Offense-defense theory argues that international conflict and war are more likely when offensive military operations have the advantage over defensive operations, whereas cooperation and peace are more likely when defense has the advantage. According to the theory, the relative ease of attack and defense—the offense-defense balance—is determined primarily by the prevailing state of technology at any given time. When technological change shifts the balance toward offense, attackers are more likely to win quick and decisive victories. This prospect of quick and decisive warfare exacerbates the security dilemma among states, intensifies arms races, and makes wars of expansion, prevention, and preemption more likely. When technological innovation strengthens the defense relative to the offense, states are more likely to feel secure and act benignly.¹

Offense-defense theory has deep roots, but has become increasingly popular in international relations scholarship and foreign policy analysis in recent years. The idea that the nature of technology affects the prospects for war and

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peace is simple, powerful, and intuitively plausible. Thus the offense-defense balance concept has been used to address a variety of important historical, theoretical, and policy questions even when scholars have not adopted the basic assumptions and logic of the theory. Perhaps the most important reason offense-defense theory continues to appeal to scholars is that it offers a compelling argument for why intense security competition among states is not an inevitable consequence of the structure of the international system. Specifically, for realists who believe that threats are more important than raw material power in explaining state behavior, the offense-defense balance appears to provide a systematic method of predicting when the balance of power is threatening and when it is not.

Offense-defense ideas also continue to shape contemporary foreign policy debates on arms control, conventional and nuclear deterrence and force posture, the prevention of civil and ethnic conflict, and the so-called revolution in military affairs. On the latter issue, for example, the *Economist* recently proclaimed that the world is in the early stages of a new military revolution that will strengthen the offense relative to the defense and thus create “a strong incentive to strike first.” The most policy-relevant conclusion offered by offense-defense theory is that arms races, conflict, and war may be prevented through carefully designed arms control agreements that either deliberately shift the balance of technology toward defense or seek to correct misperceptions of the balance.


3. For defensive realists, the degree to which one state threatens another is a function of the relative distribution of power (i.e., capabilities) filtered through the offense-defense balance. If power is distributed roughly equally and the balance of technology does not heavily favor the offense, states may feel secure and signal their peaceful intentions. If the balance heavily favors offense, however, states will face strong incentives to build offensive forces and fight preemptively. On the relationship between offense-defense theory and structural realism, see Van Evera, *Causes of War*, pp. 7–11, 117, 255–256; Glaser and Kaufmann, “What Is the Offense-Defense Balance?” pp. 48–49; Lynn-Jones, “Offense-Defense Theory and Its Critics,” pp. 660, n. 1, 664–665; and Glaser, “Realists As Optimists,” pp. 54, 60–64.


5. See Jervis, “Cooperation under the Security Dilemma,” pp. 199–201; Glaser and Kaufmann, “What Is the Offense-Defense Balance?” p. 44; and Van Evera, “Offense, Defense, and the Causes of War,” p. 40. Other proponents of offense-defense theory are less sanguine about the capacity of arms control to reduce the likelihood of war, pointing out that arms control may be possible only when it is not necessary.
In this article I argue that the central concept of offense-defense theory—the offense-defense balance of technology—is deductively and empirically flawed. My analysis conclusion follows from two basic questions: First, is there an offense-defense balance of technology that can be used to predict military outcomes? Second, do perceptions of the offense-defense balance affect political decisions to initiate conflict? I conclude that scholars have overstated both the degree to which the balance of technology shapes battlefield outcomes and the influence that beliefs of offense or defense dominance have on political or strategic behavior.

The article is organized as follows. First, I examine the offense-defense balance concept; I present the basic definitions and assumptions required to operationalize the balance for empirical evaluation and discuss why the “core” version of the balance (which focuses solely on technology) is better than the “broad” conception (which incorporates additional variables). Next, I identify and evaluate the most frequently employed criteria for classifying how technology gives a relative advantage to offense or defense. Finally, I assess how offense-defense explanations fare against the record of four watershed technological innovations since 1850. These illustrative cases are the emergence of railroads in the nineteenth century, the artillery and small arms revolution of the late nineteenth and early twentieth centuries, the innovation of the tank in the first half of the twentieth century, and the nuclear revolution of the latter half of the twentieth century. The evidence suggests that although technology can occasionally favor offense or defense, perceptions of a technological balance have little effect on the likelihood of war.

The Offense-Defense Balance

The label “offense-defense theory” refers to the body of work that explores how changes in the offense-defense balance shape state behavior in international politics. Scholars working in the field, however, have conceptualized, operationalized, and employed the balance differently. This diversity notwithstanding, there are several central features of the balance common to almost all approaches.

SHARED DEFINITIONS AND ASSUMPTIONS

The offense-defense balance denotes some measure of the relative ease of attacking and taking territory versus defending territory. “Relative ease” refers to the relative costs and benefits of attacking versus defending. The terms “offense” and “defense” refer to actual military actions, not the political intentions, goals, or objectives that motivate military action. Specifically, offense means the use of military force to attack, seize, and hold a portion or all of a defender’s territory. Defense involves using military force to prevent an attacker from seizing territory.

The causal logic of offense-defense theory is based on the relative ease of offense and defense at the strategic level of war, not the operational or tactical level. The strategic level pertains to the highest levels of war planning and direction and the achievement of ultimate war goals, the operational level deals with the conduct of specific campaigns within a theater of operations, and the tactical level concerns actions taken within a particular battle. The theory ultimately aims to explain decisions to initiate war; what matters is leaders’ expectations of final war outcomes based on their perceptions of the strategic balance. Of course, the feasibility of strategic offense and defense depends on the success of operational and tactical offense and defense, and thus the nature of warfare at these levels is highly relevant to understanding the overall offense-defense balance.

Proponents of the theory have struggled to offer a more precise definition of the balance than just the relative ease of attack and defense. Perhaps the most popular definition of the balance is cast in terms of a cost or investment ratio required for offensive success: the ratio of the amount of resources that an attacker must invest in offensive forces to offset the amount of resources a defender has invested in defensive forces. Although measuring such a ratio (especially in historical cases) may be impossible, for present purposes it stipulates that the offense-defense balance is a continuous, not a dichotomous,

variable. What matters most for empirical evaluation is not whether the balance in any given period favors offense or defense in absolute terms—in fact, it is almost always easier to defend than to attack—but how and to what degree the balance has shifted in either direction.

Finally, the offense-defense balance should be distinguished from two other key variables in international politics: power and skill. First, the balance must be defined independently of the balance of power among states. Battlefield outcomes clearly depend on a host of factors other than the offense-defense balance, such as the relative distribution of military forces and resources. Thus the success of any given offensive or defensive strategy is not necessarily indicative of the balance. For example, it might be misleading to say that offense is relatively easier than defense when a given state easily conquers another state, because this situation could simply have resulted from an overwhelming numerical disparity in the balance of forces, rather than from an offensive advantage. Similarly, a situation in which only one state in a conflict has acquired a new technology effectively represents a change in the balance of power, not in the offense-defense balance. The effects of a new technology on the balance can best be assessed in a conflict between two roughly equal-sized military forces employing the technology. Although the effects of the offense-defense balance can theoretically overcome disparities in material resources in determining war outcomes, the two variables are analytically distinct.

Second, the offense-defense balance should be defined independently of large disparities in the level of skill between the attacker and the defender. The relative ease of attack and defense is a concept meant to capture the objective effects of military technology on war and politics. To understand these baseline effects, one must assume that states make reasonably optimal or rational decisions about force posture, doctrine, and strategy. The standard of optimality employed by proponents does not require that attackers and defenders make the absolute best strategic choices, which might be impossible to determine in any case. Instead, optimality in this context assumes that states make reasonably intelligent decisions about how to employ existing technologies and forces given prevailing knowledge at the time.

