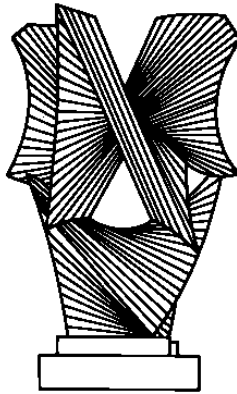


# CHICAGO

JOHN M. OLIN LAW & ECONOMICS WORKING PAPER NO. 160  
(2D SERIES)



## A Theory of the Laws of War

*Eric A. Posner*

**THE LAW SCHOOL  
THE UNIVERSITY OF CHICAGO**

This paper can be downloaded without charge at:  
The Chicago Working Paper Series Index:  
<http://www.law.uchicago.edu/Lawecon/index.html>

The Social Science Research Network Electronic Paper Collection:  
[http://ssrn.com/abstract\\_id=1332620](http://ssrn.com/abstract_id=1332620)

# A Theory of the Laws of War

Eric A. Posner<sup>1</sup>

*Abstract.* The laws of war govern the weapons and tactics that belligerents may use against each other. This paper uses a model of conflict to explain and evaluate the laws of war. In the model a nation's propensity to engage in conflict is a positive function of the effectiveness of military technology, and a negative function of the destructiveness of technology. Accordingly, in theory nations would want to agree to laws of war that permit destructive weapons and tactics but limit their effectiveness. However, nations with different endowments and resources will enjoy differential advantages, and this makes agreement on specific laws of war very difficult. The paper discusses empirical implications of the argument, and discusses whether the Hague Conventions are consistent with the model.

The ancient Greeks fought many wars among themselves but also observed rules of battle. These rules prohibited summary execution of prisoners, attack on noncombatants, the pursuit of defeated opponents beyond a limited duration, and many other forms of warfare that are condemned to the present day.<sup>2</sup> Josiah Ober argues that the Greek rules were intended to limit the violence of war, and he, like many other historians, take comfort in what seems like a natural human tendency to limit the brutality of war. A war in which prisoners are spared is surely more humane than a war in which they are executed. But another interpretation is possible. These "rules" could be descriptions of behavioral regularities rather than constraints on self-interested behavior. Prisoners are not usually executed but only because they have value as hostages and are often ransomed. Armies often spare noncombatants because they pose no immediate threat, they can provide supplies, information, and other services, and armies do not wish

---

<sup>1</sup> Professor of Law, University of Chicago. Thanks to Jack Goldsmith, Rich Hynes, and Richard Posner, and especially to Ryan Goodman and Derek Jinks, for helpful comments, to The Sarah Scaife Foundation Fund and The Lynde and Harry Bradley Foundation Fund for financial support, and to David Kitchen for valuable research assistance.

<sup>2</sup> Josiah Ober, Classical Greek Times, in *The Laws of War 13* (Michael Howard, et al. eds. 1994).

to give other civilians a reason for resistance. And any army that pursues a defeated opponent risks outrunning its supply lines and falling into disorder. Patterns of behavior that seem humane are not necessarily signs of humanity. The view shared by Ober and others mistakenly assumes that the military objective is always to slaughter as many people as possible, when it is more often to acquire territory and secure other resources, activities that often are best accomplished by treating civilians and even enemy soldiers with restraint.

The optimistic view about the laws of war is shared by many scholars in the international law community. Although their interpretation of events in past wars is, like Ober's, often superficial—the common claim that international law prevented most belligerents from using poison gas against combatants during World War II makes an unnecessary puzzle of nations' willingness to violate many other laws during that war—the pessimistic view that the laws of war have no effect is also too strong. It has trouble explaining why states talk as though they recognized laws of war, and in the last century made repeated efforts to codify them and expand them in treaties and conventions. The Hague Peace Conferences of 1899 and 1907 were the first significant official effort to spell out the rules of war. These rules included a general prohibition on weapons that cause “unnecessary suffering,” as well as several more specific restrictions on the use of weapons and tactics. Subsequent conventions have dealt with biological and antipersonnel weapons, the treatment of prisoners of war, and the treatment of civilians at time of war.<sup>3</sup> And even though the laws of war were widely disregarded during World War I and World War II, they have been the subject of extensive diplomatic negotiation since 1945.

