

THE OFFENSE-DEFENSE BALANCE AND WAR SINCE 1648*

James D. Fearon
Department of Political Science
University of Chicago
5828 S. University Ave.
Chicago, IL 60615
email: jfear@cicero.uchicago.edu

DRAFT - April 8, 1997

*This is a slightly revised version of a paper presented at the Annual Meetings of the International Studies Association, Chicago, Illinois, 21-25 February 1995. For helpful comments and discussions I wish to thank David Edelstein, Charles Glaser, Chaim Kaufmann, and Craig Koerner.

1 Introduction

In one of the most influential articles on international relations written in the last 25 years, Robert Jervis argued that technological, geographical, and political factors that render offensive operations less costly and more effective tend to make security competition fiercer and wars more likely.¹ While the basic idea that technology favoring the offense might foster war and have diverse other international effects was not new,² Jervis made a more coherent and thorough theoretical argument than had been offered previously, and supported it with a range of suggestive and plausible historical examples. Since “Cooperation under the Security Dilemma,” many international relations scholars (and neorealists in particular) have added the “offense-defense balance” to system polarity as one of the chief independent variables used to explain international outcomes, especially the occurrence of war. And possibly because polarity does not vary much over time, the offense-defense balance has been doing a lot of explanatory and theoretical work in recent realist writings on international politics.³

¹Jervis, “Cooperation under the Security Dilemma,” *World Politics*30, 2 (January 1978), 167-214. Jervis also argued that the security dilemma is more acute and war more likely the more difficult it is for states to distinguish offensive from defensive armament.

²For earlier examples see references given in Jack S. Levy, “The Offensive/Defensive Balance of Military Technology: A Theoretical and Historical Analysis,” *International Studies Quarterly*28 (June 1984), pp. 220-221.

³See, for examples, Stephen Van Evera, *Causes of War*, Ph.D. Dissertation, U.C. Berkeley, 1984; Van Evera, “The Cult of the Offensive and the Origins of the First World War,” *International Security*9, 1 (Summer 1994), pp. 58-107; Van Evera, “Primed for Peace: Europe after the Cold War,” *International Security*15, 3 (Winter 1990/91), pp. 7-52; Jack Snyder, *The Ideology of the Offensive: Military Decision Making and the Disasters of 1914* (Ithaca: Cornell University Press, 1984); Charles Glaser, “The Political Consequences of Military Strategy: Expanding and Refining the Spiral and Deterrence Models,” *World Politics*44, 4 (July 1992), pp. 497-538; Glaser, “Realists as Optimists: Cooperation as Self-Help,” *International Security*19, 3 (Winter 1994/95), pp. 50-90; Stephen Walt, “The Case for Finite Containment: Analyzing U.S. Grand Strategy,” *International Security*14, 1 (Summer 1989), pp. 5-49; Walt, “Revolution and War,” *World Politics*44, 3 (April 1992), pp. 321-68; Thomas Christensen and Jack Snyder, “Chain Gangs and Passed Bucks: Predicting Alliance Patterns in Multipolarity,” *International Organization*44, 2 (Spring 1990), pp. 137-68; Barry R. Posen, “The Security Dilemma and Ethnic Conflict,” *Survival* 35, 1 (Spring 1993), pp. 27-57.

Not all neorealists like the “offense-defense” variable. See John Mearsheimer, *Conventional Deterrence* (Ithaca: Cornell University Press, 1983), pp. 24-7; Jonathan Shimshoni, “Technology, Military Advantage, and World War I: A Case for Military Entrepreneurship,” *International Security*15, 3 (Winter 1990/91), pp. 187-215.

Empirical efforts to assess whether offensive advantages cause war lag behind the development and extension of the theoretical arguments. The single case of World War I has served, unfortunately, as the principal source for generating hypotheses about how offensive advantages matter and at the same time as the principal empirical “test.”⁴ Beyond World War I, Ted Hopf has compared European warfare in the periods 1495-1521 and 1521-59, arguing that the roughly constant frequency of war across periods is better explained by lack of variation in the offense-defense balance than by system polarity, which changed. George Quester’s pioneering book on offense and defense through history tends to generate hypotheses rather than test them.⁵ In his much cited dissertation, Stephen Van Evera undertook a “back-of-the-envelope” test of the hypothesis – a historical review of whether offensive advantages correlated with the incidence of war in Europe after 1815 and in China in the “warring states” period.⁶ Noting the difficulties involved in measuring the offense-defense balance, Van Evera found that nonetheless “the available data confirms the hypothesis so clearly that different data would have to be very different to disconfirm it. The tides of war and peace run largely where Jervis’ hypothesis says they should run.”⁷

While not offering the extended and systematic empirical test the hypothesis deserves, in this note I develop a brief assessment of how the “offensive-advantages-cause-war” hypothesis fares against the record of interstate war in Europe since 1648. I argue that the empirical support is decidedly mixed. Two facts tell in favor of the hypothesis. First, the nuclear revolution has correlated with major-power peace, and second, at least since 1648 states that share borders have been much more likely to fight wars than separated states

⁴Van Evera, “The Cult of the Offensive and the Origins of World War I”; Van Evera, “Why Cooperation Failed in 1914,” *World Politics* 38, 1 (October 1985), pp. 80-117; Snyder, *The Ideology of the Offensive*.

⁵*Offense and Defense in the International System* (New York: Wiley, 1977).

⁶“Causes of War,” pp. 142-71.

⁷Causes of War, pp. 143-44. In a more recent article, Van Evera asserts that offensive advantages have been “ubiquitous causes of past European wars,” citing only evidence on World War I and ambiguous evidence on World War II. “Primed for Peace,” p. 12.

have been. Both nuclear weapons and distance between states favor the defense.⁸

However, on the critical dimension of changes in military technology and organizational capability, I argue that the historical record suggests a surprising reversal of the conventional view: War appears to have been less frequent when offensive advantages have been greater. In particular, the nineteenth century was extraordinarily peaceful. Wars in Europe were both more common and, on average, bloodier before the French Revolution, despite the fact that both theoretical and empirical considerations suggest that the years from 1648 to 1789 were characterized by defense dominance compared to the years after the Revolution and prior to World War I. I argue that the best way to assess whether offense or defense dominates is to look at the evidence provided by the wars themselves. If wars last a long time and see many attrition contests but few decisive battles between roughly equal adversaries, then defense dominates. If wars are short and characterized by decisive battles between roughly equal opponents, offense dominates. The frequent, costly wars of the period 1648-1789 tended to be multi-year affairs characterized by attrition contests, while the less frequent, less costly wars of the 1815-1914 period tended to be short and characterized by decisive battles.

What should we make of this evidence? One possibility is that offensive advantages do cause war but that other factors are considerably more important, at least for this span of time. While there is something to this, I will develop a different position: Offensive advantages may have diverse effects, at least one of which favor peace rather than war. In particular, an important but neglected effect of offensive advantages is that they increase *the variance of military outcomes*. As the offense grows stronger, war is more likely to result in either the total victory or total defeat of a state's army, and less likely to yield stalemate or small changes in territorial holdings. This means that offensive advantages make war less safe for leaders interested in retaining power in a capital city. When defense dominates, leaders

⁸The argument that the nuclear weapons make for defense dominance – actually, stable deterrence – is not straightforward but is now widely accepted. See Robert Jervis, *The Meaning of the Nuclear Revolution* (Ithaca: Cornell University Press, 1989), and the discussion below.

can prosecute war “at the perimeter” with little fear of being deposed or otherwise subjected by a conquering army. After Napoleon and the development of the mass army, going to war more often meant risking the regime, something even “greedy” states are reluctant to do.

The paper has four major sections. In the first, I discuss the concept of the offense-defense balance, some problems with the way it has been used in the literature, and how it might be assessed empirically. Second, I consider some theoretical arguments connecting the offense-defense balance and related factors to war. Third, I consider the historical evidence, beginning with contiguity and nuclear weapons, and continuing with the comparison between war before and after the French Revolution. In the conclusion, I sketch an alternative explanation for some major trends in warfare since 1648.

2 The Offense-Defense Balance

What is the offense-defense balance and how, if at all, can it be assessed empirically? Given the widespread use and central role played by the concept, these questions should probably be easier to answer than they are. Rather than addressing all of the various problems of definition and measurement that have been noted in critiques,⁹ I will confine myself here to (1) trying to state what users of the concept seem to have in mind by it, and discussing some problems with how the concept is often used; and (2) proposing a method of empirical assessment that avoids the difficult dilemmas faced by attempts to classify different weapons as offensive or defensive and then aggregating across weapons and states.

⁹See especially Jack S. Levy, “The Offensive/Defensive Balance of Military Technology: A Theoretical and Historical Analysis,” *International Studies Quarterly* 28, 2 (June 1984), pp. 219-38; and Shimshoni, “Technology, Military Advantage, and World War I.” For recent defenses and elaborations of the offense-defense balance, see Sean Lynn-Jones, xx, and Chaim Kaufmann and Charles Glaser, “Establishing the Foundations of Offense-Defense Theory,” mimeo, University of Chicago.