CORE AND BROAD VERSIONS OF THE BALANCE
The “core” version of offense-defense theory looks almost exclusively at changes in military technology as the cause of shifts in the balance between
offense and defense. Some scholars, however, incorporate a host of factors in addition to technology when operationalizing the balance. Proponents of the “broad” version include some or all of the following factors: geography; the cumulativity of resources (the ease of exploiting resources from conquered territories); nationalism; regime popularity; alliance behavior; force size; and military doctrine, posture, and deployment. For example, according to proponents of the broad approach, nationalism tends to favor defense relative to offense because people are more likely to fight harder when they believe they are defending their rightful homeland from foreign invaders. Incorporating a host of geographic, social, political, and military factors into the balance clearly makes the theory more complex, but proponents believe the core version is otherwise incomplete. The relative ease of attack or defense is determined by a set of basic causal factors, they argue, and omitting these factors is unlikely to result in accurate explanations or predictions.

Although proponents of the broad version of the offense-defense balance believe their approach strengthens offense-defense theory, there are at least three important theoretical and practical advantages to focusing solely on the core balance of technology. First, technology is the one determinant of the balance common to all versions of the theory, the most significant factor shaping the balance, and often the only factor analyzed in any detail by scholars. None of the factors identified by the broad approach have such wide applicability and importance. Thus offense-defense theory’s contribution to the conceptual toolbox of international relations largely turns on the role that the technological balance plays in shaping state behavior.

Second, because the broad offense-defense balance incorporates factors unique to particular states (such as geography, nationalism, and regime popularity), it is not a systemic variable, and the resulting theory is no longer

10. Adopting the core approach are George Quester, Robert Jervis, and Sean Lynn-Jones. Although Jervis cites technology and geography as the two main factors that determine whether offense or defense has the advantage, technology is far more important in his work. See Jervis, “Cooperation under the Security Dilemma,” pp. 194–196.


structural. Offense-defense theory claims to share the appeal of other structural theories in international relations because it focuses on the war-causing effects of a variable that is essentially exogenous to states. Technology, in principle, provides similar constraints and opportunities for all states in a given international system.\(^{13}\) Thus comparable patterns of state behavior should arise under similar technological balances in history. At best, the broadly defined balance might shed light on a specific military conflict, but its effects are not generalizable across space and time.

Finally, and most important, the core version makes for a much more parsimonious theory than the broad version. All things being equal, simpler theories are both easier to measure (and test) and more intuitively appealing. First consider the issue of measurement. Although measuring the balance of military technology is extremely complicated, it is certainly more feasible than measuring a balance that incorporates a host of complex, ambiguous, and sometimes cross-cutting variables. Even if one were able to accurately assess the impact of the broad factors on the relative ease of attack and defense, one would still have to weigh the relative importance of each factor and aggregate them into a single value of the balance. If the balance cannot be measured, the theory has little explanatory power and prescriptive utility.

In addition, a theory that uses few variables to explain a class of phenomena in the real world is more satisfying than a theory built on all possible causes. Adopting the broad balance renders offense-defense theory atheoretical; it becomes a grab bag of variables employed in a purely post hoc descriptive enterprise. Although each of the factors identified in the broad version may shape the relative ease of attack and defense, a laundry-list explanation is not intuitively appealing. The outbreak of violence in any single case results from an inevitably complex set of opportunities and constraints, motives and goals, and decisions and actions. A more interesting theoretical issue, however, is whether there is something about military technology itself that affects the likelihood of war and peace.

**How Does Technology Affect the Offense-Defense Balance?**

What are the criteria used to identify how technology gives a relative advantage to offense or defense at any given time? Without such coding criteria, we have no theoretical guidance for judging which factors contribute dispro-

portionately to offense or defense on the battlefield and, thus, cannot determine the offense-defense balance. Proponents have struggled to provide objective and consistent criteria for distinguishing between offensive and defensive technologies. The few explicit discussions of differentiation criteria have often been supported by ambiguous arguments or contradictory examples.

Despite the high degree of confusion, there appears to be at least some consensus that mobility innovations favor offense, whereas firepower innovations favor defense. Not all offense-defense proponents make these claims, and the large majority who do would not argue that these are concrete laws of military history. Nevertheless, the mobility and firepower criteria are the most useful, clearly articulated, and frequently employed hypotheses.

HYPOTHESIS 1: MOBILITY-ENHANCING TECHNOLOGIES FAVOR OFFENSE
Almost all proponents of offense-defense theory believe that new or improved technologies that enhance mobility contribute relatively more to offense than defense. In military terms, mobility is the ability of troops and equipment to


15. Given the prominence and influence of offense-defense theory, the paucity of coding criteria is remarkable. For example, Jervis was pessimistic about the ability to define in theory or identify in practice the offense-defense variables that shape the severity of the security dilemma, and it is difficult to find any coding criteria in his seminal piece on offense-defense theory. Jervis, “Cooperation under the Security Dilemma.” Similarly, Van Evera states that “military technology can favor the aggressor or the defender,” but provides no criteria for deciding the issue anywhere in his book. Van Evera, Causes of War, p. 160. Charles Glaser and Chaim Kaufmann provide the most explicit discussion in Glaser and Kaufmann, “What Is the Offense-Defense Balance? “For a review and critique of attempts to classify the technological characteristics of offense and defense, see Keir A. Lieber, “Offense-Defense Theory and the Prospects for Peace,” Ph.D. dissertation, University of Chicago, forthcoming, chap. 2.

move from one place to another. There are essentially three types of mobility: strategic, operational, and tactical.

Strategic mobility is the ability to transport military forces from the homeland to a theater of operations, or from one theater to another. Offense-defense theorists argue that greater strategic mobility allows the attacker to expeditiously transport and supply its forces far from its own borders, thus negating the defender’s geographic advantage. Operational mobility is the ability to move forces within a theater. According to proponents, greater operational mobility allows the attacker to concentrate forces quickly to achieve a numerical advantage on a small portion of the front, rapidly exploit weak points in a defender’s line, or outflank a defender’s position altogether. Tactical mobility is the ability to move forces on the battlefield, in the face of enemy fire. Offense-defense proponents argue that greater tactical mobility reduces the number of casualties suffered by an attacker because these losses are partly a function of the amount of time that forces are exposed to enemy fire in an assault.

There are several counterarguments to the mobility-favors-offense explanation. First, in terms of strategic mobility, it is not clear why the ability to transport and supply forces far from the homeland gives an attacker an advantage over a defender who already has this capability. Once an attack is under way, in fact, the defender depends more than the attacker on the ability to quickly move forces to that theater. Moreover, the impact of strategic mobility appears indeterminate when the defender relies more heavily than the attacker on reinforcement from overseas territories and allies. Second, in terms of operational mobility, the attacker depends more on the element of surprise than on mobility to achieve a successful breakthrough of a defender’s front line, whereas the defender places a premium on mobility to reinforce threatened points in the front. Unless a breakthrough, penetration, or envelopment occurs so rapidly that the defender never has a chance to react and counterattack, the defender would also seem to profit more from mobility once an advance penetration is under way. Third, greater tactical mobility may be more advantageous to the defender than the attacker in several ways. Tactical mobility allows defenders to trade space for time through a series of tactical withdrawals to fortified positions where they can continue to fire on attacking forces. In addition, greater offensive tactical mobility may actually increase

attacker casualties, as the greater speed of an assault often comes at the price of reconnaissance, protection, and preparatory artillery fire.\textsuperscript{19} Finally, tactical mobility is advantageous for the defender because the defender often must seize the tactical counteroffensive to avoid defeat.

**HYPOTHESIS 2: FIREPOWER-ENHANCING TECHNOLOGIES FAVOR DEFENSE**

The other plausible criterion for assessing the offense-defense impact of new military technologies is the characteristic of firepower. Firepower is a measure of the destructive power of the weapons or array of weapons available to sides in a conflict. Firepower consists of not only explosive power, but also range, accuracy, and rate of fire.