The optimistic and pessimistic views, as fleshed out in the literature, differ in their assumptions about the motivations of states and their interpretations of evidence. The pessimists assume that states act in their interest, and their interest is usually that of security and power. The optimists assume that while states act in their interest, they also internalize the humanitarian norms reflected by international law, and treat them as

---

<sup>3</sup> See Geoffrey Best, *Humanity in Warfare* (1980); Geoffrey Best, *War and Law Since 1945* (1994).

partial constraints on behavior. In work with Jack Goldsmith, I have argued that international law is equilibrium behavior in which self-interested states are constrained only by their expectations about the strategies chosen by other self-interested states.<sup>4</sup> We agree with the optimists that states can in theory obtain gains through coordination and cooperation, but we agree with the pessimists that states do not regard international law as an external binding force, and we also tend to agree with the pessimists that the evidence suggests that true cooperation is relatively rare.

In this paper I also argue that the laws of war can, in theory, be explained as self-enforcing strategies adopted by self-interested states, though again I find the pessimistic interpretation of the evidence more compelling than the optimistic interpretation.<sup>5</sup> To say that the laws *could* produce joint gains is not to say that they do. My focus is not on whether the rules constrain—it is sufficient to point out that states during interwar periods either think or hope or pretend that the laws can constrain—but on the content of the rules.<sup>6</sup> The question is, Why would states think it in their interest to consent to laws of war that confine their choices among weapons and tactics? I will argue that the conventional wisdom—that the laws of war reflect humanitarian considerations—is unhelpful, and that the laws of war, like arms limitations agreements, are best understood as devices for limiting states' investment in military conflict. But I will also point out a deep puzzle about these laws.

---

<sup>4</sup> Jack Goldsmith and Eric A. Posner, A Theory of Customary International Law, 66 U. Chi. L. Rev. 1113 (1999).

<sup>5</sup> See John B. Hattendorf, Maritime Conflict, and Adam Roberts, Land Warfare, in Laws of War, *supra* note \_\_\_\_.

<sup>6</sup> For a theory of compliance with the laws of war, see James Morrow, The Laws of War, Common Conjectures, and Legal Systems in International Politics, J. Legal Stud. (forthcoming 2002). He treats the laws as efforts by states to identify in advance self-enforcing strategies in a game of attrition.

## I. The Laws of War: An Overview

The laws of war can be divided into general principles and specific prohibitions.<sup>7</sup> The necessity principle holds that the amount of suffering caused by a weapon (in the form of death, serious injuries, and so forth) should not be more than necessary to achieve a legitimate military aim. The discrimination principle, and the related proportionality principle, hold that civilians should not be targeted, and collateral damage to them and their property should be limited.<sup>8</sup>

The principles are most easily understood in their application to specific prohibitions. The necessity principle is illustrated by the distinction between dumdum bullets, which are proscribed, and explosive shells, which are permitted. Both cause severe wounds, compared to those caused by ordinary bullets, but the explosive shells also disable or kill more soldiers. For a given level of suffering, the explosive shell obtains a larger military objective. To be sure, one might quarrel with both claims, and argue that dumdum bullets are more effective than explosives and ordinary bullets when the military objective is to stop enemy soldiers without destroying nearby structures or civilians, but the basic idea is clear.

The proportionality principle would likely forbid area bombing of cities during World War II, which was intended to kill and demoralize civilians. The recent American strategy of bombing targets from high altitudes so that pilots are invulnerable to anti-aircraft fire provides a more controversial example. It has been argued that the strategy produces too many civilian deaths for a given military objective, and that the proportionality principle requires American pilots to risk their lives and fly at lower altitudes in order to reduce the harm to civilians.<sup>9</sup>

---

<sup>7</sup> This summary is based on Christopher Greenwood, *The Law of Weaponry at the Start of the New Millennium*, in *Law of Armed Conflict into the Next Millennium 194-212* (Michael Schmitt & Leslie Green eds. 1998).

<sup>8</sup> The first principle says that civilians should not be targeted; the second says that destruction of military targets should not cause unnecessary collateral civilian damage. I will treat them as a single principle limiting damage to civilians and civilian property.

