasibility of a surprise attack.

This scenario is not just hypothetical. Japan's purchase of Global Hawk, confirmed in November 2014, suggests that UAVs are likely to play a growing role in maritime surveillance.[109] Given the large number of maritime disputes in the Asia Pacific, especially in the South China Sea, unmanned surveillance

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108. For classic work on deterrence by denial, see, for example, Glenn H. Snyder, "Deterrence and Power," *Journal of Conflict Resolution*, Vol. 4, No. 2 (June 1960), pp. 163–178.
109. James Hardy, "Japan Announces Global Hawk, Osprey, Hawkeye Purchases," *Jane's Defence Weekly*, November 20, 2014.

systems could provide a new type of confidence-building measure that would make inadvertent escalation less likely. Moreover, such surveillance systems could make it easier for regional actors to monitor Chinese actions such as building airstrips on the Spratly Islands.[110] In some cases, actors may not become aware of Chinese activities until it is too late to stop them. Unmanned surveillance systems, if they provide real-time monitoring, could therefore serve a deterrent role as well, because those actors attempting to change the status quo in disputed regions will have to do so in the public eye.

COERCIVE DIPLOMACY: A POOR TOOL FOR CHANGING THE STATUS QUO

Drones may deter military conflict in some scenarios, but can they help states change the status quo with greater ease? Military technologies may bolster coercive diplomacy—that is, the use of military threats to extract concessions—in three ways.[111] The first is augmenting a state's ability to impose its will. Coercive threats will be more effective, all else being equal, if an adversary believes that it will not be able to maintain a desired possession (or policy) even if it resists. During the Cuban missile crisis, for instance, U.S. Attorney General Robert Kennedy told Soviet Ambassador Anatoly Dobrynin that Moscow had a choice: remove the missiles from Cuba or the United States would remove them. This coercive demand worked, in part, because the Soviet leadership recognized that it probably would not be able to keep its missiles in Cuba even if it ignored the U.S. threat. The second way in which military technologies may enhance the effectiveness of coercion is by raising the costs of conflict for an opponent. States are more likely to heed an adversary's demand when their opponents can inflict high levels of pain through violence.[112] Third, technologies that lower the physical costs of conflict for an attacker may also be helpful in this context. Aircraft carriers are a potentially useful coercive tool, for instance, because they allow states to project power and carry out offensive military operations with greater ease.

At first glance, drones might appear useful for coercive diplomacy because, in theory, they allow the attacker to inflict pain or impose its will at a lower cost.[113] Indeed, a coercive threat might seem more credible when the threatening party can implement it without putting its own forces in harm's way. The

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110. Ankit Panda, "China's Spratlys Airstrip Will Raise South China Sea Stakes," *Diplomat*, November 25, 2014, http://thediplomat.com/2014/2011/chinas-spratlys-airstrip-will-raise-south-china-sea-stakes/.
111. This discussion draws on the conditions for successful coercion developed in Sechser and Fuhrmann, *Nuclear Weapons and Coercive Diplomacy*.
112. See, for example, Schelling, *Arms and Influence*.
113. Amy Zegart, "Coercion in a Drone World," Stanford University, March 18, 2016.

problem, however, is that current-generation drones cannot operate effectively in hostile airspace, which makes them ill-equipped for denial or punishment. A threat to launch drone strikes against a recalcitrant government, for instance, carries little weight because of the vulnerability of drones to air defenses. States with lethal drones seemingly recognize this, as they have rarely, if ever, issued drone-related coercive threats against other states. This could change in the future as the capabilities of drones evolve, a point that we revisit in a subsequent section. Cases where drones have exhibited a punishment capability may reflect situations where there is already a large imbalance of power—for example, the use of drones against a country that lacks air defenses (meaning that it would also lack the air defenses to defeat manned aircraft).