According to most proponents, technological innovations that enhance firepower capability are disproportionately advantageous to the defense.\textsuperscript{20} First, firepower allows the defender to threaten the attacker’s concentration of forces before an attack. An attacker typically needs a local advantage of combat power to pierce the defender’s forward defenses. Numerical superiority requires density; but the greater density of forces provides more targets for defensive fire, and thus more attacker casualties. Second, firepower favors defense because it reduces the mobility (i.e., offensive power) of the attacker. In the face of greater defensive fire, an attacker must seek more armored protection, cover, concealment, and dispersal—all of which slow the attacker’s advance. Finally, defensive firepower forces the attacker to provide its own covering fire in the advance, which slows the attack because of added weight and time required to reposition covering fire.

There are several reasons to believe, however, that firepower is as crucial in the attack as it is in defense. The attacker relies heavily on suppressive or covering fire to neutralize or inhibit defender forces, weapons, or reconnaissance. Suppressive fire by an attacker reduces the amount of fire faced by advancing forces and can pin down defender forces until they can be overrun and destroyed. More important, most successful offensives require preparatory bombardments before the attack. Preparatory barrages can shatter the morale of defenders, destroy defensive positions, and disrupt defender reinforcements and communication. Finally, just as the defender uses firepower to disrupt


\textsuperscript{20} The most clear-cut logic behind the firepower hypothesis is found in Glaser and Kaufmann, "What Is the Offense-Defense Balance?" p. 64.
attacker concentrations of forces before an attack, the attacker depends on firepower to disperse defender forces into greater depth away from the frontline. Because firepower, especially artillery, does the greatest damage to forces that are grouped together, dispersal is the wisest option. When a defender disperses, however, the force-to-force ratio shifts in the attacker’s favor, making offensive breakthroughs more likely.

Mobility, Firepower, and International Security

The mobility and firepower criteria, whatever their logical weaknesses, provide a clear blueprint for case selection and empirical evaluation of offense-defense theory. I consider the four biggest technological innovations in mobility and firepower in modern history: railroads, the artillery and small arms revolution, tanks, and nuclear weapons.21 In each case, I focus on two questions. First, what impact did the innovation have on military outcomes? The relevant issue is whether a mobility innovation shifted the offense-defense balance toward offense, resulting in more quick and decisive victories for the attacker, or whether a firepower innovation shifted the balance toward defense, resulting in longer, indecisive battles of attrition. Second, what impact did the innovation have on political outcomes? Here we need to ask if and how decisionmakers thought about these revolutionary innovations in offense-defense terms and whether these perceptions made war more likely. Specifically, did leaders believe that the attacker or the defender was privileged by the innovation? Were leaders more inclined to initiate war when they believed offense was favored?

EMERGENCE OF RAILROADS

The introduction of steam-powered railroads in the second half of the nineteenth century perhaps marked the greatest revolutionary development in military mobility since the wheel. Armies were suddenly able to move and sustain huge forces across vast distances at up to ten times the speed of marching troops. The first practical locomotive appeared in 1825, railroads spread rapidly across the European continent in the 1830s and 1840s, and by

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1850 all the major powers had conducted field exercises in moving and supplying troops by rail.22

**Military outcomes.** The advent of railroads coincided with several relatively short and decisive conflicts between 1850 and 1871, and thus would appear to support the hypothesis linking mobility improvements with offensive advantages. A closer look at the evidence, however, reveals that these battlefield outcomes resulted primarily from large asymmetries in power and skill, rather than from the offensive advantages of railroads. Moreover, although no wars occurred among the European great powers between 1871 and 1914, World War I suggests that railroads if anything favored the strategic defender.

In 1850, in one of the earliest strategic uses of railroads, Austria quickly mobilized and transported 75,000 soldiers by rail to Bohemia, forcing Prussia to back down in an escalating crisis. Prussia had a small rail network and poor administrative organization at the time, however, and bungled its own mobilization to the front.23 The war between Austria and France in northern Italy in 1859 saw the large-scale use of railroads for strategic concentration, operational reinforcement, and even tactical movement of troops. The French were able to deploy 120,000 soldiers in eleven days and, once in the theater of conflict, use railroads to quickly and unexpectedly shift forces to defeat the Austrians. In this case, however, the Austrians were guilty of incompetent preparation, mobilization, and transportation, and probably would have been defeated by the French even in the absence of rail transport.24

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22. Some proponents of offense-defense theory view the railroad case as an exception to the mobility-favors-offense prediction. They argue that railway mobility is more useful for defenders because rail networks can be destroyed by retreating defenders more easily than they can be extended by advancing attackers. Van Evera, "Offense, Defense, and the Causes of War," pp. 16–17; Glaser and Kaufmann, "What Is the Offense-Defense Balance?" p. 63; and Quester, *Offense and Defense*, chap. 8. This remains an important test case, however. First, according to the general logic employed by proponents, railroad mobility should favor offense at the strategic level, where the attacker can more quickly concentrate forces at the front to surprise and/or overwhelm the defender. Second, our confidence in the mobility-favors-offense hypothesis would be considerably diminished by an empirical finding that railroads actually favored defenders on the whole, given that railroads marked such a revolutionary improvement in mobility. Finally, even if military outcomes demonstrate the defensive advantages of railroads, we can still evaluate offense-defense theory based on how leaders’ perceptions of the impact of railroads affected their behavior.


Prussia’s quick and decisive victories in the Wars of German Unification—against Denmark (1864), Austria (1866), and France (1870–71)—have commonly been attributed to the offensive power of the Prussian railroads. In fact, railroads had much less impact on the conduct of these wars than did Prussia’s superior doctrine, organization, and material power.

Against Austria, the Prussian attackers made extensive use of their railways to mobilize and transport an unprecedented 200,000 troops to the theater of operations within three weeks. But after initial deployments, the Prussians ran into great trouble supplying and sustaining their offensive beyond the railheads. Prussian forces quickly outran their supply convoys, leaving food and fodder rotting at hopelessly congested railheads. From the crossing of the Austrian border to the decisive battle of Königgrätz, railways were irrelevant to the outcome of the war.\textsuperscript{25}

The Austrians were decisively defeated by Prussia because of crucial asymmetries in power and skill, not because of the inherent offensive power of railroads. The Austrians had only one major railroad line leading into the theater of war, while Prussia had five. Because of this superior railway network, as well as the excellent planning of the Prussian general staff, Prussia was able to mobilize and deploy more battle-ready troops to the field than the Austrians. The rapid Austrian defeat was also facilitated by the technical edge of the Prussian infantry’s breech-loading rifle compared to the Austrian muzzle-loader, and Prussia’s superior doctrine of maneuvering forces to assume the tactical defensive to take advantage of modern firepower.\textsuperscript{26}

The Franco-Prussian War reveals a similar story, though in this case the planned French offensive was defeated quickly and decisively. The French mobilization and concentration of forces was utterly incompetent, despite its strategically superior rail network, and was the single most important cause of France’s defeat. Although Prussia’s mobilization of roughly 400,000 troops by railroad was organized and efficient, the concentration of their forces on the French frontier was relatively inept. These problems exposed the Prussians to potential defeat by a better organized and capable defender.\textsuperscript{27}

\textsuperscript{25} Martin van Creveld, \textit{Supplying War: Logistics from Wallenstein to Patton} (London: Cambridge University Press, 1977), pp. 83–85; and Pratt, \textit{Rise of Rail-Power}, pp. 104–105. Ironically, the unexpected Prussian freedom of movement created by the need to live off the land instead of depending on supplies from railheads helped them win a decisive victory. Westwood, \textit{Railways at War}, p. 57.