<sup>9</sup> Amnesty International, "Collateral Damage" or Unlawful Killings?: Violations of the Laws of War by NATO During Operation Allied Force (June 2000).

Also interesting, but not squarely following from the principles, is a rule against perfidy, which forbids soldiers to wear the uniforms of enemies, call a truce in order to lure the enemy into the open where they will be attacked, disguise a warship as a hospital ship, and so forth. Deception during war is not prohibited: one can trick the enemy into thinking that one's army is at point A rather than point B. The prohibition extends only to deception that involves the manipulation of international law.

There are many other principles and prohibitions, including a great many maritime rules of an analogous nature, and more detailed rules contained in the Geneva Conventions and subsequent international court opinions. But those that have been mentioned serve to convey the general sense of the laws of war.

## II. The Humanitarian View

The conventional explanation for the laws of war is that they serve humanitarian values, but it is hard to find a detailed defense of this position. The necessity and discrimination principles are usually identified with the humanitarian premise, as if they were logically entailed. Other principles or rules, such as those against perfidy, are said to reflect "chivalric values."<sup>10</sup> The prohibition of highly expensive weapons, a goal of some of the parties to the Hague Conferences, appears to be based on the goal of making war less costly, not necessarily to save lives and property during wars.<sup>11</sup> The rules also reflect "deep-seated taboos" like the taboo against fire, and "self-interest," such as the desire to preserve a military advantage (like Britain's navy) against a new technology (submarines).<sup>12</sup> But this hodgepodge is not satisfactory. There might or might not be a deep-seated taboo against fire; fire has been an important weapon for hundreds of years. Chivalric values are offended by all kinds of permitted behavior: not just the use of

---

<sup>10</sup> Greenwood, *supra* note \_\_, at 190; Thomas Meron, *The Humanization of Humanitarian Law*, 94 *Amer. J. Int'l L.* 239 (2000).

<sup>11</sup> *Id.*, at 191

<sup>12</sup> *Id.*

deception that does not involve international law, but the use of artillery and other long range weapons. There are too many moving parts and ambiguous concepts.

The deeper puzzle about the humanitarian theory is that limiting the destructiveness of weapons and tactics does not necessarily minimize the loss of life and destruction of property. The contrary view, which has been asserted time and again, is that short-term ruthlessness reduces long-term suffering.<sup>13</sup> Massive destruction promises to end a war earlier rather than later, and to deter future wars. Nuclear weapons, it is often argued, kept the peace during the Cold War.<sup>14</sup>

The standard rejoinder to these objections (other than denial of its empirical validity) is that the laws of war accept the existence of war, and have the limited role of constraining suffering.<sup>15</sup> But if the result is more war and more suffering, then the laws do not serve a humanitarian purpose; they are merely perverse.

### III. A Theory

#### A. A Simple Case Involving Equal States

Imagine two states ( $i = 1, 2$ ) that start with equal resources ( $r_i$ ) and then invest them either in productive capital ( $e_i$ ) or military capital ( $f_i$ ).<sup>16</sup> Productive capital produces goods for domestic consumption; military capital produces appropriative capacity—the ability to extract a share of the other state’s resources. Each state knows that the other state will divide its resources between production and predation; there is full information.

---

<sup>13</sup> Paul Kennedy and George J. Andreopoulos, The Laws of War: Some Concluding Reflections, in *The Laws of War* 217; Best, *Humanity in Warfare*, supra note \_\_\_\_.

<sup>14</sup> Nuclear weapons have not been subject to specific prohibitions but they potentially run afoul of the proportionality principle, depending on their use. Compare *Legality of the Threat or Use of Nuclear Weapons*, 1996 I.C.J. 226.

<sup>15</sup> Meron, supra note \_\_\_\_.

<sup>16</sup> I rely on a simplified version of Hirshleifer’s conflict model here and throughout, and the reader should consult his discussion for assumptions, limitations, and so forth. Jack Hirshleifer, *The Paradox of Power*, in *The Dark Side of the Force* (2001). I do not discuss production technology and thus assume that in his model the production technology variable  $s = 1$ . For a related model, see Herschel Grossman and Minseong Kim, *Swords or Plowshares? A Theory of the Security of Claims to Property*, 103 *J. Pol. Econ.* 1275 (1995).