2.1 What should “offense-defense balance” refer to?

The core idea behind the concept of an offense-defense balance seems to be that there are a number of essentially exogenous factors, such as geography and weapons technology, that influence the relative value of attacking and invading territory versus defending it. Jervis says that “Technology and geography are the two main factors that determine whether the offense or defense has the advantage.”¹⁰ “Advantage” seems to refer in Jervis’ and many other discussions to a difference between the expected benefits and costs of an attacking versus a defending state, holding other factors, like the balance of forces, constant. He writes:

When we say that the offense has the advantage, we simply mean that it is easier to destroy the other’s army and take its territory than it is to defend one’s own. When the defense has the advantage, it is easier to protect and to hold than it is to move forward, destroy, and take. (p. 187)

The sense of “easier” here seems to be that the costs are lower and the prospects of success higher. In more formal terms, the idea might be specified as follows. Let A_i be state i ’s expected utility for attacking state j , and let D_i be i ’s expected utility for defending against an attack by j . Then we would say that any technological or geographic factor that tends to increase the difference $A_i - D_i$ tips the “offense-defense balance” towards the offense.¹¹

Imagine, for example, two states separated by a body of water. It is plausible that the difference between the expected value of attacking the other state and of defending against an attack increases with the size of the body of water. It would then seem natural to say that

¹⁰ “Cooperation Under the Security Dilemma,” 194. Jervis also discusses a more political factor, nationalism (195).

¹¹The offense-defense balance can also be defined in terms of force ratios – what ratio of forces or military spending is required in order to be able to attack (or defend) successfully? Alluded to by Jervis (p. 178), Lynn-Jones, xx, and Kaufmann and Glaser, “Establishing the Foundations,” attempt to develop force-ratio definitions. These are clearly related to the definition suggested here: The smaller the advantage in the force ratio required to attack successfully, the greater the utility of attacking relative to defending, if attackers can get some jump in mobilization for war. A full analysis of the relation between the two definitions is beyond the scope of this paper; as Kaufmann and Glaser’s paper shows, working out the force-ratio definition carefully is a very complex matter.

the greater the distance between the states, the more the offense-defense balance between the states favors the defense.

Or consider the case of two states before and after the invention and adoption of some new military technology. We could attempt to evaluate the impact on the offense-defense balance in the same way: Defense is favored if the new technology yields an increase in the difference between the expected value of defending and the expected value of attacking. Here, however, we need another assumption. If we want to say something about the effect of the new technology per se, we need to assume that both states choose the best strategies they can given the technology. For example, nuclear weapons shift the balance towards defense if deployed optimally (in secure second-strike postures), but would make for offensive advantages if deployed sub-optimally (e.g., in bombers concentrated in exposed airfields). The latter possibility does not lead us to say that the nuclear revolution favors the offense, although we might say that this particular deployment can.¹²

More problematic is the historically common case in which one state figures out how best to exploit a new technology before others do. Tanks in the 1930s, railroads in 1860s, and nationalism in the 1790s have each been said to have created “offensive advantages” or to have favored offense in the offense-defense balance.

This usage, however, reflects a common and important confusion. Properly interpreted, the offense-defense balance must be some measure of the *relative* value of attacking versus defending, and not of the absolute value of attacking for one state. In other words, the offense-defense balance should not be (but often is) confused with the probability that an attacking state will prevail. To do so is to confuse “offensive advantage” in the offense-defense

¹²It is not hard to imagine that for some technologies there might be multiple equilibria in doctrines for their use. That is, an offensive deployment might be a best response to an offensive deployment by the other side, while a defensive deployment would be a best reply to a defensive deployment. In this instance, the technology by itself does not affect the offense-defense balance one way or the other. Also, such cases would imply a natural role for arms control negotiations and agreements – namely, to select out one or the other equilibrium. For security-seeking (not “greedy”) states, it seems likely that the defensive deployment equilibrium would pareto dominate the offensive deployment.

balance with the balance of power or forces. Indeed, the very term “offensive advantage” is dangerous, since it can refer either to an advantage for offense in the offense-defense balance, or to the fact that one state is likely to do well by attacking, which might be due to any number of factors that have nothing to do with the offense-defense balance. In my view, Jonathan Shimshoni’s critique is largely vitiated by the failure to distinguish these two senses. Shimshoni argues that technology does not determine the offense-defense balance because sufficiently creative military “entrepreneurs” can almost always engineer “offensive advantage,” by which he means a high probability of winning or doing well.¹³ But the offense-defense balance refers to the ability to do well by attacking *relative to* defending, and so one needs to consider how well “defensive advantage” can or will be engineered as well.

To give an example, conventional wisdom holds that tanks gave offense the advantage in the 1930s, but that few military leaders, except in Germany, realized this.¹⁴ At the same time, it is held that “defense dominance” prevailed on the NATO-Warsaw Pact front, even leaving aside nuclear weapons and considering only the conventional, tank-dominated balance.¹⁵ However, if in the 1930s all states had chosen optimal strategies given the new tank technology, and if this would have implied defense dominance (as in the 1970s and 80s), then the 1930s could be characterized as a time of defense dominance purely at the level of technology. When one state develops an innovation that raises its chance of successful attack above those of other states that lack the innovation, this implies a change in the balance of power rather than a change in the offense-defense balance.

The question is whether to evaluate how a new technology affects the offense-defense balance (1) conditional on the deployments and doctrines actually chosen by states in a particular case, and (2) conditional on an assumption of “best responses” to the new technology

¹³Shimshoni, “Technology, Military Advantage, and World War I.”

¹⁴Mearsheimer, *Conventional Deterrence*, 99-101; Christensen and Snyder, “Chain Gangs and Passed Bucks,” 160-61, 166-67.

¹⁵Mearsheimer, *Conventional Deterrence*; Barry R. Posen, “tank article...”

and to other states. The former would be more appropriate for evaluating the balance in a particular case, the latter for an assessment of a new technology per se.¹⁶ For example, to assess how tanks affected the offense-defense balance in the 1930s we might ask about the difference between Germany's value for being the attacker and being the defender before and after tanks – and likewise for the British and French – given the doctrines each side was employing at the time. If, given their strategic innovations, the Germans would have done just as well or better if they were attacked as opposed to attacking, then tanks may have had little if any affect on the offense-defense balance even if they did greatly affect the balance of power.

The issue of how states deploy a new technology poses some additional, complicated problems for deciding how the offense-defense balance affects the probability of war. Suppose that states realize that a particular innovation has the potential to greatly increase the ability to strike first or invade successfully. For example, European leaders immediately after Napoleon saw this potential in the organizational innovation of the mass army motivated by nationalism.¹⁷ In consequence, rational, security-seeking states might attempt to reach an international agreement threatening retaliation against any state that tried to adopt the new offensive technology or force posture.¹⁸ If this regime worked and peace resulted, would we then say that peace was caused by offense or defense dominance? It would not seem unreasonable here to say that a correct appreciation of the offensive advantages implied by

¹⁶Kaufmann and Glaser (“Establishing the Foundations”) argue that the balance should be defined only in terms of optimal behavior for given technologies. It seems to me that this should depend on the purpose of the analyst. For example, if we intend to use perceptions of the offense-defense balance to predict behavior, then of course we will need to look at actual rather than theoretically optimal doctrines.

¹⁷See, for example, Barry R. Posen, “Nationalism, the Mass Army, and Military Power,” *International Security* 18, 2 (Fall 1993), 80-124.

¹⁸Or they might tacitly agree to deploy small forces in a defensive a way as possible, implicitly understanding that any state that tried to “break out” would be matched by a rival, leading to a new, less desirable equilibrium at the offensive posture. The Concert of Europe may be understood in these terms, and indeed Paul W. Schroeder argues something like this in *The Transformation of European Politics, 1763-1848* (Oxford: Oxford University Press, 1994).

the new technology led to endogenous diplomatic and political reactions that fostered peace. Thus, a shift in the exogenous, technological offense-defense balance in favor of offense might correlate with peace, due to endogenous diplomatic, political, and strategic reactions.

Since states can affect the probability of innovations by investing in research and development, technological developments are not totally exogenous to state choices. Nonetheless there is much to be said for restricting the concept of “offense-defense balance” so that it applies to essentially exogenous factors like technology and geography, as Jervis and his predecessors did. Some more recent scholars – Stephen Van Evera in particular – have argued for broadening the notion to include diplomatic behavior as a factor determining the offense-defense balance. Van Evera argues, naturally enough, that balancing behavior practiced by states favors the defense, while bandwagoning or failures to balance favor the offense. In fact, as Van Evera suggests, it is precisely because he broadens the concept in this way that his historical assessment of the relationship between war and the offense-defense balance since 1815 supports the standard hypothesis about the war-causing impact of offense.¹⁹ Virtually all of the “work” in his historical argument is done by reference to whether Britain was acting “aggressively” as a balancer from 1815 to 1870, and Bismarck’s purported balancing behavior after 1870.²⁰

By the measure proposed above, there is a natural and immediate sense in which balancing behavior favors the defense. If, for example, Britain acts as balancer between France and Germany, then the difference between the expected values of defending and attacking is increased for both of them. But while this may be a good way of “unpacking” the old argument that balancing favors peace, I do not think it is a good idea to assimilate balancing behavior (or any other diplomatic strategy) to the offense-defense balance.

In the first place, this move pushes the hypothesis towards tautology. To say that “defensive diplomacy” (as Van Evera describes the broader category that includes balancing)

¹⁹Van Evera, *Causes of War*, pp. 123-4.

²⁰*Ibid.*, especially pp. 145, 147, 159.

causes peace is perilously close to saying that if states act so as to avoid war, war will be less likely. For instance, states may practice “defensive diplomacy” primarily when they are relatively satisfied with the status quo, in which case it is not really the “offense-defense balance” that is doing any work explaining peace here.

Second, much of the appeal of the original hypothesis is that it proposed to explain the likelihood of war by essentially exogenous factors like technology and geography (just as polarity is essentially exogenous, and thus an attractive independent variable). If variations in balancing behavior explain most of the variation in war in the 19th century, then what is gained by lumping this ancient idea under the new rubric, “offense-defense balance”? We would really like to know why states balance effectively at some times but not others – that is, what essentially exogenous factors cause effective or ineffective balancing?