After the initial deployment of forces, railroads played virtually no important role in the Prussian offensive into France. The extended railway lines were jammed with traffic and vulnerable to French attacks, the railheads could not keep up with the advancing forces, and the Prussians faced enormous difficulties in getting supplies from the railheads to the front. The heavy artillery, ammunition, and forces conveyed by railroads did make possible the siege and bombardment of Paris, but this occurred well after the decisive mobile phase of the campaign was over. Other sharp disparities in military skill and capability compounded France’s dismal performance, including the French army’s flawed command and staff system, lack of reserves, and unsuitable tactical doctrine of massed frontal attacks against the Prussian Krupp steel, rifled, breech-loading artillery.

The American Civil War (1861–65) offers additional evidence that railroad mobility had not shifted the balance toward offense. The control of railroads was crucial for both Union and Confederate forces given the vast territorial scale of military operations. At critical times, both sides used railroads to concentrate forces at strategic points to hold off enemy offensives. Although Union forces also often relied on long rail lines for communications and supplies as they advanced deep into the South, railroads were on balance more useful for the Confederates fighting on the strategic defense. Outnumbered and outgunned, the Confederates depended on rapidly concentrating separated forces against key segments of the Union army. Railroads prolonged the Civil War and made it more difficult to fight quick and decisive campaigns.

The impact of railroads in World War I clearly contradicts the mobility-favors-offense hypothesis. By the time of the war, all sides in the conflict had a good understanding of railroad technology, had adopted appropriate doctrines for its use, and had a generally equal level of skill in its employment. At the outbreak of war, railroads moved soldiers, weapons, and supplies at an

unprecedented pace and scale. The enhanced strategic mobility conferred by the railroad did not translate, however, into quick and decisive battlefield outcomes, as was demonstrated by the French use of railroads to shift resources to halt the Schlieffen Plan, the initial German offensive, and the German use of railroads to shift forces from the western to eastern front to defeat the Russian offensive.31

**Political Outcomes.** Railroads did not confer an advantage on the attacker. Did political and military leaders believe and act as if they did?32 In fact, the historical record flips the standard offense-defense hypothesis on its head. Conventional wisdom between 1850 and 1871 (when wars were more frequent) held that railroads favored the defender, while the dominant view after 1871 (when wars were infrequent) held that railroads favored the attacker.

By the mid-nineteenth century, although some commentators warned that the building of railroads would only facilitate a foreign invasion of the homeland, the prevailing military view was that railroads would favor the defender by greatly improving the defender’s ability to shift troops to counter any threatened sector of the frontier. Theoretical writings, most notably by the economist Friedrich List, even surmised that the defensive advantages of railroads would bring perpetual peace to the European continent.33

Military leaders in Prussia, which was surrounded by potential enemies, were especially quick to see the defensive benefits of railroads. Helmuth von Moltke, chief of the general staff beginning in 1857, thought that Prussia would eventually be attacked and believed that the defensive mobility provided by an extensive network of railroads could counterbalance Prussia’s disadvantage in sheer number of forces.34 After building such a comprehensive railway network, and despite the perception that railroads favored the defender, Prussia promptly provoked three wars in less than a decade, waging some of the most decisive offensive campaigns in history. In fact, it was largely because the railroad made the defense of Prussian territory easier—that is, troops could be deployed rapidly from the center to any front or redeployed from front to front—that Prussia was able to act aggressively toward its neighbors.

32. Some offense-defense proponents claim that while actual offense dominance has been rather rare, “perceived offense dominance is pervasive, and it plays a major role in causing most wars.” Van Evera, *Causes of War*, p. 185.
34. Van Creveld, *Supplying War*, p. 88; and Showalter, *Railroads and Rifles*, pp. 18, 28, 43, 56.
After the Franco-Prussian War, every state in Europe quickly concluded that railroads favored the attacker and strove to copy Prussian institutions for the use of railways. All the European general staffs believed that quick and decisive victory would come to the side that mobilized and concentrated its troops the fastest, and the railroads were thought to provide the key. Despite the new dominant view that railroads favored the attacker, however, no war occurred on the continent for the next forty years.

**SMALL ARMS AND ARTILLERY REVOLUTION**

A technical revolution occurred in the late nineteenth and early twentieth centuries with the development of rifled, breech-loading small arms and artillery of unprecedented range, accuracy, and rate of fire. The combined effect was an enormous increase in firepower that armies could bring to bear on the battlefield.

**MILITARY OUTCOMES.** The firepower revolution rendered massed frontal assaults exceedingly difficult, and many conflicts were marked by costly battles of attrition. On balance, therefore, it is fair to say that the new technologies shifted the offense-defense balance toward the defender.

As early as the Crimean War (1854–56), rifles showed the potential to be highly effective defensive weapons against attacking infantry. But the American Civil War, Wars of German Unification, Russo-Turkish War (1877–78), Anglo-Boer War (1899–1902), Russo-Japanese War (1904–05), and World War I provide the best evidence that defenders armed with modern rifles, machine guns, and artillery had gained an enormous advantage against assaulting infantry.

The defensive advantage conferred by firepower has often been exaggerated, however. Two sets of evidence are notable. First, the tactical impasses created by firepower technologies did not necessarily translate into strategic or operational deadlock. The clearest example is the Prussian method of using strategic envelopment and flanking maneuvers to place forces where they could employ tactical defensive firepower against the enemy rear or flank. This fusion of the strategic offensive with the tactical defensive contributed to Prussia’s quick and decisive victories against Austria in 1866 and France in 1870–71. In the

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American Civil War, Union forces were able to bring the war to an end more quickly when they learned to employ a strategic offensive/tactical defensive doctrine in pursuit of the Confederates.\(^{37}\) In fact, every major war between 1861 and 1905 was ultimately decided by strategic offensive maneuvers.\(^{38}\) In World War I, the Schlieffen Plan was modeled on earlier Prussian victories and almost succeeded—recall the French “miracle on the Marne.”

A second reason to question the degree to which technology favored defense in this period was the success of the Germans and then the Allies in carrying out a series of offensive breakthroughs in the later stages of World War I using innovative infantry and combined arms tactics. As far back as the American Civil War, infantry learned with some success to break up from waves of attacking troops into small groups that alternated advancing with providing covering fire while others moved forward. But it was the German army’s decision in 1917 to introduce new “infiltration tactics” that provided a real tactical solution to the stalemate of trench warfare. These tactics called for a brief surprise artillery bombardment aimed at disrupting narrow weak points in the enemy line, followed by the quick penetration by small independent groups of storm troops who were to bypass points of strong resistance and advance as far as possible. The Germans employed infiltration tactics with great success in late 1917 and, especially, in the spring of 1918 with the famous Ludendorff offensives.\(^{39}\) Despite no major changes in technology, the Ludendorff offensives achieved significant and unprecedented breakthroughs followed by deep advances behind the Allied lines.\(^{40}\) These offensives, of course, ultimately failed on the strategic level, as the Germans lacked the transportation and logistical capabilities necessary to follow up on their tactical successes, but the Allies adopted similar tactics in their own offensives until the end of the war.

Massed frontal assaults in the face of modern firepower were clearly not the optimal method of attack, but it is impossible to say whether warfare would

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have looked drastically different had infiltration tactics been introduced earlier in World War I. At a minimum, the German offensives suggest that the defensive advantage of firepower was not as intrinsic to the prevailing technology as is often portrayed.

**Political outcomes.** In the decades before World War I, according to offense-defense proponents, European statesmen and military leaders erroneously believed that attackers would benefit most from the vast increases in firepower, and wars would thus be short and decisive. This “cult of the offensive,” proponents argue, was a principal cause of World War I.41

Europeans did embrace offensive strategies before World War I, but this had little to do with beliefs in the offensive advantages of technology. Instead the dominant preference for offensive strategies sprung from a host of organizational, social, political, and psychological causes. Rather than address these causes of the cult of the offensive, which have been well documented,42 I focus here on whether perceptions of the nature of the firepower revolution dampened or promoted conflict.