At the same time, drones may have coercive utility against nonstate actors. When operating in permissive airspace, given their loitering-related advantages, drones increase a state's ability to track and kill members of rebel groups. It is plausible, then, that states could credibly threaten to carry out drone strikes against insurgents to extract political concessions. Indeed, states could engage in a form of coercion that has been called "targeted hurting."[114] A leader might say (or imply) that a rebel's family members will be killed or her village destroyed unless she ceases violent attacks against the government. That threat would raise obvious ethical considerations as well as concerns about blowback and precedent setting. Those issues aside, the low cost of using drones may make them useful for implementing a policy of targeted punishment in this context.

Success is by no means guaranteed, however, because factors other than technology influence the efficacy of military threats. The balance of resolve (i.e., which side places greater value on the issues at stake in the dispute) often plays a critical role.[115] This may be bad news for governments hoping to extract coercive leverage from their drones given that rebels are often highly motivated to achieve their objectives. States must threaten to impose costs that are sufficiently large to offset the benefits that rebels expect to derive from fighting. Despite being relatively low-cost tools of punishment, drones—or any military technology—may not inflict enough pain on rebels to accomplish this objective.

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114. Zegart, "The Coming Revolution of Drone Warfare."
115. Robert Jervis, *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon* (Ithaca, N.Y.: Cornell University Press, 1989); and Sechser and Fuhrmann, *Nuclear Weapons and Coercive Diplomacy.*

CIVIL WAR AND DOMESTIC CONFLICT: AUGMENTING THE AUTOCRAT'S TOOLKIT

If one of the main reasons why states do not use drones in some settings is their vulnerability to air defenses, then intrastate conflicts (i.e., those in which insurgents, domestic protest groups, or suspected terrorists are less likely to have sophisticated air defense systems) are best-suited to the use of drones. Indeed, for some of the same reasons that states find drones attractive in an interstate setting—primarily that they seem to come at low risk and low cost—they might be inclined to use them against perceived domestic enemies. Many of the countries that have or are pursuing armed drones, such as China, Iraq, Pakistan, Russia, and Turkey, have opposition movements that potentially threaten their leaders' hold on power. Unmanned drones might be attractive to these leaders, who may prefer to target insurgents or suspected terrorist networks with drones rather than ground forces or manned aircraft. With their precision and long loiter time, drones might be seen as able to perform tasks that otherwise could expose regime forces to unacceptable risk.[116]

States dealing with an internal insurgency or a civil war, by definition, do not have a monopoly on the use of force. They are therefore inherently distrustful of at least a subset of their population.[117] This is especially true for autocratic regimes, even those not confronting active insurgencies. Autocratic leaders often face an inherent contradiction when seeking to create military forces. On the one hand, developing efficient and effective military forces is often necessary to defeat regime opponents, whether domestic or international. On the other hand, efficient and effective military forces are precisely those that might present the largest challenge to an autocrat's power.[118] This dilemma has surfaced throughout history, from Spartan concern about Hoplite slaves in the Peloponnesian War to Joseph Stalin's purges of the Soviet military in the 1930s.

Drones, as well as military robotics as a more general category, could in theory provide new means for autocrats (or others engaged in domestic repression) to overcome some of these challenges and more generally repress their local populations. Drones can operate from centralized locations where those most loyal to the regime can directly supervise their use. To the extent that the unwillingness of large numbers of troops to fire weapons at their fellow citizens stymies autocratic repression, drones could significantly reduce the num-

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116. Zenko and Kreps, "Limiting Armed Drone Proliferation."
117. Max Weber, *The Vocation Lectures*, David Owen and Tracy B. Strong, eds., Rodney Livingstone, trans. (Indianapolis: Hackett, 2004).
118. Caitlin Talmadge, "The Puzzle of Personalist Performance: Iraqi Battlefield Effectiveness in the Iran-Iraq War," *Security Studies*, Vol. 22, No. 2 (2013), pp. 180–221.

ber of military personnel who have to be persuaded before engaging in such action.[119] Moreover, the act of persuasion could be much easier when the personnel firing on the civilian population represent a small set of those most loyal to the regime and they are being directly monitored from within a centralized installation.[120] To illustrate, the Iraqi military under Saddam Hussein performed relatively poorly because his staffing and training decisions focused more on weakening regime opponents than on preparing for external threats.[121] With more centralized control over the use of force through drones and less concern over armies in the field turning against him, he might have been able to field more effective forces.