Moreover, as argued above, diplomatic strategies like balancing may well be endogenous reactions to more exogenous factors like military technology. Hence, aggressive, peace-causing balancing might be caused by a perception of offensive advantages at the level of technology or geography. By contrast, states might fail to balance, and so encourage war, when they believe that defense has the technological advantage (as in the 1930s).²¹ In such cases, claiming victory for the hypothesis that defensive advantages cause peace would just seem to obscure matters – in particular, the fact that there is a complicated relationship between military technology, diplomacy, and the risk of war.

A final problem with the way the offense-defense balance concept is currently used in the literature is that scholars frequently seem to assume that technological change affects the risk of war only by affecting the offense-defense balance. This is not the case. Consider

²¹In “Chain Gangs and Passed Bucks,” Christensen and Snyder argue that variation in the perceived offense-defense balance explains the different alliance patterns and pathologies observed before World War I and between the two world wars. They do not, however, draw out the implication for the hypothesis that offensive advantages cause war (i.e., that alliance behavior may tend to neutralize the impact of the technological offense-defense balance on the risk of war). Van Evera, *Causes of War*, pp. 137-42, recognizes that “Military and diplomatic factors favoring the defense ... can corrode or reinforce each other,” but asserts that “Overall, in my view, defensive diplomacy is harder when the offense dominates militarily...” (p. 137).

a technological innovation that makes fighting less costly – for example, developments in medicine lower casualty rates; developments in financial systems make it easier for sovereigns to raise money to fight with; or effective ballistic missile defense is invented. In so far as such changes lower the costs of a defending state just as much as an attacking state, they have no effect on the offense-defense balance, if this is understood to refer to the relative value of attacking versus defending. Nonetheless, these technological changes might very well increase the likelihood of war by lowering its costs on all sides.

If the offense-defense balance refers to the relative value of offense versus defense, then technological changes that affect the costs of war affect the balance only when their import *differs* for attackers and defenders. For example, the more one expects battles to cause collateral damage to cities and countryside, the lower the costs for fighting on enemy rather than home territory. This favors offense in the balance by lowering the costs of war for attacking relative to defending.²² Another significant example concerns the organization of supply systems for armies. Before these were rationalized (very gradually from the late 17th century to the mid-19th century), standing armies had to be paid at home from the treasury but abroad could be sustained to a large degree by plunder of the local population. This lowered the relative cost of attacking versus defending (and gave a direct incentive for wars of conquest). Just before his 1667 war with Spain, Louis XIV argued that “it would be more convenient for me to thrust [my army] upon the domains of Spain than to feed them constantly at the expense of my subjects.”²³ Similarly, William McNeill argues that a principal motive behind the French revolutionary wars was that masses of unorganized, unemployed young men could be supported at lower cost (and less domestic danger) if sent to war on foreign soil.²⁴

²²Note that this example demonstrates the following possibility: A technological change may increase the costs of war even as the offense-defense balance shifts towards favoring the offense.

²³Cited in Evan Luard, *The Balance of Power: The System of International Relations, 1648-1815* (New York: St. Martin's Press), p. 181.

²⁴William H. McNeill, *The Pursuit of Power* (Chicago: University of Chicago Press, 1982) pp. 192ff.

2.2 Assessing the offense-defense balance

The measure suggested above provides a rough means for gauging the impact of a particular technological or other change on the balance for a particular state, holding all other factors constant.²⁵ It is not enough, unfortunately, to establish any very operational measure of how the offense-defense balance has evolved over time in the world. Three intractable problems intervene, two concerning aggregation and the third concerning classification.

First, if there are multiple, concurrent developments in military technology and organization, as is typically the case, then the “other factors” are not constant. We would seem to require, then, a way of aggregating across innovations, of weighing the relative impact of different technological developments on the balance. For example, in the 19th century, were numerous technological and organizational improvements that vastly improved army mobility offset by improvements in firepower due to breech-loading rifles?

Second, there is the problem of aggregating across states to ascertain a dyadic or, even more difficult, a system-wide offense-defense balance. Note that the measure proposed above, which I think can be defended as close to what offense-defense theorists sometimes seem to have in mind, assesses the impact of a technological innovation on the offense-defense balance for *a particular state*. By this measure, it is in principle possible for an innovation to tip the balance towards offense for one state and defense for another.²⁶ Further, it is certain that size of the effect would vary markedly across states, since factors such as regime type and the leadership’s value for conquest may figure into a state’s value for attacking versus defending. The problem of aggregating up to the system level seems yet more complex.

²⁵It should be stressed this measure only assesses *the direction of change* in the offense-defense balance, and not some absolute value. Lynn-Jones, xx, and Kaufman and Glaser, “Establishing the Foundations,” seek to get an absolute value via a definition in terms of force-ratios.

²⁶For example, consider any innovation that increases expected collateral damage and civilian casualties in battle, and consider relations between an autocracy and a democracy. The innovation might shift the offense-defense balance in favor of offense for the autocracy (relatively lower costs for being attacker) but in favor of defense for the democracy (if higher collateral damage implied greater motivation and war effort for democracies).

Finally, there is the problem of classifying weapons. A single new technology or organizational improvement may have multiple effects that are difficult to assess. Further, whether a specific weapon favors offense or defense may depend in a very complex way on doctrines for use and on how it interacts with other technologies and with the political and strategic context. To give just one example, John Mearsheimer has argued that at least in the case of tank warfare, it is not at all clear whether increases in mobility favor the offense, the usual supposition.²⁷

Chaim Kaufmann and Charles Glaser have argued persuasively that it is not necessary to classify weapons to assess the offense-defense balance at the level of a specific dyad – one need only answer questions about what force ratio is needed for successful attack or defense, which is what “net assessment” is already about. Nonetheless, if dyadic context determines the impact of particular technologies in the extreme, and if context varies widely from dyad to dyad, then this is a problem for estimating any “system level” balance.²⁸

In my view, these three problems of aggregation and classification make it virtually impossible to measure the “overall” offense-defense balance at a given time simply by looking at the technology and doctrines employed by states.²⁹ Fortunately there is another, much more satisfactory method available. The wars fought in a given period provide quite direct evidence about the state of the offense-defense balance. Take the wars fought in a given 50 year interval in some region. If these tend to be long, drawn-out wars of attrition that see few decisive battles and small but costly changes in battle lines, then this is a period in which

²⁷ *Conventional Deterrence*, 27.

²⁸In fact, for this and related reasons, Kaufmann and Glaser abandon the notion of a system-wide balance, which would seem to undermine the idea that aggregate amounts of interstate war can be explained by variation in the (system-wide) offense-defense balance. Kaufmann and Glaser, “Establishing the Foundations.”

²⁹The same conclusion is argued by Levy, “The Offensive/Defensive Balance of Military Technology”; Shimshoni, “Technology, Military Advantage, and World War I”; Wright, *A Study of War* (Chicago: University of Chicago Press, 1965 [rev. ed.]), p. 796. Note that if we incorporate diplomatic behavior into the assessment of the balance as well, as Van Evera would like, the problem becomes even more thoroughly hopeless. This is both for the reasons mentioned in the text and because of the problem discussed earlier – diplomatic behavior can be an endogenous reaction to technology.

defense dominates. On the other hand, if the wars in this period tend to be short, marked by decisive battles and large changes in who controls territory, then offense dominates. By looking at the evidence provided by the wars themselves, we avoid the difficult problems of classifying and aggregating different technologies. Further, the method should tap not just the reality of the balance but, to some degree, perceptions as well. Leaders tend to expect that the next war will look like and last roughly as long as the previous several, so that over relatively long periods in which wars actually do tend to be roughly similar in profile, these perceptions will tend to be roughly accurate. For example, in the 18th century princes expected siege warfare and this is almost entirely what they got. To select the endpoints of the time-periods used, we should look for wars that completely surprised observers at the time, radically changing their estimates of the relative efficacy of offense and defense.³⁰

Essentially this method of measuring the offense-defense balance has been proposed or noted by several scholars, including some advocates of the hypothesis that offensive advantages make war more likely.³¹ Quincy Wright suggested that “...it is difficult to judge the relative power of the offensive and defensive except by a historical audit to determine whether on the whole, in a given state of military technology, military violence had or had not proved a useful instrument of political change.” Citing Wright, Jack Levy notes that “It would be tautological to use this conception of the offensive/defensive balance to predict the military success of the aggressor, though it would be legitimate to predict the frequency of war.” Jervis argues that “When defense is dominant, wars are likely to become stalemates and can be won only at enormous cost,” while under relative offense dominance “wars are expected to be both frequent and short.”³² Van Evera explicitly endorses this approach to measurement in a footnote, but does not actually employ it:

³⁰Accordingly, below I will use the French Revolutionary Wars and World War I as cut points.

³¹It is actually hard to imagine that more a priori theoretical approaches to measuring the balance will not implicitly rely on evidence from actual wars in which the weapons are used.

³²Jervis, “Cooperation under the Security Dilemma,” 187-88.

[The offense-defense balance] can be measured by asking: On average, what proportion of the territory of states at war is likely to change hands as a result of the war? (When war breaks out, how much conquest is in fact likely to take place?) [This measure] looks to results.³³

The approach is not without drawbacks. In the first place, it precludes year-to-year or even decade-to-decade assessments of changes in the offense-defense balance, since not enough wars are fought in these intervals to make a judgement possible. Because wars are not all that frequent in any century and because there can be considerable variation in what wars look like within any one interval, we need intervals large enough to get a reasonable sample.