The efficiency with which resources are converted into productive or military capital depends on the productive and military technologies. Keeping things simple, we will assume a simple productive technology where one unit of production produces one unit of income. Think of the two states jointly producing an income equal to the sum of their respective investments in productive capital ( $y = e_1 + e_2$ ). This joint income is, in effect, a common pool from which each state extracts a share through its investment in military capital. Each unit of investment in military capital increases the investing state's share of the joint income, holding constant the other state's investment. If each state invests an equal amount, each obtains half of the joint income; if one state invests more than the other, then the first state's share is larger than one half. The military technology,  $m > 0$ , is a variable that changes as a result of technological and strategic innovation: the more efficient the military technology, the larger a share of the joint income will be obtained by a state that invests one additional unit in military capital, holding constant the other state's investment in military capital.<sup>17</sup>

For each state, the optimal outcome occurs if both invest all their resources in production and none in predation. They produce the maximum output and divide it evenly.<sup>18</sup> The problem is that each state has an incentive to invest in predation as well. If state  $j$  invests 0 in its military, then state  $i$  can obtain all of the joint income by investing a small amount in its military. Because state  $j$  has the same incentive, both states will invest a positive amount in their militaries. Further, because each state expects the other to engage in some predation, the first state does not expect to obtain the full marginal dollar of its investment in productive capital; and this creates an additional incentive to move resources from production to predation. On the other hand, neither state will invest all of its resources in military capital, for then at the margin it will obtain relatively little from the other state while foregoing its own opportunity to produce goods and keep a share of them.

---

<sup>17</sup> A state's share  $p_i = f_i^m / (f_1^m + f_2^m)$ . Thus, each state's utility function is  $p_i y$ , subject to  $r_i = e_i + f_i$ .

<sup>18</sup> For now, I assume that each state wants to maximize consumption; a common assumption among realists is that states care about relative position. This assumption does affect the discussion here; I will discuss it below when it matters.

In equilibrium each state will invest equal, positive amounts in both military and productive capital. What is more interesting, for our purposes, is that they will invest more in military capital as the military technology becomes more efficient (holding constant productive efficiency). The reason is that with greater efficiency, the predatory returns generated by an additional dollar invested in military capital will be greater than the share of productive returns generated by an additional dollar invested in productive capacity. But because both states invest more in predation, they become jointly worse off. Thus, the prisoner's dilemma-like logic of the game forces the states to impose greater joint costs on each other as military technology becomes more efficient.

The states will be better off if they can jointly limit (1) investment in military capital, or (2) the efficiency of military technology. The first goal is generally reflected in arms limitation agreements, and is not of concern here. The second goal suggests a hypothesis for the laws of war: that they are designed to limit the efficiency of military technology.

This hypothesis sheds light both on the general standards and specific rules. The necessity principle, by requiring states to use weapons and tactics that do not cause too much harm given a military objective, forces the state to use less powerful or destructive weapons. By reducing the options available to commanders, the principle reduces the capacity of a unit of military investment to inflict harm on the enemy. The same is true for the discrimination principle, which requires a military force to *take losses* rather than inflict too much harm on civilians and civilian property. The discrimination principle thus increases the cost of achieving a given objective, that is, increasing one's share of the joint income.

Rules prohibiting poison gas, the execution of prisoners, the laying of untethered mines at sea, and many other activities exhibit a similar logic. Poison gas can be cheap and effective; prisoners are costs when conditions prevent their use as hostages or

workers;<sup>19</sup> untethered mines are cheaper than tethered mines; and so forth. Also consistent with the hypothesis are repeated but usually unsuccessful efforts to restrict new, highly effective weapons—the crossbow, submarines, nuclear devices.

The rules against perfidy can also be understood from this perspective. Perfidy—for example, displaying the white flag but then firing on enemy forces as they approach—is a highly effective tactic, in the sense that it enables a weaker force to inflict losses on a stronger force by luring the latter into the open. Of course, once one side uses this tactic, the other side will not trust it, but we must assume that the first side takes the costs into account. The rules against perfidy removes an option that is sometimes effective, thus driving up the cost of military operations.