Prussian leaders were aware of the defensive impact of firepower before initiating the Wars of German Unification. As early as 1858, Moltke argued that any potential enemy should be forced by maneuver into taking the tactical offensive against Prussian defensive firepower.43 After the costly attacks by his forces against Denmark in 1864, Moltke concluded that in the age of the breech-loading rifle, no combination of bravery and superior numbers could overcome the problem of attacking frontally over open ground against modern firepower. “The attack of a position,” Moltke wrote in 1865, “is becoming notably more difficult than its defense.”44 This view of the

42. Van Evera, “Cult of the Offensive”; and Snyder, *Ideology of the Offensive*.
44. Quoted in Showalter, *Railroads and Rifles*, p. 125. Prussian military instructions and training manuals reflected this belief as well.
increased power of the defense did not dissuade Prussia from initiating war with Austria in 1866 and France in 1870. Instead, Moltke adopted an offensive strategy that sought to capitalize on the firepower of a tactical defensive.

Even after the spectacular offensive successes by Prussia, no country denied the impact of firepower. Technical arguments that improvements in firepower had benefited offense over defense did appear, but were mainly promulgated to justify offensive doctrines already deemed necessary for political and organizational reasons. In short, perceptions of the offensive advantages of firepower did not lead states to adopt offensive strategies; rather, the bias in favor of offensive strategies made military thinkers concentrate on ways to use firepower in the attack.

Germany’s role in the outbreak of World War I contradicts offense-defense predictions. German military leaders evaluated the technical realities of firepower more objectively than all other European general staffs at the time, and thus were fully aware of the increased power of the defense. Yet Germany’s war plan since 1891 consistently called for a decisive offensive envelopment against France before rapidly shifting forces against Russia. Neither Alfred von Schlieffen, his successor Moltke (the younger), nor Germany’s civilian leaders envisioned that conquest would be easy. Germany’s geostrategic position, combined with its foreign ambitions, demanded a quick and decisive victory at the outset of an expected two-front war.

Offense-defense predictions about European security between 1890 and 1914 face other major anomalies. Consider Stephen Van Evera’s claim: “Belief in the power of the offense increased sharply after 1890 and rose to very high levels as 1914 approached. . . . [This belief] peaked in 1914 in Europe, and Germany had the largest offensive opportunities and defensive vulnerabilities among Europe’s powers. Offense-defense theory therefore forecasts that war should erupt in Europe in about 1914, authored largely by Germany.”

Note first that if war broke out in 1890, 1905, or 1912, Van Evera could still make the same claim of theory validation because beliefs in offense were steadily rising and thus potentially always “peaking.” Second, if offense was

45. According to one historian, “nobody was under any illusion, even in 1900, that frontal attack would be anything but very difficult and that success could be purchased with anything short of very heavy casualties.” Michael Howard, “Men against Fire: Expectations of War in 1914,” International Security, Vol. 9, No. 1 (Summer 1984), p. 43.
46. See Rothenberg, “Moltke, Schlieffen, and the Doctrine of Strategic Envelopment.”
47. Van Evera, Causes of War, pp. 193, 199, n. 25.
perceived to have had an advantage since 1890 (if not since 1871), why did war not break out in 1890, 1905, or 1912? Germany’s alleged belief in the technical supremacy of the offensive, combined with its sheer military advantage over a weakened France and Russia, ought to have led it to attack France in 1905 or Russia in 1909, when Germany faced real windows of opportunity. Moreover, if the technological revolution in firepower was thought to favor offense, why did no real competitive arms racing on land occur before 1912? In short, offense-defense theory does not appear capable of explaining the outbreak and timing of World War I.

TANKS
The character of land warfare was transformed by the mechanization and motorization of armies from the end of World War I through World War II. The most important military innovation in this period was the tank. The combination of technological advances in the internal combustion engine, armored protection, and radio communication greatly increased operational mobility on the battlefield.

Military outcomes. Proponents of offense-defense theory believe that the incorporation of tanks into the European armed forces resulted in greater offense dominance. In World War I and the interwar period, however, tanks had a negligible affect on operational outcomes. In World War II, the most relevant evidence does not show the offensive superiority of tank forces.

In World War I tanks occasionally contributed to tactical breakthroughs and penetrations, but ultimately could not translate any tactical successes into operational victories. In fact, the most spectacular breakthroughs of the war, such as the 1918 Ludendorff offensives, were made possible by new infantry tactics, not tanks. The wars fought between 1919 and 1939 were primarily

either civil wars or colonial conflicts, and involved unevenly matched adversaries or forces that were not well equipped with tanks. When tanks were used in battle, as in the continuing French effort to extend control over Morocco (1908–34), the Italian war against Ethiopia (1935–36), the Spanish Civil War (1936–39), and the Russo-Japanese border clashes in Manchuria (1938–39), the results were not illuminating.\footnote{See Archer Jones, *The Art of War in the Western World* (New York: Oxford University Press, 1987), pp. 497–507; and Addington, *Patterns of War*, pp. 191–194.}

The revolutionary potential of the tank was first demonstrated by Germany’s rapid envelopment of Polish forces in 1939, quick and decisive defeat of France in 1940, and invasion of the Soviet Union in 1941. These campaigns offer inadequate evidence that tanks conferred a decisive advantage on the offense, however, because the victories resulted more from German material and doctrinal superiority than from the balance of military technology. In September 1939, German forces were better trained, better equipped, and far larger than the Polish army.\footnote{The German armored and motorized divisions played an important role in overwhelming the Polish frontlines and encircling Polish forces, but the German victory was a foregone conclusion, one only hastened by Polish weaknesses and mistakes. See Matthew Cooper, *The German Army, 1933–1945: Its Political and Military Failure* (New York: Stein and Day, 1978), pp. 169–176; B.H. Liddell Hart, *History of the Second World War* (New York: G.P. Putnam’s Sons, 1971), pp. 27–32; and Jones, *Art of War*, pp. 508–509.}

The root cause of the German victory over France lies with Germany’s far superior strategy, tactics, and organization, rather than in the nature of its military hardware.\footnote{The German armored forces were neither more numerous nor technically superior to Allied forces. In fact, the Allies possessed a slight numerical advantage in tanks (at a ratio of 1.3 to 1) and manpower (1.2 to 1). Barry Watts and Williamson Murray, “Military Innovation in Peacetime,” in Murray and Millett, *Military Innovation in the Interwar Period*, pp. 372–373.}

It is highly unlikely that Germany could have achieved its stunning offensive in France if not for glaring Allied weaknesses and if the Allies had been more adept at using armored forces.\footnote{For the ledger of German strengths and Allied weaknesses, see Jones, *Art of War*, pp. 510–544; Larry H. Addington, *The Blitzkrieg Era and the German General Staff*, 1865–1941 (New Brunswick, N.J.: Rutgers University Press, 1971), pp. 101–123; Cooper, *The German Army*, pp. 214–215; Liddell Hart, *History of the Second World War*, chap. 7; and Robert Allan Doughty, *The Breaking Point: Sedan and the Fall of France, 1940* (Hamden, Conn.: Archon, 1990), chap. 1.}

The German invasion of the Soviet Union was enormously successful, as panzer and motorized divisions achieved spectacular encirclements of entire Soviet armies. Once again, however, the key to German success lay in Josef Stalin’s blunders and Red Army failings.\footnote{On the Red Army’s deficiencies on the eve of the war, see Alan Clark, *Barbarossa: The Russian-German Conflict, 1941–45* (New York: William Morrow, 1965), chap. 2.}
The best evidence with which to evaluate the offense-defense impact of tanks comes from military operations later in World War II, when all sides in the conflict had become relatively adept at armored warfare. The most pertinent period is from operations on the eastern front in the winter of 1943 through the final German offensive on the western front at the end of 1944. By the winter of 1943, after two years of painful lessons, the Russians had developed the necessary organizational and doctrinal expertise to conduct offensive and defensive armored warfare at a reasonably proficient level. After 1944 the impact of tanks on the offense-defense balance was eclipsed by the sheer imbalance of material power between Germany and its adversaries.