Second, this measure will vary with factors that, strictly speaking, do not affect the offense-defense balance as defined above. Consider an innovation that decreases the likelihood of stalemates while increasing the likelihood of total victory or total defeat for an attacking or defending army. If this innovation did not differentially affect attackers and defenders, then it would not affect the offense-defense balance as defined above. Nonetheless it would clearly make wars shorter and more apt to end with large transfers of territory.

Even so, many users of the offense-defense concept would tend to classify such an innovation as “favoring the offense” in the offense-defense balance – the concept has not been tightly specified in the existing literature. Thus, for the purposes of empirically assessing the standard hypothesis, the method may be adequate.

3 Offensive Advantages, the Bargaining Range, and the Likelihood of War

How do offensive advantages influence the likelihood of war? Jervis and Van Evera provide the most extensive theoretical treatments of this question, both arguing that offensive ad-

³³Wright, *A Study of War*, rev. ed., (Chicago: University of Chicago Press, 1965), 796-97; Levy, “The Offensive/Defensive Balance of Military Technology,” 222; Van Evera, *Causes of War*, 78n2.

vantages point almost uniformly in the direction of more frequent war.³⁴ Van Evera, for example, discusses more than ten ways that “offense dominance” increases the risk of conflict, the net effect being that “war is *much* more likely when conquest is easy, and shifts in the offense-defense balance have a radical effect on the risk of war.”³⁵ Van Evera also argues that relative offense dominance will make for more “intense” wars, meaning more killing in less time.³⁶

Rather than working through these various arguments (many of which strike me as plausible), in this section I will present a simple theoretical framework for assessing how technological and other changes might be expected to influence the risk of war between two states or coalitions.³⁷ My main point is that there is at least one natural and possibly important way by which greater “offensive advantages” might make states more reluctant to try war.

Whether the result is victory or defeat, war is both a costly and risky endeavor for state leaders – resources are spent on arms and soldiers that could be spent elsewhere, and losing a war can make death or loss of power much more likely. This means that rational leaders should have an incentive to locate bargained agreements that would allow them to

³⁴Jervis, “Cooperation under the Security Dilemma”; Van Evera, *Causes of Wars*, 79-118.

³⁵*Causes of War*, 79 (emphasis in original).

³⁶*Ibid.*, 642-666.

³⁷Regarding Jervis’ and Van Evera’s arguments, I will say that they seem incomplete to me in two respects. First, with few exceptions, the arguments fail to explain precisely how offense dominance prevents state leaders from locating bargains both sides would prefer to a fight. Instead, both authors tend to assume that it is sufficient to show how offense dominance might increase a state’s value for war, or that war is more likely when the “security dilemma” is fiercer, for reasons that are not well specified. I argue elsewhere that this is not enough (“Rationalist Explanations for War,” *International Organization* 49, 3 (Summer), 379-414). Second, the arguments given by Jervis and Van Evera tend to be partial in the following sense: They argue that offense dominance creates an incentive for dangerous behavior X, without considering whether state leaders might recognize this and be able to take effective compensating actions (for example, balance actively when offense dominates in technology). In other words, Jervis and Van Evera tend to assume, more or less implicitly, that offense dominance traps states in a big, metaphorical prisoner’s dilemma that they cannot escape – offense dominant technology leads states to take unilateral actions that make them all worse off than could be, and they cannot escape this dilemma. This strikes me as possible, but in need of stronger justification.

get whatever benefits they seek without paying the costs and risks of fighting. I have shown elsewhere that between genuinely rational states there will in general exist a set of agreements both sides prefer to the costly gamble of war (even if both sides value conquest in addition to survival).³⁸ Referred to as the “bargaining range,” this is the set of negotiated agreements that both would prefer to the gamble of attacking the other. One way to assess how an independent variable (such as the offense-defense balance) affects the likelihood of war is to ask how the factor affects the size of the bargaining range. The size of the bargaining range can be thought of as a measure of the extent of the “conflict of interest” between the states. Factors that tend to shrink the bargaining range make war more likely by making negotiations more likely to fail and crises to escalate. Factors that increase it make war less likely.³⁹

The bargaining range is delimited by the states’ “reservation values for attacking” the other side. A state’s reservation value for attacking is the negotiated settlement that would make the state just willing to accept the agreement rather than to attack, trying an offensive war. It is important to note that the bargaining range is determined by the states’ values for attacking, not for defending. This is because a state cannot unilaterally choose to be the defender, while it can unilaterally choose to attack. Thus any stable peaceful settlement has to be at least as good as attacking for both sides. A state’s “reservation value for defending” is the (hypothetical) negotiated settlement that would leave the state just indifferent between the settlement and being the defender in a war. By the definition offered above, the offense-defense balance varies with the difference between a state’s reservation values for attacking and defending: The greater the difference (in favor of attacking), the more offense is favored

³⁸Fearon, “Rationalist Explanations for War.”

³⁹This is really something of a conjecture about something I believe will hold true for a broad range of models. For example, Roger Myerson and Mark Satterthwaite, “Efficient Mechanisms for Bilateral Trade,” *Journal of Economic Theory* 29 (April 1983), 265-281, can be read as suggesting that a smaller bargaining range makes bargaining failure due to private information more likely.

in the balance.⁴⁰

The hypothesis is that war is more likely the more narrow the bargaining range – in other words, the smaller the set of negotiated agreements both sides prefer to attacking. Thus, any factor that increases either both or only one side’s value for attacking will tend to narrow the range and increase the odds of war. I next evaluate several plausibly important factors using this criterion.

1. *Changes in the balance of power* will increase one side’s reservation value for attacking while reducing the other side’s. This implies a shift in the location of the bargaining range but no necessary decrease in its size, and thus no necessary change in the odds of war.⁴¹

2. *Changes in the offense-defense balance* that favor offense will narrow the bargaining range and make war more likely only in so far as they increase one or both sides’ reservation values for attacking. For example, a change such as increased first strike advantages would increase states’ values for attack and so narrow the bargaining range, as would any technology that lowered the force ratio required for a successful offensive.⁴²

In principle, however, a technological innovation could shift the offense-defense balance in favor of offense by making defense harder, even while it might have no effect on states’ values for attacking. Such a change would not necessarily affect the bargaining range, or the odds of war. For example, technological and organizational changes that increase expected

⁴⁰I should stress that I am never in this paper claiming that offense can be “absolutely” easier or more effective than defense, whatever this would mean.

⁴¹Writing about the negotiations to end wars in progress, Donald Wittman, “How a War Ends: A Rational Model Approach,” *Journal of Conflict Resolution* 23, xx (xx 1979), 743-63, was the first to observe this. Fearon, *Threats to Use Force*, Ph.D. Dissertation, U.C. Berkeley, 1992, chapter 1, demonstrates that a “neutrality result” holds in a take-it-or-leave-it bargaining model of war initiation: With risk neutral states, the probability of war is completely independent of the balance of power. The result does not generalize very far, and there are other mechanisms that may imply diverse relations between the dyadic balance of power and the likelihood of war. See R. Harrison Wagner, “Peace, War, and the Balance of Power,” *American Political Science Review* 94, 3 (September 1994), 593-607.

⁴²For more on this see Fearon, “Rationalist Explanations for War.”

collateral damage and civilian casualties lower the costs to fighting on foreign soil as opposed to fighting at home; such innovations may make offense relatively more attractive even as the bargaining range expands with the increasing costs of war. Thus, for technologies that increase costs more for defenders than attackers, an increasing offensive advantage may be accompanied by a *lower* risk of war.

3. *Reductions in the costs of war* or increases in the benefits of victory will increase both sides' values for attacking and so narrow the bargaining range. Note that since such changes may equally increase the states' values for defending, they need not have any impact on the offense-defense balance defined as above. This is a separate category from (2), despite the fact that reductions in the costs of war may result from technological, political, or organizational innovations that would conventionally be lumped under the "offense-defense" balance heading.⁴³

4. *Decreases in the variance of military outcomes* will tend to increase both sides' values for attacking, if the states are risk averse about territorial control and survival as independent entities. In loose terms, the variance of military outcomes is larger, the greater the likelihood that a war will result in total victory or total defeat as opposed to stalemate or small transfers of territory. Neorealist theory holds (correctly, I think) that states tend to be risk averse when it comes to survival, which implies that they will not like greater variance in military outcomes. Smaller variation in the outcomes that war might produce will thus tend to increase both sides' values for attacking, decreasing the bargaining range and making war more likely. Conversely, technological or other factors that tend to increase the variance in military outcomes will increase the bargaining range, favoring peace (other things equal). Intuitively, war is a more serious, dangerous gamble when the variance of

⁴³To some extent states choose their costs for war by choosing how long and how hard to fight, so that we cannot treat the costs of war as a wholly exogenous variable determined by technology and society. I am not sure what the implications of this point for offense-defense arguments are. Thanks to Craig Koerner for raising this issue.

military outcomes is large.⁴⁴

Because this last factor, military variance, is not discussed in the literature and because it will play a role in my interpretation of the evidence considered in the next section, I will expand on the argument here. Note that military variance is treated separately from the offense-defense balance. This is because in principle a technological change could increase the variance of military outcomes without affecting the relative value of attacking versus defending. In practice, however, changes that bear on military variance are also likely to tip the offense-defense balance towards favoring offense.