The laws relating to neutrality are designed to make clear the ways that belligerents will treat neutrals. Belligerents generally want expansive rights—they want to be able to stop neutral ships and search for, and seize, materials being shipped to the enemy; and they want to blockade enemy ports. Although belligerents also fear that if they treat neutrals too roughly, these states will enter the war on the other side, they will balance this cost against the benefit. If laws of neutrality are constraining, then they again take away an effective weapon from the hands of the belligerent. (It is conceivable that strong neutral rights should be counted as the effective weapon; for example, if enemies ship spies and saboteurs via neutral vessels. But the history of the laws of war suggest otherwise: that being able to stop, block, or sink neutral ships was an important freedom for belligerents.)

The main barrier to empirical verification of the model is the difficulty distinguishing between an efficient technology and an inefficient technology. There is much debate, for example, about whether poison gas is efficient or inefficient; and apparently efficient technologies like laser-guided bombing are not efficient if they are too costly. Still, the “technology limitation” hypothesis has enough support to be

---

<sup>19</sup> On which, see James D. Morrow, *The Institutional Features of the Prisoners of War Treaties*, 55 *Inter'l Org.* 971 (2001); Posner, *Comment*, *supra* note \_\_.

considered a legitimate rival to the ill-defined humanitarian view. It implies that laws of war will be directed foremost at the most efficient weapons (that is, with the highest ratio of military effectiveness to cost, and thus not necessarily the most expensive weapons). It also implies that states would ban all weapons if they could; but we will see why they do not go that far in the next two sections.

## B. Unequal States

Suppose now that state  $i$  starts with more resources than state  $j$  does. Some of the basic results of the original analysis continue to hold: each state will invest some amount in military capital and as a result neither is as well off as it would be if both invested solely in productive capital. However, with unequal resources there is a twist.

Suppose that the military technology is below some threshold  $m^*$ . Despite its greater wealth, state  $i$  will invest the same amount in military capital that state  $j$  invests, and thus more in productive technology. The reason is that state  $j$ , given its limited resources, will not produce much income; thus state  $i$  gains little from investing in predation, and instead will invest more in production. State  $j$  thus has all the more to gain from predation—it gets a share of the income disproportionately produced by state  $i$ . State  $j$  will gain relative to state  $i$ : in the extreme case, they could end up with the same share of the joint income. Hirshleifer calls this phenomenon the “paradox of power”: a weaker state can gain at a stronger state’s expense.<sup>20</sup>

This result does not hold for sufficiently high  $m$  and for sufficiently great inequality, however. Above a certain  $m^*$ , and with sufficient inequality, state  $i$  will be able to invest much more in military capital than state  $j$  can. State  $j$ ’s resources put a ceiling on the amount it can invest in military capital; once production is down to 0, state  $j$  can allocate no more resources to the military. But a sufficiently large state  $i$  can devote much more to the military, and thus maintain its advantage against  $j$  or do better. An illustration might be the American defeat by Vietnam and victory over Iraq. In the

---

<sup>20</sup> Hirshleifer, *supra* note \_\_, at 52.

comparatively low-technology Vietnam war, Vietnam's lack of productive opportunities made its opportunity cost of military investment very low.<sup>21</sup> As for Iraq, even if it had put all its resources into military investment, it would have been unable to resist superior American technology and training.

The result adds a dimension to the earlier model. There is a long history of using international law against small predatory states: from the Berber pirates to the current exporters of terrorism. Efforts to ban the use of chemical and biological weapons, and the spread of nuclear weapons, reflect this logic, as does (controversially) recent efforts to ban antipersonnel mines. A small state with powerful weapons can extract tribute, concessions, and other benefits from a much wealthier state, and wealthier states would like to respond, even in concert, by creating international law that restricts the weapons and tactics that favor the small states.<sup>22</sup> The rules requiring humane treatment of POWs, and permitting trickery but not torture to extract information from them, while to all appearances humane, likely benefits wealthier states that have the resources to hold POWs in decent conditions, transport them to safe locations, and conduct lengthy interrogations. But if we can understand why large states would create international law banning these weapons and tactics, we should not be surprised that they have trouble enforcing it. Large states that suffer less from small state extortion have little reason to aid large states that suffer more from it, and indeed refraining from rendering such assistance will produce relative gains in a security competition.