The risk of autocrats using armed drones for domestic control reflects growing concerns held by some senior U.S. defense officials about their potential use. For instance, in a discussion about the future of military robotics in December 2015, U.S. Deputy Secretary of Defense Robert Work argued that "authoritarian regimes who believe people are weaknesses in the machine, that they are the weak link in the cog, that they cannot be trusted . . . they will naturally gravitate towards totally automated solutions."[122] There are signs that this is already happening. Consider, for example, that when facing protests in Xinjiang in 2014, the Chinese government reportedly ordered the deployment of surveillance drones to monitor the situation.[123]

OPERATIONS BY VIOLENT NONSTATE ACTORS: A LEGITIMATE CONCERN

Drones may also be a useful military tool for nonstate actors. But why would militant groups need them? They already have a variety of potential means to attack targets, including nail bombs and explosives that may be less expensive and more deadly.[124]

Small drones could generate military benefits for militant groups as a preci-

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119. Tucker, "Every Country Will Have Armed Drones within 10 Years."
120. Autocratic countries monitoring their soldiers to ensure that they comply with orders are nothing new, of course. The Soviet Union, in World War II, famously employed "blocking battalions" designed to shoot anyone retreating from the front. See Richard J. Overy, *The Dictators: Hitler's Germany and Stalin's Russia* (New York: W.W. Norton, 2004). What drones enable is the use of these techniques without the mass mobilization necessary in the Soviet case.
121. Talmadge, "The Puzzle of Personalist Performance."
122. Robert O. Work, "Deputy Secretary of Defense Speech at CNAS Defense Forum," JW Marriott, Washington, D.C., December 14, 2015, http://www.defense.gov/News/Speeches/Speech-View/Article/634214/cnas-defense-forum.
123. Didi Kirsten Tatlow, "China Said to Deploy Drones after Unrest in Xinjiang," *New York Times*, August 19, 2014, http://sinosphere.blogs.nytimes.com/2014/2008/2019/china-said-to-deploy-drones-after-unrest-in-xinjiang.
124. Davis et al., "Armed and Dangerous?" p. 6.

sion weapon where the drone, likely with explosives attached, is the weapon itself.[125] Some groups initially turned to suicide bombing partially because this tactic provided accuracy against either important civilian or hard military targets.[126] Drones offer a similar level of precision, potentially allowing groups facing personnel shortages to use drones instead of suicide bombs in some situations. Groups might even be able to accomplish useful (for them) levels of destruction without advanced drones. A hobbyist drone mounted with a small amount of explosive could potentially have the ability to generate damage and terrorize the population, while having the advantage of being too small to detect for air or even ground defenses that keep more traditional threats in their sights.[127] Take, for example, the drone that landed on the White House lawn in 2015. Although the drone was unarmed, its ability to transgress fortified boundaries illustrates how drones could be used for more sinister purposes.[128]

Smaller drones could also be attractive for lone-wolf actors inspired by militant groups around the world. For example, individuals similar to those who carried out attacks in Sydney, Australia, in December 2014 and at the Boston Marathon in April 2013 might consider using hobbyist drones armed with explosives or simple firearms to create psychological terror.[129] In 2014, the Federal Bureau of Investigation arrested a suspect who allegedly planned to fly a drone armed with a bomb into a school.[130]

Militant groups may also value larger drones for the same reason that states do—namely, their utility for surveillance and strike operations. To be sure, the ability to launch and fly drones from a distance could make it easier for militant groups to conduct strikes. Some nonstate actors have already demonstrated the capacity to operate drones. Hezbollah possesses an array of drones