For example, two sorts of technological change that might increase military variance are (1) improvements in transportation due to railways, steam power, internal combustion engines, and all-weather roads, and (2) improvements in systems of logistics that enable larger armies to cover longer distances more rapidly. All of these work in a way closely analogous to the effect of distance between states on the offense-defense balance.⁴⁵ When it is very difficult to move large armies very far very quickly, it may be harder to take territory and capture another state's capital. Rapid transport and superior control of large numbers of soldiers increase the odds that war will result in large transfers of territory, thus making war more risky. On the other hand, these changes may also increase the advantages due to striking first, making attack a more attractive option. The two effects work in opposite directions on the bargaining range.

Similarly, the expected costs of war may be larger when the variance of military out-

⁴⁴To give a numerical example, consider a state with the utility function $u(x) = \sqrt{x}$, where x refers to the proportion of territory in its region controlled by the state. This utility function represents risk averse preferences; the state is more concerned about gaining additional territory when it is close to elimination than when it controls almost all of it. Suppose that under one technological regime, war will result either in the state's elimination ($x = 0$) or total victory ($x = 1$) with equal chances. Under a different regime, war will result in either total victory ($x = 1$), total defeat ($x = 0$), or stalemate ($x = .5$) with equal chances. The state's expected utility of war in the first case is .5, while it is .57 in the second. If there were one other state in the region and this state had the same preferences, the bargaining range would be (.25, .75) under the first technology, and (.32, .68) under the second.

⁴⁵Deployed and used optimally, railroads may be an exception here, since defenders can destroy track as they retreat while using the remaining network to quickly reinforce attacked positions.

comes is small because stalemates are more likely). So while greater variance implies more risk of total defeat, the expected costs of fighting may also be lower, which works in the opposite direction on the bargaining range and the risk of war.

4 Some Evidence

As noted in the introduction, the hypothesis that wars are more likely when offense is relatively favored in the offense-defense balance has not been rigorously tested.⁴⁶ The empirical case for the hypothesis has rested overwhelmingly on a single case, World War I, which has also served as the principle inspiration for the theoretical arguments that it is then used to “test” – it is not so surprising that the case of World War I supports the hypothesis. I do not offer a rigorous and fully developed test here. Instead, I try to take a first-cut at empirical assessment by considering how the hypothesis fares against readily available data on variation in major power warfare over the past several centuries.

This first-cut yields mixed results. Two significant empirical regularities seem to tell in favor of the hypothesis. First, the nuclear revolution has been associated with 51 years of major power peace, and there are good reasons to code this revolution as producing a major and even decisive shift towards “defense dominance.”⁴⁷ A state cannot militarily conquer (in the pre-nuclear sense) an opponent with secure nuclear forces without at the very least running significant risks of unspeakable devastation. In so far as it is hard to imagine how

⁴⁶An exception is Hopf’s “Polarity, the Offense Defense Balance, and War,” although as he notes (p. 487) the periods he considers provide stronger evidence against the claim the bipolarity promotes stability than they do in favor of the standard offense-defense claim. In the two periods Hopf compares, the frequency of war varies little, and neither does the offense-defense balance (by his reckoning), so at best the data does not reject the hypothesis.

⁴⁷Properly speaking, nuclear weapons render defense impossible; they revolutionize strategy by creating a world where deterrence is the inescapable condition. But, as Jervis puts it, “the result is the equivalent of the primacy of the defense.” “Cooperation under the Security Dilemma,” 198. See also Thomas Schelling, *Arms and Influence* (New Haven: Yale University Press, 1968), chap. 1; Glenn Snyder, *Deterrence and Defense* (Princeton: Princeton University Press, 1961); Kenneth N. Waltz, “Nuclear Myths and Political Realities,” *American Political Science Review* 84, 3 (September 1990), pp. 731-747; Robert Jervis, *The Illogic of American Nuclear Strategy* (Ithaca: Cornell University Press, 1984).

a state could “take over” a nuclear power the way that Germany conquered France in 1940, nuclear weapons imply a decisive technological shift against offense (conquest) and in favor of defense. In addition, secure second strike forces greatly lower states’ sensitivity to changes in military ratios, which favors defenders by reducing value of “break out” and first-strikes for attacker.⁴⁸

On the other hand, it is hard to know exactly how to weight nuclear weapons’ contribution to post-War stability. In the first place there are other contenders for explaining the “long peace” and not enough data to sort reliably among them. Second, while 49 years of major power peace is “the record” for the modern states system, there are close contenders in the not-so-distant past. The 19th century saw two quite significant episodes without serious major power wars – 1815 to 1853 and 1871 to 1914.⁴⁹ As I will argue below, from a longer historical perspective the “long peace” appears as the continuation of a striking historical trend: Wars in which major powers have fought other major powers have been steadily and dramatically declining in frequency since 1495.⁵⁰ It is not accurate to characterize the data as showing continuous and roughly constant major-power warfare up to the invention of nuclear weapons. And if the long peace represents the continuation of a longer-term trend, then

⁴⁸Some caveats: It is not entirely clear if nuclear weapons lower the probability of war simply by raising its risks and costs on all sides, or if they work this effect by making offense relatively more risky and costly than defense. The usual argument is that defenders typically have more at stake, and thus have greater resolve to run nuclear risks in a military (or crisis) confrontation. See Robert Jervis, *The Meaning of the Nuclear Revolution*, 29-34; Jervis, *The Illogic of American Nuclear Strategy*, 153-57. However, (1) one can imagine a highly motivated and expansionist leader who has to have nuclear weapons, and (2) to the extent that defenders do tend to have greater resolve, this means that in the rare instances when they are challenged militarily, the challenger is sending a strong signal of willingness to run risks, so that the “balance of resolve” conditional on a crisis is unclear. For the latter argument, see James D. Fearon, *Threats to Use Force*, 240-47. I agree with the argument that defenders typically are willing to run greater risks to prevent loss of territory than potential attackers are to gain it, but I am not sure if the peace-causing effect of nuclear weapons stems more from this defense-dominance factor or just the increase in the expected risks and costs of war.

⁴⁹If one counts the 1905 Russo-Japanese war, then I suppose we should also count China-United States 1949 in the later period.

⁵⁰This very interesting fact is observed by Jack S. Levy, “Historical Trends in Great Power War, 1495-1975,” *International Studies Quarterly*26 (June 1982), 278-300, and by Kevin Wang and James Lee Ray, “Beginners and Winners,” *International Studies Quarterly*38, 1 (March 1994), 139-154.

we need to know how to differentiate the effect of nuclear weapons from whatever factors lie behind the trend.

Still, the fact that the nuclear weapons have been associated with a long period of no major power war, and that they can be plausibly argued to have revolutionized the offense-defense balance, must count at least somewhat in favor of the hypothesis. I will return to the question of “how much” in the conclusion.

The second significant piece of evidence also tells in favor of the standard hypothesis: States have overwhelmingly tended to fight wars with close neighbors rather than opponents at large distances, and distance tends to favor the defender by raising the attacker’s costs. In J. David Singer’s and Melvin H. Small’s data, 59 of the 67 interstate wars since 1815 (88%) are between states that are contiguous or are separated by less than 150 miles of water. Slightly higher percentages appear to hold for major power warfare in earlier centuries.⁵¹ The offense-defense hypothesis would further predict that as the costs of long-distance transport have fallen over the last 500 years, we should observe more wars carried on at long distances. This prediction appears confirmed up to the 20th century: European states’ war involvement outside of Europe increases enormously and steadily from the 16th century to 1900.⁵² I expect it falls considerably in the twentieth century, which is anomalous.⁵³ All in all, however, the strong tendency of states to fight wars closer rather than

⁵¹See John Vasquez, *The War Puzzle* (Cambridge: Cambridge University Press, 1993), 134, who uses Small and Singer, *Resort to Arms: International and Civil Wars, 1816-1980* for the figure on post 1815 warfare.

⁵²See, for example, Geoffrey Parker, *The Military Revolution* (Cambridge: Cambridge University Press, 1988). Once more, however, there is the problem of differentiating the effect of lower costs per se and a change in relative costs for attacking versus defending.

⁵³One might try to salvage the argument by pointing to improvements in the “periphery’s” military and organizational capabilities in the 20th century, but this just argues a change in the balance of power rather than a change in the offense-defense balance. See Vasquez, *The War Puzzle*, 136-39, for an alternative interpretation of the data. Vasquez, who argues that contiguity predicts war not because of military technology but rather because of an innate human sense of territoriality, cites an unpublished study by Charles Gochman that found an increase in the proportion of wars fought by contiguous states after 1870 (versus 1815-1869). He does not say whether the study controlled for the huge increase in the number of weak states (who can’t project power very far), or for the increase in the military capabilities of the periphery relative to the major powers in the 19th century.

farther from home tends to support the standard offense-defense hypothesis. Once again, there are alternative hypotheses that cannot be simply dismissed – for example, contiguous states may fight more because they have more things to disagree about – but surely some part of the explanation is the technological one.

Given that the core arguments for and about the hypothesis have concerned changes in conventional military technology and military organization through time, these two pieces of evidence provide relatively indirect tests. I now turn to what seems like a more direct and important test: Has the frequency of major power war since 1648, the beginning of the modern states system, varied as the offense-defense hypothesis would predict?