The evidence from this period demonstrates that the mobility conferred by tanks did not favor offense. After the Russian encirclement of an entire German army at Stalingrad in late 1942, the Soviets went on the strategic offensive, and the Germans fell back on a fundamentally defensive strategy. Time after time, however, the German army relied on its armored forces to halt and defeat major Soviet offensives. German army doctrine regarded speed, mobility, and counterattack to be the decisive elements of defense, and tanks provided the perfect tool. The Germans discovered early on that the best way to defeat a Soviet armored penetration was by immediate counterattack with tanks against the flanks of the spearhead. Thus, as one panzer general noted, “the armored divisions, originally organized as purely offensive formations, had become [by early 1943] the most effective in defensive operations.”

The power of a tank-oriented defense was best displayed by Field Marshal Erich von Manstein’s operations against major Soviet offensives in southern Russia and the Ukraine from January to March 1943. Though lacking the forces necessary to fight a true mobile defense, Manstein allowed Soviet penetrations in some sectors, ordered stubborn positional defense in a few other sectors, and rapidly shifted and assembled panzer units for counterattacks against the most threatening breakthroughs. Against a numerical balance of seven to one, Manstein stabilized the southern front and prematurely ended the Soviet winter offensives. Mobile armored units proved uniquely suited for these delicate and demanding defensive operations.

58. These operations are particularly informative because they were conducted largely free of Hitler’s rigid no-retreat policy, which elsewhere prevented the German army from conducting a
The Germans were not alone in using the inherent mobility of tank forces to stop enemy armored offensives. The final German strategic offensive of the war on the eastern front aimed at pinching off and destroying the Soviet forces in the Kursk salient in July 1943. This was a far more limited goal than the deep penetrations and multiple encirclements of the earlier German offensives, but Hitler intended to use the same successful formula of massing tanks for a lightning blow against the Red Army. The battle of Kursk, the greatest armored battle in history, was indeed a quick one, but resulted in a clear and decisive victory for the defender. The German armored spearheads were rapidly worn down by antitank defenses and then crushed by the Soviet armored reserves. The defeat marked the first time a German offensive had been halted before it could break through enemy defenses into the strategic depths beyond.

After Kursk, Germany was pushed back along a broad front in an unrelenting series of Soviet offensives. Despite facing a growing numerical imbalance in forces with a deteriorating army, the Germans fought a skillful withdrawal, shuttling dwindling armored reserves back and forth for effective counterattacks on Soviet armored breakthroughs. The war ended on the eastern front with the Russians never having conducted any large strategic encirclements comparable to the German victories of 1939 to 1941.

The war on the western front provides generally less suitable evidence for exploring the offense-defense impact of tanks, primarily because of the Allied preponderance of power. In December 1944 Hitler launched his last major offensive of the war in the Ardennes forest. The German armored spearheads penetrated deep into the allied rear before they were halted by skilled armored

flexible, maneuver-oriented defense to which it was best suited and which would have been more effective against Soviet armored offensives. For detailed accounts of these operations, see David M. Glantz, From the Don to the Dniepr: Soviet Offensive Operations, December 1942–August 1943 (London: Frank Cass, 1991); Erich von Manstein, Lost Victories (Novato, Calif.: Presidio Press, 1982), F.W. Von Mellenthin, Panzer Battles (New York: Ballantine, 1956); and Wray, Standing Fast, pp. 155–164.

61. For an account of these counterattacks, particularly in November and December 1943, see ibid., pp. 174–175.
62. There are, however, some noteworthy instances of failed attempts to emulate the armored offensives of 1939 to 1941. For example, Operation Cobra (the Allied breakout from Normandy in July and August 1944) saw armored breakthroughs and deep penetrations, but the Allies were unable to encircle the bulk of the German forces, mainly because the tank forces had to operate in close conjunction with supporting infantry, artillery, and air forces to avoid destruction by other tanks and antitank forces.
(and tactical air) maneuvers and counterattacks on the flanks of the German bulge. In sum, the evidence suggests that the spectacularly successful armored offensives from 1939 to 1941 were an aberration not to be repeated against opponents skilled at armored warfare.

**Political Outcomes.** Did a belief in the offensive superiority of tanks contribute to the outbreak of World War II? Adolf Hitler may have been undeterrible, of course, but we may still be able to assess whether his eagerness to take the offensive was influenced by perceptions of the mobility-enhancing potential of tanks. Offense-defense proponents claim that Hitler was more willing to attack his neighbors in 1939–41 because he believed offense was dominant. In particular, proponents argue that Hitler’s decision to attack the Low Countries and France in May 1940 (instead of in the fall of 1939 and winter of 1940) can be explained by his recognition that armored forces, combined with the *blitzkrieg* doctrine, had greatly strengthened the offense.63

The interwar period witnessed a tremendous debate about how tanks should be integrated into the armed forces, but few experts concluded that tanks would have a revolutionary impact on warfare. In the 1920s a small group of British military thinkers led by Major-General J.F.C. Fuller and Sir Basil Liddell Hart argued that the inherent mobility of tanks could restore offensive superiority to the battlefield. British experiments with armor never lived up to expectations, however, and by the mid-1930s Fuller and Liddell Hart had lost their enthusiasm for tanks as revolutionary offensive weapons.64

From the end of World War I through the attack on Poland in September 1939, few German leaders perceived the operational or strategic significance of tanks. In the 1920s the German army had returned to its traditional military doctrine of seeking quick and decisive victories through highly mobile offensive warfare.65 Most Germans, nevertheless, discounted the combat potential of tanks based on their experience in World War I, where tanks were seen to have a “moral effect” on unprepared troops but could be easily defeated by countermeasures.66

63. Van Evera, *Causes of War*, pp. 123, 175, 177.
65. See Cooper, *The German Army*.
A myth persists that during the 1930s the German army developed a new doctrine of warfare—the blitzkrieg—based on the revolutionary potential of armored forces to achieve a quick and decisive victory for the attacker, which they then employed with great success in 1939–41.\textsuperscript{67} It is true that Heinz Guderian, a captain and then general in the German army, was the driving force behind the development of tank forces and leading advocate of the idea of using large, independent armored formations to break through the enemy’s front and conduct deep strategic penetrations. Guderian’s ideas, however, met with much skepticism, resistance, and outright subversion by the senior leaders of the army throughout the 1930s.\textsuperscript{68} After all, the German attack on Poland was based not on a blitzkrieg strategy, but on the traditional German strategy of a combined-arms attack on the flanks in search of a decisive envelopment of enemy forces. Hitler eagerly attacked Poland absent any revelations of the offensive power of tanks.

Hitler was not deterred from attacking France in late 1939 and early 1940, and planned to do so without any new model for employing tanks. At the conclusion of the Polish campaign, Hitler met with his military commanders and announced that he had decided to attack in the west as soon as possible. The operational plan drawn up by the German army and endorsed by Hitler in October 1939 called for an attack through the Netherlands, Belgium, and Luxembourg to defeat as much of the French and Allied forces as possible and to capture a large portion of the English Channel coast for subsequent operations against Britain and the remainder of French territory. German military leaders, as well as Hitler himself, realized that this plan could achieve only a limited territorial objective and would probably lead to a war of attrition. Most important, Hitler did not believe that tank forces offered the potential for a decisive victory.\textsuperscript{69}

Despite Hitler’s own reservations, and the determined opposition of the German military leadership, he gave his full approval to the plan to attack in the west and fixed November 12 as the date for the beginning of the offensive. This attack was postponed because of poor weather conditions, as were a series

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of rescheduled offensives through December. A final date for the attack was
set for January 17, 1940, but on January 10 a German plane carrying secret
documents relating to the offensive was forced to land in Belgium, thus com-
promising German intentions. The unlikely sequence of weather delays, the
plane crash, and the onset of winter forced Hitler to postpone his attack until
the spring of 1940 and made drastic operational changes more attractive. Hitler
eventually accepted an alternative plan of concentrating panzer forces for a
surprise attack through the Ardennes.\textsuperscript{70} In sum, the evidence of German
planning and decisionmaking before World War II indicates that the political
decision to initiate military conflict preceded any perceptions of the great
offensive potential of tank technology.