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125. Eugene Miasnikov, "The Threat of Terrorism Using Unmanned Aerial Vehicles: Technical Aspects" (Moscow: Center for Arms Control, Energy, and Environmental Studies, 2005), http://www.armscontrol.ru/UAV/UAV-report.pdf.
126. Bruce Hoffman, "The Logic of Suicide Terrorism," *Atlantic Monthly*, June 2003, pp. 40–47.
127. Sarah Kreps's interview with U.S. Air Force colonel stationed in South Korea, March 2014. For an example of the use of small drones to evade surveillance by a nation-state, see North Korea's use of surveillance drones in South Korea. The drones crashed but evaded detection by air defense systems. As Van Jackson writes, "[I]t's the low-performance qualities of North Korea's drones that enable them to evade South Korean defenses, which are optimized for more traditional threats from bigger, faster, higher-altitude aircraft." See Jackson, "Kim Jong Un's Tin Can Air Force," *Foreign Policy*, November 12, 2014, http://foreignpolicy.com/2014/2011/2012/kim-jong-uns-tin-can-air-force/.
128. Michael S. Schmidt, "Secret Service Arrests Man after Drone Flies near White House," *New York Times*, May 14, 2015.
129. Ibid.
130. Alex Brandon, "FBI: Man Plotted to Fly Drone-Like Toy Planes with Bombs into School," Associated Press/CBS News, April 8, 2014, http://www.cbsnews.com/news/fbi-man-in-connecticut-plotted-to-fly-drone-like-toy-planes-with-bombs-into-school/.

acquired from Iran, including the Ababil, a surveillance drone. In 2012, Israel shot down a Hezbollah-owned drone that reportedly had the ability to communicate surveillance data back to the group's leaders, illustrating the potential for nonstate actors to use drones for military purposes.[131] Hezbollah also allegedly has an Iranian-made Shahed-129 drone, which carries Sadid-1 missiles. The group claimed to use this drone in a strike against al-Nusra forces in Syria in late 2014, though these reports are unconfirmed. Hamas has similar drones. Although Israel has had success at shooting them down, Hamas advertises its drone capabilities as a way to signal strength to its followers.[132]

Of course, the logistical constraints that make it difficult for some nation-states to operate state-of-the-art drones will undoubtedly apply to nonstate actors as well. Nevertheless, Hezbollah's and Hamas's use of drones for surveillance purposes demonstrates the way that violent nonstate actors may be able to use even simple surveillance drones to do the kind of reconnaissance necessary to plan attacks. Moreover, if operating armed drones, even at reasonably short ranges, continues to become easier for militaries without vast logistical support as the technology improves, they could become more useful for militant groups as well.

Evaluating the Drone Debate

In recent years, the proliferation of drones has shifted from a theoretical concern to a reality with which countries must grapple. The most advanced current-generation drones, those that give nations the ability to conduct strikes around the world, require intense logistical support and global bandwidth of the sort that will likely remain outside the realm of possibility for many countries. Yet military-relevant drones, both armed and unarmed, are spreading, in contrast to predictions that useful drones would diffuse slowly: Italy now fields armed drones, and relatively underdeveloped states—Iraq, Nigeria, and Pakistan—have also employed them. At the same time, sophisticated surveillance drones, which can be used to monitor other countries or domestic regime opponents, are also spreading quickly, as acquisition by France, Spain, and the Netherlands demonstrates.

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131. Carlo Muñoz, "Iran Claims Drones Gained Access to Secret Israeli Facilities," *The Hill*, October 29, 2012, http://thehill.com/policy/defense/264691-iran-claims-drones-gained-access-to-secret-israeli-facilities.
132. "Hamas Flexes Muscles with Gaza Drone Flight," Agence France-Presse, December 14, 2014, http://english.alarabiya.net/en/News/middle-east/2014/12/14/Hamas-flies-drone-over-Gaza-during-anniversary-parade-.html.