4.1 War and the Offense-Defense Balance since 1648

I will focus on the contrast between the periods 1648-1789 and 1815-1913, first presenting some aggregate data and then proceeding to assess covariation with the offense-defense balance. The French Revolutionary/Napoleonic wars and World War I were chosen as cut points for the reason noted above – they were widely seen by observers as indicating a radical change in the relative efficacy of offense and defense, the former in favor of offense and the latter in favor of defense.⁵⁴ Including the revolutionary wars in the earlier period and Napoleon’s wars in the later period would generate numbers essentially similar to those reported below; putting both sets of wars in one period or the other would have predictable effects, but the basic patterns reported below would remain. For similar reasons, and also because of contention about how to assess the offense-defense balance between 1918 and 1945, I will not consider the period from 1914 on. Once again, including World War I in the 1815- period, or even looking at the whole period 1815-1995 would not alter the key patterns in the aggregate data. Throughout I rely on Jack Levy’s data set on “great power” conflict;

⁵⁴There is an argument in favor of counting the French Revolutionary wars as belonging to the earlier period, and World War I in the later, on the grounds that each was *begun* largely with expectations that past patterns would repeat. The reader can easily recalculate the frequency of war statistics to reflect this coding; it matters little.

other compilations give a fundamentally similar picture.⁵⁵

By Levy's reckoning, between 1648 and 1789 there were 32 wars involving a great power on at least one side, and 20 wars with a great power on both sides. This translates to .22 wars involving a great power per year, and .14 "great power wars" (great powers on both sides) per year. By contrast, in the period 1815-1913, there were 18 wars involving a great power (.18 per year), and only 4 (.04 per year) great power wars.⁵⁶ Thus great powers fought less often in the later period, and dramatically less against each other. (If we consider the period 1815-1995, the figures are 35 wars involving a great power (.19 per year) and 10 great power wars (.055 per year).⁵⁷)

Table 1 assembles from Levy's data descriptive statistics on the duration, severity, intensity, concentration, and extent of wars involving the great powers in the two periods. Table 2 does the same for great power wars across the two periods. "Duration" means number of years the conflict lasted; "severity" means number of battle deaths for the great powers involved; "intensity" is number of great power battle deaths per million European population; "concentration" is battle-deaths per nation-year of fighting; and "extent" is the number of great powers participating.

The contrast between the two periods is striking in several respects. First, note that not only is war more frequent in the earlier period; it is also more bloody. This is true not just regarding battle deaths per capita ("intensity"), but even in absolute terms ("severity"). The average number of battle deaths for a war involving a great power in the earlier period was 152,000, and only 38,620 in the later period; the contrast for the median war is similarly

⁵⁵Jack S. Levy, *War in the Modern Great Power System, 1495-1975* (Lexington, Kentucky: University of Kentucky Press, 1983). See Levy for specification of which states are counted as great powers and when. Similar results are obtained from Luard, *War in International Society*; Wright, *A Study of War*; and Kalevi J. Holsti, *Peace and War: Armed Conflicts and International Order, 1648-1989*.

⁵⁶These were the Crimean War, Italian Unification 1859, Austria-Prussia 1866, France-Prussia 1870. Counting Japan as a great power in 1905 would add one more to this set.

⁵⁷For these figures I use Levy's data, which extend up to 1975, and count the following as wars involving "great powers" after 1975: Soviet Union-Afghanistan 1979, China-Vietnam 1979, Britain-Argentina 1982, United States (et al.)-Iraq 1991.

dramatic (23,500 in the first period, 5,800 in the second).⁵⁸

The data thus contradict a standard characterization of war prior to the French Revolution. Almost any military history or study of 18th century diplomacy characterizes this as an age of “limited war” among sovereigns who played by a set of rules that kept wars small and civilized.⁵⁹ While the wars in this period may indeed have been “limited” relative to the Thirty Year’s War and the Revolutionary and Napoleonic Wars, they were nonetheless typically much more lethal than typical later wars.⁶⁰

A second striking fact about the contrast between the periods is that the average and median duration of wars plummets across the two periods, by factors ranging from 5 to 15 depending on type of war and whether one considers the average or the median. For instance, the median war involving a great power lasted 4 years in the period 1648-1789 but less than 10 months in the period 1815-1913. The precipitous decline in the length of wars accurately reflects changes in types of battles that we observe in the two periods. The earlier period is marked by long, slow, and generally indecisive wars of attrition; the latter period is marked by short and decisive battles which deal crushing blows to the army of the loser.⁶¹

As argued above and by advocates of the standard offense-defense hypothesis, relative

⁵⁸The one exception here is that median battle-deaths in great power wars increase across the periods. This is at once a reflection of little data (only 4 great power wars in the second period, two of which had small casualties and two large, and a longer term trend: While the great powers have fought each other less and less since 1495, when they have fought the results have on average grown more and more bloody. The average severity of the five 20th century great power wars in Levy’s data set is 4.3 million; the median is 954,960 (Korea).

I include medians here because (as is evident) descriptive statistics on war tend to be highly skewed to the right – in all periods, there are always a lot of little wars and relatively few big ones.

⁵⁹For example, John U. Nef, *War and Human Progress* (Cambridge: Harvard University Press, 1950), 155-67; Gunther E. Rothenberg, *The Art of Warfare in the Age of Napoleon* (Bloomington, IN: Indiana University Press, 1978), chapter 1.

⁶⁰Citing Levy’s data, Paul Schroeder makes this point in *The Transformation of European Politics*, 3-5. Robert E. Osgood and Robert W. Tucker observed that the wars of the 18th century “produced extremely high casualty rates” and were “limited” chiefly in that they entailed limited destruction of civilian life and property. See *Force, Order, and Justice* (Baltimore: Johns Hopkins Press, 1967), 47.

⁶¹Evidence is presented below.

defense dominance should be marked by wars that are long, indecisive attrition contests, and relative offense dominance by short wars with decisive battles. By this measure, then, the period 1648-1789 should be coded as defense dominant relative to the period 1815-1913.⁶²

But note that war is *more frequent* in the first period relative to the second, so the relationship is precisely the opposite of what the standard offense-defense hypothesis predicts. This must be counted as a major anomaly for the standard view. Certainly, if the 19th century had been marked by a great many short decisive wars of the sort we actually observe, this would have been counted as striking confirmation of the standard theory.

4.2 Behind the numbers

It may seem somewhat crude simply to use average and median duration of wars as the principal indicators of the offense-defense balance in a given period. In this section I contrast warfare in the two periods more directly, arguing that a strong case can be made for the claim that the first is “defense dominant” relative to the second (at least according to what the literature seems to understand by the offense-defense concept).

Military and diplomatic historians and other analysts routinely characterize 1648-1789 as defense dominant relative to other periods. Gunther Rothenberg, Martin van Creveld, Quincy Wright, Geoffrey M. Parker, Michael Howard, Hans Delbruck, and many others have all been impressed by the prevalence of siege warfare in this period.⁶³ In Henri Guerlac’s words, “In the late seventeenth century throughout the 18th century, warfare often appears

⁶²In addition, Van Evera argued that relative offense dominance should make wars more “intense,” or in Levy’s terms, “concentrated” – there should be more killing per unit of time of fighting (*Causes of War*, pp. 642-666). Consistent with this hypothesis and with the supposition that the second period is offense dominant relative to the first, note that the Tables show a massive increase in “concentration” across the two periods. Average concentration increases more than sixfold for wars involving a great power, and more than twelvefold for great power wars.

⁶³Rothenberg, *The Art of War in the Age of Napoleon*, 6-11; Wright, *A Study of War*, 295-96, 795; Parker, *The Military Revolution*, chap. 1; Howard, *War in European History* (Oxford: Oxford University Press, 1976), 20-37; Hans Delbruck, *History of the Art of War, vol. 4: The Dawn of Modern Warfare* (Lincoln, NB: University of Nebraska Press, 1985), 293-318; Martin van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (Cambridge: Cambridge University Press, 1977), 26-39.

as an interminable succession of sieges.”⁶⁴ R. R. Palmer writes that in this period “Quick and decisive political results were not in any case expected from battle. ... War of position prevailed over war of maneuver, and a strategy of small successive advantages over a strategy of annihilation.”⁶⁵ After years of experience, Frederick the Great himself wrote that “all that princes can expect from the greatest advantages at present is to acquire, by accumulation of successes, either some small city on the frontier, or some territory which will not pay interest on the expenses of citizens who perished in the campaigns.”⁶⁶

The principal cause of the prevalence of siege warfare seems to have been improvements in the art of fortification in the course of the 17th century. Epitomized by the work of Vauban for Louis XIV, fortresses and walled towns patterned on the *trace italienne* improved to more than counter the effects of increased artillery power dating from the “military revolution” of the late 15th century.⁶⁷ The defender’s ability to build and man such fortresses put major constraints on an attacking army’s ability to invade and take territory. Bypassing a fort left the attacker’s communication and supply lines exposed; moreover, if the enemy decided not to stand and fight, the attacker could invade the territory but could not control it without taking the fortified towns.⁶⁸ Detaching troops to “mask” a fort seriously weakened

⁶⁴Guerlac, “Vauban: The Impact of Science on War,” in Edward Mead Earle, ed., *The Makers of Modern Strategy* (Princeton: Princeton University Press, 1941), 26-48 at 34. He continues: “Almost always [sieges] were the focal operations of a campaign: when the reduction of an enemy fortress was not the principal objective, as it often was, a siege was the inevitable preliminary to an invasion of enemy territory.” See also Howard, *War in European History*, 34; Eric Robson, “The Armed Forces and the Art of War,” in J.O. Lindsay, ed., *The New Cambridge Modern History, vol. 7: The Old Regime, 1713-63*, 163-190 at 166.