NUCLEAR WEAPONS
Proponents of offense-defense theory argue that the nuclear revolution
strongly shifted the offense-defense balance toward defense.\textsuperscript{71} The case of
nuclear weapons is unique, of course, and the traditional concepts of offense
and defense do not translate easily from the conventional to the nuclear level.
Moreover, the coding of nuclear weapons as defense dominant flows from a
more complicated logic than the enhanced-firepower criterion. These differ-
ences notwithstanding, offense-defense theory offers a valid explanation for
nuclear defense dominance and yields concrete and testable predictions about
the political effects of nuclear weapons.

MILITARY OUTCOMES. The impact of nuclear weapons on battlefield out-
comes must be based on logical deduction, not empirical evidence. According
to offense-defense proponents, when all sides in a conflict possess a secure
second-strike nuclear capability (i.e., when no side can launch an attack that
is successful enough to prevent retaliation from the other), the defender has
an enormous advantage over the attacker. This conclusion is counterintuitive
and requires clarification because under conditions of mutual assured destruc-
tion (MAD), no side can defend against a nuclear attack, strictly speaking.

Offense-defense theory codes nuclear weapons as defense dominant because
it is relatively easier and less costly for states to maintain a retaliatory capabil-

\textsuperscript{70} Some argue that even the attack launched in May 1940 was based on essentially traditional
operational principles and methods, and was not motivated by the belief that armored forces had
transformed warfare. See Harris, \textit{The Myth of Blitzkrieg}; Cooper, \textit{The German Army}; J.P. Harris
and F.H. Toase, \textit{Armoured Warfare} (New York: St. Martin’s, 1990), pp. 64–69; and Doughty, \textit{The
Breaking Point}, p. 323.

\textsuperscript{71} Robert Jervis, \textit{The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon}
(Ithaca, N.Y.: Cornell University Press, 1989), chap. 1; Charles L. Glaser, \textit{Analyzing Strategic Nuclear
ity than to build a force capable of taking away another’s retaliatory capability. States are thus deterred from attacking one another in a nuclear world; and deterrence is the functional equivalent of defense. The theory essentially aims to explain when states feel secure and when they do not or, alternatively, when they can deter attacks and when they cannot. When states rely on deterrence for their security, forces that enhance deterrence are essentially defensive. In a world of conventional arms, deterrence becomes easier as the defender is increasingly capable of denying territorial gains to the attacker. In the nuclear world, deterrence rests on the defender’s ability to punish the attacker with unacceptable costs for attempted aggression. The only way to take territory at an acceptable cost in the nuclear world is by eliminating the defender’s second-strike capability. This is very difficult to do, however, because it is much easier to enhance one’s own deterrent forces than to strengthen forces that threaten an adversary’s deterrent forces.\(^\text{72}\) Thus nuclear weapons favor the defender by greatly improving the ability to deter by punishment.

**Political outcomes.** The consequences of nuclear warfare in a MAD world are easy to comprehend and extremely difficult to change. Large and drastic shifts in the offense-defense balance, such as has occurred with the nuclear revolution, should have significant effects on international politics. The most fundamental prediction of offense-defense theory is that war among nuclear powers should not occur. The theory makes two additional predictions that can be evaluated against the historical record: arms racing beyond robust MAD levels should not occur, and security competition over distant territory should not be intense.

First, consider the no-war prediction. According to offense-defense theory, the prospect of devastation in a nuclear conflict is enough to deter even the most highly expansionist country, and the robust security provided by nuclear weapons virtually eliminates fears that might lead status quo states to launch preventive or preemptive wars. In short, the implausibility of obtaining military victory—not to mention a quick and decisive one—makes war among the nuclear powers virtually obsolete.

War among the major powers has not occurred since the introduction of nuclear weapons. Indeed, it is hard to imagine any great power armed with thermonuclear weapons and advanced delivery systems being attacked and conquered in the traditional sense. Alternative explanations for the “long

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peace” abound, however; specifically, that either bipolarity, economic integration, or political/normative changes were responsible for preventing the Cold War from becoming hot. More important, one could point to important cases that cut against the logic of the no-war prediction. For example, a state armed with nuclear weapons has been attacked (Israel in 1973), a state has intervened in a war against a nuclear power (China in Korea against the United States in 1950), and two states possessing nuclear weapons have fought each other (the major armed clashes between China and the Soviet Union in 1969). Furthermore, the military conflict between Pakistan and India, two nuclear powers, in the Kargil mountains of Kashmir in the spring of 1999 was a short war by traditional casualty measures. Nuclear weapons, nevertheless, have been a major force for preventing war.

Second, according to offense-defense theory, arms racing should not occur once states believe they have acquired the capability for assured nuclear retaliation. This prediction has both a quantitative and qualitative element. In quantitative terms, adversaries will not be too concerned with comparing the relative size of their nuclear arsenals because even large shifts in relative force levels pose little threat to the “weaker” side’s ability to retaliate and inflict unacceptable damage. The actual size of the superpower arsenals in the Cold War, however, far exceeded any reasonable estimate of the capabilities required for assured destruction or deterrence. By the early 1960s, both U.S. and Soviet leaders perceived that the United States could not effectively disarm the Soviets with a first strike. In terms of U.S. requirements for deterrence, the minimum force levels thought necessary to inflict unacceptable damage on the Soviet Union in a retaliatory strike were well in hand by 1964. By this time

76. See Jervis, “Cooperation under the Security Dilemma,” pp. 188, 198; and Van Evera, Causes of War, pp. 244-245.
78. Most analysts cite Secretary of Defense Robert McNamara’s famous criteria for an assured destruction capability developed in 1963, which assumed the United States would need about
the United States had deployed 4,718 strategic nuclear warheads on a triad of bombers, intercontinental ballistic missiles (ICBMs), and submarine-launched ballistic missiles (SLBMs), while the Soviet Union had deployed almost 800 warheads. Yet the Soviet Union had begun a massive military buildup of both nuclear and conventional forces, and the United States quickly followed with a vast increase of its own warheads. The United States deployed 6,135 deliverable warheads in 1970; 10,768 in 1980; 12,304 in 1990; and almost 7,000 in 1999—a decade after the end of the Cold War. The Soviet Union deployed 2,327 warheads in 1970; 7,488 in 1980; 11,252 in 1990; and Russia still possessed almost 5,500 warheads in 1999.79

The qualitative aspect of the no-arms-race prediction is that once states find themselves in a MAD world, they should not attempt to gain an advantage at the nuclear level by building offensive counterforce weapons (i.e., forces aimed at destroying an adversary’s strategic nuclear weapons). Possession of an assured destruction capability already provides states with a high degree of security; a first-strike advantage is virtually unattainable, impossible to maintain, and thus irrational to pursue. The evolution of U.S. and Soviet nuclear strategies from the early 1960s was characterized by a persistent interest in escaping from MAD through the deployment of sophisticated counterforce weapons systems. Both countries threatened each other’s retaliatory capabilities, aimed at limiting damage to their own forces and society, and generally sought to prevail in the event of nuclear war. In the U.S. case, policymakers declared a nuclear doctrine consistent with MAD, but actually embraced a counterforce posture and strategy.80 U.S. counterforce planning and targeting began in the late 1950s even though it was apparent that the Soviet Union would soon acquire a secure second-strike


This strategy was accelerated in the 1960s, when more than 90 percent of Soviet bloc targets in the U.S. nuclear war plan were counterforce targets. In the 1970s, despite having concluded agreements with the Soviet Union to limit strategic defense, the United States continued to enhance its counterforce arsenal by building highly accurate weapons capable of destroying hardened Soviet targets. In the 1980s, the Reagan administration took counterforce to an extreme by pursuing effective strategic defenses and offensive counterforce programs. The Soviet Union also did not regard the possession of an assured destruction capability as sufficient to maintain its security. The Soviets began to build an antiballistic missile (ABM) system around Moscow in the mid-1960s and, after signing the ABM treaty in 1972, continued to develop its strategic defense capabilities through air defense programs against bombers and civil defense efforts aimed at protecting Soviet leadership. More important, the Soviets embarked on a massive nuclear counterforce buildup that stressed heavy, accurate missiles specifically designed to destroy the U.S. ICBM force. Both the United States and the Soviet Union recognized their mutual vulnerability to nuclear destruction, but were driven by the goal of winning a nuclear war and accordingly based their nuclear strategies on robust counterforce arsenals.