The model therefore suggests that the small states will not necessarily consent to the laws of war. When North Vietnam objected to a proposed law against cluster bombs during the Lucerne Conference of 1974, a delegate explained that "a weapon used by the imperialist is an imperialist weapon.... In the hands of a liberation fighter, it is a sacred tool."<sup>23</sup> Small states seek to outlaw only those weapons and tactics that rich states alone can afford. Rich states will support bans on cheap and effective weapons, and also on

---

<sup>21</sup> One must be careful about fitting the model to the facts. The joint income includes something like control over the economic and political decisions of Vietnam and Iraq.

<sup>22</sup> Also known as the "weapons of the weak." See Richard Price, *Reversing the Gun Sights: Transnational Civil Society Targets Land Mines*, 52 *Inter'l Org.* 613, 641 (1998).

<sup>23</sup> Eric Prokosch, *The Technology of Killing* 155 (1995).

more expensive ones to the extent that they are more concerned about their absolute level of production than about the relative standing of poorer states. Multilateral consensus will be difficult to achieve, and peace conferences that begin with high hopes will often produce vague principles or rules with large loopholes—a recurrent complaint about the Hague and Geneva conventions.

### C. Destructive Weapons

One can make a useful distinction between *effective* weapons and *destructive* weapons.<sup>24</sup> For a given level of military investment an effective weapon increases the state's share of joint income more than a less effective weapon. By contrast, holding constant its effectiveness, a destructive weapon reduces the size of the joint income more than a less destructive weapon. In the prior sections, we assumed that military capital had zero destructiveness: the loss of income came indirectly through the investment in military capital rather than productive capital. With positive destructiveness, a weapon reduces the size of the joint income independently of its effect on parties' incentives to allocate resources between the two types of capital.

The destructiveness of weapons appears to be an important theme of the laws of war. Illustrations include limitations on destruction to civilians and civilian structures, on the mistreatment of POWs, on weapons that cause devastating wounds, on mines and other weapons whose dangerousness persists after the conflict ends, and on weapons that cause significant environmental harm. The objectionable feature of these practices is, one might argue, not the efficiency of the technology but the extent to which the weapons harm productive capital, defined broadly to include the human capital of civilians and of soldiers after they are demobilized.

One might therefore believe that the laws of wars are designed to limit the destructiveness of war, and in doing so, to increase production and reduce investment in

---

<sup>24</sup> See Grossman and Kim, *supra* note \_\_\_. Hirshman's model does not make this distinction, and I use a slightly modified version of it in this section.

military capital. But the truth is more complex. It is possible that limits on the destructiveness of weapons make states worse off, not better.

To see why, one must understand that the destructiveness of a weapon has a good as well as a bad side: states are less likely to go to war against states that have destructive weapons, even if all states have the same weapons. Assume that each of two states has the same resources. Imagine that the existing military capacity of a state can be measured by a variable  $v$ , where a high  $v$  means that a given investment in military capacity results in a relatively large reduction in the joint surplus available to both states. If  $v = 0$ , as in our examples prior to this section, then each state will invest a given amount in military technology. For  $v > 0$ , each state will reduce its investment in military technology. The reason is that while a given amount of military activity will have the same distributional effects as before, it will also reduce the size of the joint income that will be divided. With a lower marginal benefit from military investment, states will invest fewer resources in military capital. In equilibrium, there will continue to be some military investment, but much less, and the joint income will be higher than it would be if  $v$  were equal to 0. If a state can win a war only by destroying the enemy's cities and factories—and in the process will lose its own cities and factories as well—then the fruits of victory are not particularly attractive, and neither is conflict.

The argument is not as paradoxical as it sounds: many people believe that the destructiveness of nuclear weapons explains why there was no serious military conflict between the United States and the Soviet Union during the Cold War, and this was one reason why the I.C.J. did not declare them illegal.<sup>25</sup> In addition, during World War II commanders frequently used a similar argument to justify the destruction of cities and civilians through massive aerial bombardment. The more ruthless we are today, the more likely they will surrender tomorrow rather than a year from now.

But the argument cannot be a full explanation for the laws of war: the laws of war do not forbid less destructive weapons, as the argument implies that they should.

---

<sup>25</sup> See supra note \_\_.

According to the model, the laws of war should forbid non-destructive weapons, and should permit destructive weapons. However, the analysis of destructiveness suggests an important negative conclusion: that states will be reluctant to ban efficient weapons that are also destructive.