⁶⁵Palmer, “Frederick the Great, Guibert, Bulow: From Dynastic to National War,” in Meade, *The Makers of Modern Strategy*, 49-74 at 52. Brian M. Downing writes that “Numerous factors conspired to make warfare in the early modern period much longer than most of the conflicts of medieval Europe. The defensive superiority of disciplined infantry often made a single decisive battle a thing of the past. Conflicts became lengthy wars of maneuver or sieges of walled cities” (*The Military Revolution and Political Change* (Princeton: Princeton University Press, 1992), 68-9). Osgood and Tucker assert that in the 18th century, “The relative strength of the defense continued to retard the pace of war” (*Force, Order, and Justice*, 46).

⁶⁶Cited in Robson, “The Armed Forces and the Art of War,” 173.

⁶⁷Guerlac, “Vauban and the Science of War.”

⁶⁸Van Creveld, *Supplying War*, 9, 38.

the invading force, and laying full siege was expensive and time-consuming. According to Michael Howard, “Most [generals] thought themselves lucky if they could conduct one or two successful sieges and win a favourable position from which to begin their campaign the following year.”⁶⁹ Siege warfare is of course a preeminent case of the war of attrition that marks defense dominance.⁷⁰

Several other factors have been cited as causes of defense dominance in this period. Armies grew to unprecedented sizes in the second half of the 17th century, but they remained composed of mercenaries and poor youth impressed into service who had to be watched and disciplined constantly to prevent desertion. Surprise attack by night was not feasible.⁷¹ More importantly, troops could not be allowed to forage for food supplies unguarded – as Napoleon could do with his more motivated troops – restricting the speed of marches and making supply and provisioning expensive for an invader.⁷² Michael Howard also argues that the increase in firepower dating from the “military revolution” of the late 15th century (muskets particularly) helped cause a robust state of defense dominance that he argues began by 1525.⁷³

The wars of this period were singularly indecisive, as one would expect if defense were relatively favored in the offense-defense balance. According to Luard’s count, “More than in any other age, the wars of this period usually ended in a kind of draw. ... The nature of military power available made total victory extremely costly.”⁷⁴ Eric Robson claims that

⁶⁹Howard, *War in European History*, 76.

⁷⁰According to Brian Downing, in the wars of this period “Each commander hoped that the other’s food and money would run out, precipitating mutiny and dissolution” *The Military Revolution and Political Change*, 70.

⁷¹Delbruck, *The Dawn of Modern Warfare*, 304.

⁷²Martin van Creveld argues against the conventional wisdom that defense dominance in this period stemmed in a large part from long and costly supply “tails” required by large armies composed of unenthusiastic and cautious soldiers. He argues that rapid attacks and marches were possible in this period but were pointless given the tactical requisites of siege warfare. *Supplying War*, 28, 38.

⁷³Howard, *War in European History*, xx.

⁷⁴*War in International Society*, 50. Howard, *War in European History*, notes similarly that defense dom-

military technology in this period was such that “small countries could still survive against large,” another indicator of relative defense dominance.⁷⁵

To my knowledge, no military historian argues that the French Revolutionary and Napoleonic Wars ushered in a period of even greater defense dominance. Rather the opposite – Napoleon’s innovations are universally argued to have broken defense dominance and restored the power and efficacy of offense. No one argues that some technological or organizational innovation immediately followed Napoleon that restored the power of the defense, and which accounts for the Europe’s first “long peace” (1815-1853). If offensive advantage in the offense-defense balance is such a powerful cause of war, we should expect to see considerable fighting in this period – or at least more than was typical in the 18th century – but we do not.⁷⁶

For the second half of the 19th century, there is some debate over whether the major technological innovations (breech-loading rifles and railroads in particular) in principle strengthen offense or defense, with the most sophisticated arguments favoring the defense.⁷⁷ But at the same time there is widespread consensus that leaders in this period generally believed in the relative power of the offense, especially after 1890. Certainly, rapid offensive action and decisive battles were viewed as much more feasible and likely than they were at any time in the 18th century, and such views were in fact justified by the evidence of most wars in Europe, as noted above.⁷⁸ Luard observes that wars in Europe in this pe-

inance in this period “explains why, for over a hundred years, warfare in Europe was so prolonged and so indecisive, smouldering away like wet wood, inflicting continuous damage on the countryside ...” (p. 37).

⁷⁵Robson, “The Armed Forces and the Art of War,” 167.

⁷⁶In both military histories and in some offense-defense scholarship, this period tends to be neglected. Van Evera explains this peace almost wholly in terms of “defensive diplomacy” but also argues that the power of the defense was “restored” by conservative governments abandoning the *levee en masse*; Van Evera, *Causes of War*, 125. But if state leaders know how to raise and command mass armies, then keeping small armies just makes for a very large advantage to offense in the offense-defense balance.

⁷⁷xx

⁷⁸Much is made of how military leaders misread the evidence provided by wars in this period, leading them to be blind to the massive increase in the power of the defense observed in World War I. There is a lot of

riod were unprecedentedly brief and were usually decided by decisive battles (for example, Bismarck's three wars, Austria-Italy 1859, Serbia-Bulgaria 1885 and the First and Second Balkan Wars). Like others, he traces this development to changes in technology: "the use of railways to transport mass armies, strategies based on high mobility and the concentration of large forces, and the hugely increased fire-power of artillery, which made it possible to secure overwhelming victory in a very short space of time."⁷⁹

Finally, if the belief that offense is favored in the balance is in fact a very powerful cause of war and makes war very likely – as some advocates of the standard hypothesis claim – then how do we account for Europe's second long peace from 1871-1914, or even the 24 year period 1890-1914, for which it is generally argued that belief in offensive advantages were at an extreme?

5 Conclusions: An Assessment and an Alternative Hypothesis

What should we make of these three conflicting pieces of evidence? One could argue as follows: The standard offense-defense hypothesis is correct, but it has an empirically significant impact only at the extremes. That is, nuclear weapons and distance between states confer a sufficiently large advantage on the defense to have a noticeable effect on the frequency of war. By contrast, technological and organizational innovations at the conventional level never swing the balance far enough to matter empirically, relative to other more powerful causes of war. This argument would hold that defense dominance *did* depress the amount of warfare between 1648 and 1789, and relative offense dominance (or the perception of it) did raise the amount of war in the 19th century. But the technological/organizational offense-defense balance is simply not a very important cause of war – it is "swamped" by other more important factors, such as (say) diplomatic strategies, states' levels of contentment with the

hindsight bias at work here.

⁷⁹Luard, *War in International Society*, 61.

status quo, or state-society relations.⁸⁰

Note that to retain the standard hypothesis, this argument has to concede that the aspects of the offense-defense balance that have drawn the most attention in recent neorealist writing on the subject – the conventional technological and organizational aspects – are actually not very important causes of war.

While I think that this is correct – other factors are generally more important, except in the case of nuclear weapons – I will conclude by sketching an alternative explanation in which the technological offense-defense balance does matter empirically. I will argue that while many of the war-causing effects that Jervis and Van Evera attribute to relative offense-dominance may exist, so does another effect that works against war.

I develop the argument by addressing the question of what explains the long-term historical trend evident in Levy's and other data sets: The major powers have fought less and less since 1495, and dramatically less against each other. There seems to be no widely accepted explanation for these trends, although at least three conjectures are repeatedly advanced. First, various arguments essentially claim that people have grown more civilized and less war-like over this period. Second, some argue that an evolutionary learning process has occurred in which leaders have gradually learned how better to manage international conflict.⁸¹ Third, some argue that over this long period the benefits of conquest have fallen as the costs have risen.⁸²

Each argument may have something to it. For example, relevant to the second thesis,

⁸⁰Van Evera's "back-of-the-envelope" reading of offense-defense after 1815 actually seems to agree with this assessment. He writes: "Historically, *diplomatic* arrangements have probably shaped the offense-defense balance in Europe as much as *military* arrangements, if not more so ..." *Causes of War*, 130 (emphasis in original)..

⁸¹See, for examples, Holsti, *Peace and War*; Luard, *War in International Society*; Schroeder, *The Transformation of European Politics*; Wang and Ray, "Beginners and Winners"; George Modelski, "Is World Politics Evolutionary Learning?" *International Organization*44, x (xx 1990), 1-24.

⁸²For example, Levy, *War in the Modern Great Power System*, x; Carl Kaysen, "Is War Obsolete?" *International Security*14, 4 (Spring 1990), 42-64. For a counter argument that the benefits of conquest have not fallen, see Peter J. Liberman, "The Spoils of Conquest," *International Security*18, 2 (Fall 1993), 125-53.

Paul Schroeder argues that the “Vienna System” constructed after the Napoleonic wars successfully resolved a large number of the international problems that had caused constant warfare in the 18th century. Further, he argues that the learning embodied in this diplomatic system was in a major part responsible for the peacefulness of the 19th century.⁸³ Relevant to the third thesis – that benefits have fallen as the costs of war have risen – the frequency of great power war has indeed varied inversely with “costs” as measured by battle deaths. The death toll in the decreasing number of wars with great powers on each side has skyrocketed since 1850.⁸⁴

Nonetheless, with the possible exception of the second, these arguments do not square well with an interesting pattern in the data: The decline in major power war is not as smooth and steady as we might expect of the presumed trends in civilization, learning, and benefits and costs. Instead, there seems to be a something of a disjuncture, or “breakpoint,” with the Revolutionary and Napoleonic Wars. Whereas before 1800 the strongest states fought each other on average 18 times per century, after Napoleon they fight only 5 times each century.⁸⁵ Could this sharp break have something to do with the impact of the French Revolution and Napoleon?

I think it might. The Revolution and Napoleon have two related effects that work together to make wars considerably more *risky* for leaders than they had been before. First, the Revolution swept away the principle of political legitimacy that had justified monarchy in previous centuries – the divine right of kings. Under the new principle, monarchical rule was not justified solely by God’s will but by the monarch’s claim to rule on behalf of the welfare of the state and the people. Schroeder sees this shift enshrined in Vienna treaty

⁸³Schroeder, *The Transformation of European Politics*.