A final prediction offense-defense theory makes about behavior under nuclear defense dominance is that states should not compete or fight too intensely over territory beyond the homeland or the homeland of close allies. Nuclear

83. Among other steps, the United States built Minuteman ICBMs and Polaris SLBMs, added threatening multiple independently targetable reentry vehicles (MIRVs) to its ICBMs and SLBMs, and decided to upgrade its Minuteman III ICBMs and deploy highly lethal and accurate Peacekeeper MX ICBMs, Trident D-5 SLBMs, and Pershing II medium-range ballistic missiles—all of which threatened the Soviet ability to retaliate in a nuclear exchange.
weapons devalue traditional concerns over geographic depth; in other words, buffer zones and distant bases are less important in a nuclear world because nuclear retaliation can be assured in their absence.\textsuperscript{86} In the Cold War, offense-defense theory predicts minimal intervention and competition between the superpowers in the third world: “Nuclear weapons make conquest much harder, and vastly enhance the self-defense capabilities of the superpowers. This should allow the superpowers to take a more relaxed attitude toward events in third areas, including the Third World, since it now requires much more cataclysmic events to shake their defensive capabilities. Whatever had been the strategic importance of the Third World in a nonnuclear world, nuclear weapons have vastly reduced it.”\textsuperscript{87}

Although a full exploration of the nature of U.S. and Soviet intervention and competition in the third world is beyond the scope of this article, it is fair to say that the superpowers had anything but a “relaxed attitude.” In fact, most crises between the United States and the Soviet Union occurred in the third world, as each superpower resorted to the whole range of economic, political, and military means to advance its own interests or block the influence of its rival.\textsuperscript{88} The most relevant and striking evidence is the relationship between the Soviet achievement of nuclear parity and its increased level of intervention in the third world. As several scholars have noted, the Soviets were constrained from too overtly challenging the United States in the third world early in the Cold War because of U.S. nuclear hegemony. The arrival of strategic nuclear parity, however, coincided with a much more assertive role for the Soviets, as demonstrated by their actions in the Middle East (1970–73), Angola (1975–76), Ethiopia (1977–78), Yemen (1978–79), and Afghanistan (1979).\textsuperscript{89} The emergence of nuclear parity did not mitigate, and may have aggravated, the superpower competition for influence in the third world.

The United States intervened with its own military forces in the third world throughout the Cold War as well, including in Korea (1950–53), Egypt (1956),

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  \item \textsuperscript{86} Van Evera, \textit{Causes of War}, p. 245.
  \item \textsuperscript{87} Posen and Van Evera, “Defense Policy and the Reagan Administration,” p. 33.
  \item \textsuperscript{88} See Garthoff, \textit{Detente and Confrontation}, pp. 732–745.
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Lebanon (1958 and 1982), Thailand (1962), Laos (1962–75), Vietnam (1964–73), Congo (1964 and 1967), the Dominican Republic (1965), Cambodia (1970), Libya (1981 and 1986), Grenada (1983), and Panama (1989). Because great powers have interests beyond defense of the homeland that may require intervention and competition abroad, a superpower military presence and some competition for power in the third world do not necessarily undermine offense-defense theory. The fact that the superpowers were consistently drawn into very real and frequently costly conflicts in areas of little economic or strategic value, however, is disconfirming evidence.

Conclusions

Offense-defense theory contends that the relative ease of attack and defense often plays a major role in causing instability and war in international politics. The theory holds that states will tend to seek security through aggression when offensive advantages render the capabilities of others more threatening, whereas peace is more likely when defensive advantages make changes in the balance of military power less worrisome. The theory also claims prescriptive utility because misperceptions and miscalculations of the balance often lead states to initiate conflict when they otherwise might feel secure with the status quo; these misperceptions can sometimes be ameliorated through arms control and confidence-building measures.

Given the pervasive influence of the offense-defense balance in international security scholarship, the logical consistency and empirical validity of the theory deserve rigorous evaluation. The lion’s share of past criticism has been directed at the conceptual and operational problems endemic to “broad” versions of offense-defense theory—those versions that define the balance to include a laundry list of factors in addition to technology. Although proponents of the broad theory believe that they are buttressing the explanatory power of the theory with a more sophisticated approach, in practice the balance becomes an ad hoc collection of variables employed pell-mell to account for empirical anomalies and logical qualifications.

The “core” version of offense-defense theory, which focuses almost exclusively on how technology shapes the relative ease of attack and defense, is the potentially more fruitful approach. The core theory offers two basic criteria for

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judging how a given technology affects the offense-defense balance and thus military outcomes: mobility-improving innovations generally favor offense and result in more quick and decisive victories for the attacker, whereas firepower-enhancing innovations typically strengthen defense and lead to more indecisive warfare. In terms of political outcomes, the theory predicts that states are more likely to initiate conflict when they perceive that the offense-defense balance favors offense.

This article “tested” offense-defense propositions using four illustrative case studies, chosen as the most important mobility and firepower innovations in modern military history. The impact of railroads on military outcomes was mixed, with attackers benefiting from greater strategic mobility and defenders profiting from better operational mobility. The quick and decisive character of some wars at the time primarily arose because of great asymmetries in military strength and doctrine. More important, more wars were initiated when railroads were perceived to favor the defender than when railroads were thought to favor the attacker. The small arms and artillery revolution shifted the offense-defense balance toward defenders. Perceptions of the military consequences of the revolution in firepower technology, however, did little to dampen conflict. In fact, leaders in Prussia and Germany were more cognizant of the technical realities of firepower than those in any other European state and yet provoked all of the major power wars on the continent at the time. Tanks had an indeterminate effect on the offense-defense balance. The conventional view that tanks favored offense is based largely on Germany’s stunning operations from 1939 to 1941 and is undermined by the evidence when all sides were adept at armored warfare. Moreover, Hitler attacked his neighbors absent any belief in the great offensive potential of tanks. Finally, the nuclear revolution offers only mixed evidence for offense-defense theory. The logic for coding nuclear weapons as defense-dominant is sound, and nuclear war has not occurred. Although leaders correctly perceived the military consequences of a nuclear conflict, however, the United States and the Soviet Union engaged in an intense and costly arms race and competed hard in regions of secondary importance.

The evidence suggests that scholars have overstated both the degree to which the nature of technology shapes military outcomes and the influence that beliefs of offense or defense dominance have on political and strategic decisions. Understanding the limitations of offense-defense theory might help scholars develop more nuanced causal explanations, as well as construct more precise empirical tests of these hypotheses. Ultimately, however, the theory
may not provide enough analytical leverage for understanding international politics, especially given the complexity of operationalizing and measuring the offense-defense balance. In any event, the relationship between technological change and international security is too important and fascinating a subject to abandon based on the flawed concept of an offense-defense balance of military technology.