Table 1. Overall Consequences of Current-Generation Drone Proliferation

Context	Consequences of Current-Generation Drone Proliferation
Counterterrorism operations	high
Interstate war	low
Crisis onset and deterrence	moderate
Coercive diplomacy	low
Domestic control and repression	high
Use by nonstate actors	moderate

In light of these trends, this article shows the potential effects of drone proliferation in six different contexts, making our study one of the most comprehensive assessments of this topic carried out to date. Table 1 summarizes the main results from our analysis. As the table shows, the implications of drone proliferation for the international security environment are more heterogeneous and complex than most of the existing scholarship and policy commentary suggests. Drones are neither a game changer across every dimension of international security nor simply a redundant military technology with little significance for peace and stability. Based on our analysis, several main correctives to the narratives that appear in the scholarship on drone proliferation are worth emphasizing.

First, advanced armed drones have advantages over manned alternatives in ways that make them attractive in certain settings. By not putting the life of the user at risk, offering some cost advantages, and providing greater endurance than manned aircraft, drones are often easier to employ than manned aircraft. Thus, when there are missions for which drones are appropriate, such as counterterrorism operations, drones may make the use of force more likely.

Second, some analysts exaggerate the capabilities of current-generation drones. With limited weapons capabilities, the ability to operate only at relatively slow speeds, and no ability to defend themselves against ground-based or airborne threats, there are significant limits on the types of operations where drones are useful. Current-generation drones are unlikely to be useful in contested environments. As a result, the utility of drones for interstate operations or coercive diplomacy is quite limited when an adversary has sophisticated air defenses.

Third, existing views on drone proliferation gloss over a key point: drones may have stabilizing effects on the international security environment in some cases. Our analysis suggests that by enhancing the ability of states to monitor disputed territories and borders, drones can potentially reduce uncertainty

about an adversary's behavior, which could promote peace if the enemy's intentions are benign. If the adversary is making preparations for an attack, drones could increase the likelihood of early detection. Particularly given the fledgling, albeit shaky, norm that shooting down drones does not constitute grounds for escalating a conflict, this is a significant aspect of drone proliferation that existing studies ignore. But, because they make countries more likely to use force in certain circumstances and are easier to deploy, there is always a risk that drones could encourage crisis escalation in a case where an actor views the shooting down of its drones as especially provocative, or where the deployment of a drone leads to a diplomatic incident that might not otherwise occur.

Fourth, current-generation drones could have significant consequences for domestic politics. Democracies likely value drones in part because they reduce the risk of casualties, making the use of force more acceptable to the public. On the other hand, authoritarian leaders may find drones attractive for monitoring and repressing domestic opponents. Drones may also allow leaders to exert greater control over the military and become less dependent on large number of soldiers on the battlefield. In this context, the technical constraints of drones are minimized because governments generally control their airspace, reducing the risk that a drone would be shot down. To date, there have been relatively few uses of drones domestically, but this may change in the future. Leaders in Nigeria and Pakistan have used already drones to address regime threats, and it is not inconceivable that other states, such as Saudi Arabia, may employ armed drones to deal with similar threats in the future.

Fifth, even small drones could prove useful for militant groups that deploy drones attached with inexpensive and rudimentary explosives as weapons. Countries such as the United States tend to have sophisticated air defenses that are focused on larger aerial objects, or advanced ground defenses geared toward stopping a truck full of explosives, but nonstate groups seeking to wreak havoc could do so with drones that become the equivalent of suicide bombs.

Future Developments

One challenge in assessing the consequences of drone proliferation is the speed of technological change. This article focuses on current-generation drones, but next-generation systems already in development could improve the capabilities of drones to perform the types of surveillance and strike missions they do now, as well as gain the ability to conduct new missions currently limited to manned aircraft.