⁸⁴Even so, the benefits/costs hypothesis is really somewhat vacuous. How could anyone plausibly measure economic and human costs and benefits over this length of time, given massive changes in economies, societies, states, and the self-understanding of key actors? Battle deaths presumably don’t mean or “cost” the same thing in different periods.

⁸⁵The duration and concentration of wars involving great powers also seems to undergo a major shift after Napoleon.

system:

After 1815, the legitimacy of states, especially new ones, rested not on patrimonial divine right, but on the treaty system, backed by the consent of Europe. The state itself had now become the subject of sovereignty, a kind of moral person, and its prince had become essentially the executive organ of that sovereignty.⁸⁶

The effect of this shift in legitimating principle was to change war from a game played purely among sovereigns and their hired armies to a game in which “the people” or the political classes payed attention to and cared more about the prince’s involvement in war. The Revolution brought to Europe an alternative model for political order within a state, and this meant that monarchs now had to worry that costly and/or losing efforts at war would spell the end of their rule, or at least pressure for reform from domestic liberalizers. An important explanation for major power peace from 1815 to 1853 is that the continental monarchs recognized that going to war entailed major domestic risks. By 1900, the principle of rule for the sake of the people or nation completely dominated, meaning that whether democratic or not, rulers ever since have to be quite concerned about justifying war and its results before domestic political audiences.⁸⁷

This “audience effect” was complemented by effects of the technological and organizational changes resulting from the Revolution and Napoleon, and which concerned the offense-defense balance. Napoleon’s use of the mass army along with subsequent technological innovations increased the variance of military outcomes in war. As I have argued, increased variance makes armed conflict more risky and less attractive for state leaders. The mass army, combined with vastly improved, all-weather road networks, superior supply sys-

⁸⁶ *The Transformation of European Politics*, 578-79.

⁸⁷For example, by the time of Bismarck the question of who was responsible for starting the war had assumed such importance that initiators tried very hard to manipulate and manufacture appearances, as they would in 1866, 1871, and July 1914. I believe that such manipulations are almost unheard of in 18th century diplomacy.

Kaysen, “Is War Obsolete?”, argues similarly that the change in the basis of political legitimacy mattered. However, he tends to argue that it matters because it increases the costs of war as perceived by leaders, whereas my claim is that its main effect is to make war more risky for them. “The people” may like *winning* wars just fine, every bit as much as 18th century monarchs did.

tems, and later, railroads, introduced a possible war outcome that virtually never occurred in major power conflict prior to 1804.⁸⁸ After Napoleon, losing one or a few battles could mean that a massive enemy army might show up in the loser's capital city and throw out the existing regime. The mass army motivated by nationalism and rendered highly mobile by revolutions in transport and supply could move incredibly quickly all over the European map, posing a new sort of threat to rulers. Thus, technological factors that tended to tilt the offense-defense balance towards offense tended also to make war more risky and less safe for sovereigns. In so far as leaders are risk averse about losing power or the ability to govern effectively, this increased variance of outcomes should have made them more cautious about going to war.

Data on what happened to the regimes of losers before and after the Revolution supports this hypothesis. From 1648 until the French Revolution, no monarch in a major power was unseated by an opponent or domestic reaction following a war; the biggest problem monarchs faced in losing wars was debt.⁸⁹ After Napoleon, losing regimes have frequently faced removal, occupation or serious domestic unrest – Austria in 1866, France in 1871, Russia in 1905, Germany in both world wars, Japan in 1945, for example. Indeed, in a more systematic study Bruce Bueno de Mesquita, Randolph Siverson, and Gary Woller find that war participation has remarkably large effects on fate of political leaders for the period 1815-1975. They find that 18.8% of regimes engaged in war were deposed or otherwise *violently* replaced during the war or within three years of the war's end. This rate is about twice as high as the rate for a random sample of states not at war. Further, losing a war increases the rate of violent regime change to 29.5%. Finally, if a state loses a war it initiated, the rate is a remarkable 44%.⁹⁰

⁸⁸On these improvements, see McNeill, *The Pursuit of Power*, chaps. 5-6.

⁸⁹Minor powers, such as Poland, were occasionally carved up.

⁹⁰Bruce Bueno de Mesquita, Randolph Siverson, and Gary Woller, "War and the Fate of Regimes: A Comparative Analysis," *American Political Science Review* 86, 3 (September 1992), 638-46.

If these changes in technology and the basis of political legitimacy do tend to make leaders more risk averse after 1815, then we should also find that major powers require a higher probability of success in order to initiate a war. Wang and Ray's data show that there is in fact a striking change in the success rate of initiators after 1800. Before 1800, major power initiators won slightly more than half the time, while in the periods 1800-1899 and 1900-1991 the success rates jump to 73.6% and 66.7%, respectively.⁹¹

In sum, the hypothesis is that after Napoleon, increased offensive advantages (relative to the prior period) increased the variance in military outcomes, which made war less attractive for state leaders. This technological effect worked together with the effect of a new principle of legitimacy, which obliged monarchs to justify the results of war or face domestic unrest and pressure for reform.⁹² While I cannot give a full assessment here, I would argue that this mechanism makes sense of several minor puzzles beyond the major anomaly discussed above.

First, it may help explain why it took 24 years for a major war to occur in Europe during a period of apparently extreme belief in the power of offense. Precisely because military and civilian leaders in the period 1890-1914 glorified the offense, they also expected that the losers in a big war could very well lose everything, including their regime. Belief in offense-dominance entails the belief that war is a grave gamble, a roll of the "iron dice." The high variance of war outcomes worked to make them cautious about starting such a conflict, even as belief in first-strike advantages pushed them towards war in the crisis that finally led to war. Thus offensive advantages may have conflicting effects on the probability of war.

Second, why does Britain almost top the list for number of wars fought inside and

⁹¹Before 1800, the rates are 55.6%, 52.3%, and 52.9% for the respective periods 1495-1599, 1600-1699, 1700-1799. Wang and Ray, "Beginners and Winners," 145.

⁹²There may be a more general principle at work: Anarchy plus technology drives an arms race; to pay for it and keep up, kings need to strike a bargain with wealth producers (which takes the form of more democracy), but this entails that the suppliers of blood and money ask for more control over the decision to fight, and sanction leaders more for poor decisions. Brian Downing suggests this argument in *The Military Revolution and Political Change*, especially p. 25.

outside of Europe since 1815?⁹³ From the conventional standpoint this is a puzzle – Britain was relatively powerful and blessed with a natural defensive advantage in the English channel, so it should not have faced security dilemmas as acute as Germany or France. But Britain’s defensive advantage meant that she could safely prosecute colonial and other wars in the periphery, without having to allocate significant resources to deterring invasion by neighboring states. In Small and Singer’s data, France, Russia, and Britain head the list for war involvement since 1815, in each case largely due to constant, often defense-dominant warfare on the peripheries of their empires. These were “safe” wars that bore no risk of the enemy showing up in Paris, London, or St. Petersburg. Germany, the major power with the worst naturally protected borders in Europe, fights in less than half the number of wars as France, Russia, or Britain in this period.

Finally, the hypothesis can account for why the “defense-enhancing” effect of nuclear weapons *does* appear to matter empirically as the conventional offense-defense argument would predict, despite the apparent failure of the argument for conventional technology. As noted, the argument that nuclear weapons favor defense in the balance is not straightforward. If nuclear weapons favor the defender, they do so by rendering defense in the classical sense impossible. Instead, nuclear weapons favor the defender by making deterrence the inescapable condition – regardless of the battlefield outcome, nuclear states retain the power to utterly devastate an opponent. Whereas in a defense-dominant world states can safely prosecute war on the perimeter without worrying much about total defeat, in a deterrence-dominant world wars on the perimeter of a state always carry some risk of escalating to include nuclear strikes to one’s home territory. Thus nuclear weapons may favor the defender at the same time as they increase military variance (by introducing risks of complete annihilation), in which case both the standard argument and the military variance argument point in the direction of less war.

⁹³France heads the list with 22; Britain and Russia tie for second at 19. See Small and Singer, *Resort to Arms*, 167-73.

TABLE 1: Wars involving at least one great power

1648-1789: N = 32, or .22 wars per year

	Average	Median	Standard deviation
Duration	5.34	4	4.7
Severity	152,070	23,500	29,800
Intensity	1,498	242	2,911
Concen.	5,951	3,313	6,287
Extent	2.5	2	1.6

1815-1913: N = 18, or .18 wars per year

	Average	Median	Standard deviation
Duration	1.02	.8	1.12
Severity	38,620	5,800	65,650
Intensity	306	45	522
Concen.	34,207	5,527	54,038
Extent	1.5	1	.78

TABLE 2: Great power wars (great powers on both sides)

1648-1789: N = 20, or .14 wars per year

	Average	Median	Standard deviation
Duration	6.65	6	5.41
Severity	228,000	50,500	355,790
Intensity	2,258	516	3,476
Concen.	6,966	4,367	6,855
Extent	3.3	3	1.53

1815-1913: N = 4, or .04 wars per year

	Average	Median	Standard deviation
Duration	.825	.4	1.07
Severity	112,750	107,000	100,320
Intensity	897	843	800
Concen.	87,083	81,667	53,961
Extent	2.5	2.5	.577

Note: Data assembled from Jack S. Levy, *War in the Modern Great Power System, 1495-1975* (Lexington, KY: University of Kentucky Press, 1983).