For example, China is currently pursuing the development of a stealth drone, reportedly named the Sharp Sword, which has already undergone initial flight testing. The Sharp Sword would not only have a larger weapons bay than China's CH-4 or Wing Loong; it would also have low observability characteristics that could make it harder for Western radars to detect. Until early 2016, the U.S. Navy was considering acquiring a next-generation armed drone (UCLASS, as mentioned above) as the follow-on to the X-47B, an experimental platform. The X-47B has an air-to-air refueling capability, allowing it to extend its range. Also, it is reportedly designed to support stealth technology, and it uses a piloting algorithm to take off from and land on an aircraft carrier. Some plans for follow-on programs included a large weapons bay capable of launching a wide variety of munitions, not just the Hellfire used by the Reaper and the Predator.[133]

The United States decided, however, to turn the UCLASS program into an unmanned, carrier-based, air-to-air refueling program—the MQ-25 Stingray/ Carrier-Based Aerial Refueling System (CBARS)—and delay acquisition of a next-generation armed platform.[134] The capabilities demonstrated by the X47-B show, however, that if bureaucratic political support exists, the United States could build a drone with the ability to do what current-generation drones cannot do (i.e., operate in environments with adversary air defenses and complete strike missions more like those conducted by manned aircraft now). Similarly, one version of plans for the U.S. Air Force's Long Range Strike Bomber includes an "optional manning" feature that would allow the aircraft to go from a manned to an unmanned platform, "meant to give the bomber the best attributes of a killer drone (long endurance, no risk to aircrews) *and* a manned warplane (greater flexibility and the ability to respond to a fast-acting enemy)."[135]

These advances would make drones more useful in conventional, interstate settings given that they would be less vulnerable to air defenses. As a result, armed drones might assume a larger role in the context of wars such as the conflict in Syria or in a potential U.S.-China or NATO-Russia conflict. Although more operationally capable drones could translate into more capabili-

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133. LaGrone, "Navy Conducts Successful Test of Aerial Refueling with X-47b, UCAS-D Program Ending."

134. Sydney J. Freedberg Jr., "Navy Hits Gas on Flying Gas Truck, CBARS: Will It Be Armed?" *Breaking Defense*, March 11, 2016, http://breakingdefense.com/2016/03/navy-hits-gas-on-flying-gas-truck-cbars-will-it-be-armed/.

135. David Axe, "Bombs Away: How the Air Force Sold Its Risky New $55 Billion Plane," *Wired*, March 26, 2012, https://www.wired.com/2012/03/airforce-bomber-gamble/ (emphasis in the original).

ties for striking in contested environments, it is unlikely that they would make interstate conflict—which is rare for a number of reasons[136]—significantly more likely.

In addition, ongoing trends in the development of commercial drones could reduce the cost of drones and make them financially advantageous for militaries to acquire. Military technologies based on underlying commercial capabilities generally experience faster relative price declines than military technologies such as stealth, which have only military markets.[137] As the commercial drone market continues growing around the world, price competition in the high-end commercial market is likely to make more capabilities (excluding the military aspects of those capabilities, such as the most advanced surveillance packages and launching weapons) available at a lower price point.

Trends in the development of military robotics suggest that drones are merely the beginning with regard to the integration of robotics in militaries around the world. For example, Israel already deploys an armed, remotely piloted, naval surface ship to patrol its sea borders.[138] The U.S. Navy is developing the Knifefish, an unmanned underwater vehicle that will help protect its ships from sea mines.[139] Russia is reportedly developing ground-based drones to help guard the perimeters of its ballistic missile bases.[140] These systems are likely to be among the first of many developed and deployed by militaries around the world. From European countries facing labor shortages and budget crunches to autocracies concerned with regime stability above all, drones and related military robotic systems are likely to appear increasingly attractive over the next decade. As drones move from a niche capability to part and parcel of how militaries generate and deploy military power, their effects will undoubtedly change.

Over the longer term, as technological uncertainty increases, the effects of military robotics could further shift the development and use of military

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136. John E. Mueller, *Retreat from Doomsday: The Obsolescence of Major War* (New York: Basic Books, 1989). In Jon R. Lindsay's analysis of why cyber conflict between China and the United States is unlikely to escalate to militarized war, he notes that the cost of warfare and foregone trade is prohibitive. See Lindsay, "The Impact of China on Cybersecurity: Fiction and Friction," *International Security*, Vol. 39, No. 3 (Winter 2014/15), pp. 7–47.
137. Michael C. Horowitz, *The Diffusion of Military Power: Causes and Consequences for International Politics* (Princeton, N.J.: Princeton University Press, 2010).
138. Inbal Orpaz, "Israel Navy's First Unmanned Surface Vehicle Keeps an Eye on the Sea," *Haaretz*, April 17, 2013, http://www.haaretz.com/news/diplomacy-defense/israel-navy-s-first-unmanned-surface-vehicle-keeps-an-eye-on-the-sea.premium-1.515978.
139. Daniel Perry, "Navy 'Mine-Hunter' AUV Sets Mission Endurance Record," *U.S. Naval Research Laboratory*, November 20, 2013, http://www.nrl.navy.mil/media/news-releases/2013/navy-mine-hunter-auv-sets-mission-endurance-record.
140. Kelvin Wong, "Russia to Deploy Armed UGVs at Ballistic Missile Bases," *Jane's IHS International Defense Review*, March 2014.

power. For example, a shift to smaller, cheaper swarming platforms—which involve many drones flying together in formation—as opposed to large platforms could drive changes in how military operate. Given the significant uncertainty about technological trends in these areas, however, such outcomes remain speculative.

Conclusion

To whatever extent a U.S. monopoly on cutting-edge drones existed, it is over. Given ongoing proliferation trends and the technological advancements made by countries such as China, drones (and military robotics more generally) appear to be a critical area of military investment for many states over the next generation. How should the United States respond to this trend? Washington has placed significant restrictions on UAV exports, but if widespread proliferation is likely anyway, especially as countries such as China and Israel seem to be less discriminate in the marketplace, the United States could increase its level of drone exports. Which policy would best advance U.S. strategic interests in the coming years and decades?

There is no easy answer, as there are costs and benefits associated with each approach. One contribution of our study is to underscore the trade-offs that the United States must consider as it responds to the proliferation of drones. The global spread of militarily useful UAVs could affect U.S. national security, but in more limited ways than the alarmist view suggests—namely, by lowering barriers to the use of force domestically or in uncontested airspace. That drones are unlikely to prompt new interstate conflicts or transform international relations, however, suggests that the United States could reap the benefits of exporting UAVs in some cases while avoiding the most significant costs. Moreover, given the potential for drones to provide useful information about an adversary's maneuvers and possibly ease tension in some circumstances, U.S. exports could help provide reassurance to Washington and its allies.

Nevertheless, there are several potential concerns for the United States regarding drone proliferation. As described above, technological advancements will likely make some drones more suitable for use in contested airspace, potentially increasing their military and political effects. Indeed, as drones continue proliferating and are used for a much broader array of missions than counterterrorism strikes, the U.S. military will have to consider how to deal with the use of drones by potential adversaries in areas where its forces are present.

The use of armed drones also raises important ethical dilemmas that may

become more acute as the technology spreads globally. The United States has a potential role to play in shaping global norms for drone use. More transparency by the United States concerning its decisionmaking process for drone strikes could give it more credibility in seeking to convince other countries to use their newly acquired drone capabilities in ways that comply with international law.[141]

Finally, one long-term risk for the United States is that its edge in more traditional, manned systems causes it to underestimate the potential uses of drones and other military robotic systems as the technology continues to advance. Leading militaries often struggle in the face of innovation, as it can be difficult to combine new technologies with human capital and organizational processes to effectively field them.[142] That the U.S. Air Force has no program of record for the development of a next-generation armed drone and the U.S. Navy canceled the UCLASS program suggests that the bureaucratic politics of drones remain an important obstacle.

In any case, it seems likely that drones are here to stay.[143] It would therefore behoove the international community to anticipate the regional and international consequences of further drone proliferation. Our analysis shows that understanding these consequences first requires identifying the contexts in which drones may be used. Based on that perspective, it is clear that current-generation drones are not uniformly transformative. When it comes to future developments, however, it may be a different story.

141. Zenko and Kreps, "Limiting Armed Drone Proliferation."
142. Horowitz, *The Diffusion of Military Power.*
143. Byman, "Why Drones Work," p. 32.