Let us say a few words about destructiveness when states have unequal endowments. Recall that poor states gain more from highly effective weapons than wealthy states do, at least up to some threshold of effectiveness. This gives wealthy states a reason for favoring laws that limit the effectiveness of weapons. One might think that a similar logic is at work for destructiveness. But there are many offsetting effects. An increasingly destructive weapon makes conflict less likely, but as we have seen, conflict can (but does not always) favor poorer states. On the other hand, the destruction itself is a deadweight cost and can reduce joint income to the point where the poorer state is made worse off. And of course much depends on the extent of the inequality of resources. So it is hazardous to judge the impact of destructiveness on enthusiasm for international law when states have unequal resources.

#### D. Summary

States have an interest in agreeing to binding (if possible) laws of war that limit the effectiveness of military weapons; but the zone of agreement shrinks as one takes account of (1) the inequality of wealth among states; (2) the value of effective but destructive weapons for averting war. In the next section, we discuss further reasons why agreement on the laws of war is difficult.

### V. Complications

#### A. Technological and Other Strategic Asymmetries

A significant barrier to agreement on the laws of war is the asymmetry of the positions of states. We have already discussed asymmetry of resources. Another

asymmetry is technological. Russia proposed the Hague Peace Conferences in the hope of restricting a powerful type of field gun recently developed by Austria-Hungary. Austria-Hungary naturally opposed Russia's design and no such law was created. Another asymmetry is strategic. Britain sought restrictions on submarines because it feared that they would threaten Britain's dominant navy. States with weaker navies opposed Britain's position.<sup>26</sup> Opponents of the recent treaty that bans mines point out that many signatories have no need for mines; for other states, mines keep the peace between them and belligerent neighbors. When a facially neutral law of war has distributional effects because of the asymmetric positions of states, agreement will be difficult unless there are side payments or compromises. But because of the great heterogeneity among states—and particularly in their technological capacities and their strategic positions—it will be very rare for *all* states to benefit from a significant limitation on weapons or tactics; and if states care about their relative position, vanishingly rare. Asymmetry of position is probably the most important factor limiting the laws of war, forcing peace conference delegates to produce vague standards rather than crisp rules.<sup>27</sup>

## B. Verifiability

Another significant barrier to agreement is the problem of verifiability. Morrow discusses an incident during World War II, when the Luftwaffe bombed an American ship that carried chemical weapons.<sup>28</sup> The resulting chemical cloud might have been seen as a deliberate use of chemical weapons, and a violation of the law of war, justifying retaliation in kind. If states jointly benefit from the prohibition of one weapon or tactic, but not from the prohibition of a closely related weapon or tactic, then the viability of a law against the first depends on whether it can be distinguished from the second.

---

<sup>26</sup> See Legro, *supra* note \_\_, at 36. France during the Napoleonic Wars also attempted to use international law to constrain Britain's dominance at sea; see Hattendorf, *supra* note \_\_, at 107. There have been similar conflicts between nations that depend on maritime commerce, and their opponents; see Howard S. Levie, *Mine Warfare at Sea* (1992).

<sup>27</sup> International criminal courts and international war crimes legislation also fit within the analysis: the ICCJ is best understood as an effort to increase the United State's cost of projecting military power. See Jack Goldsmith, *The Self-Defeating International Criminal Court* (unpublished manuscript, 2002).

<sup>28</sup> Morrow, *supra* note \_\_, at \_\_.

### C. Multistate Agreements and Wars

Wars often involve more than two powers. An increase in the number of states is likely to result in an increase in the amount of military investment, and a decrease in the amount of productive investment. The logic is the same as that for the Cournot model of oligopoly: as the number of firms increases, cooperation becomes more difficult, and the cooperative surplus declines. The laws of war should be either weaker and more limited, or broken more frequently, as the number of states increases.

The modern laws of war emerged from multilateral conferences, and have many signatories. Morrow argues that many states agree to laws in advance of war, rather than a few belligerents agreeing to laws at the start of a war, because in the prewar period a veil of ignorance facilitates agreement by masking the distributional effects of the laws.<sup>29</sup> The problem with this view is that the multilateral treaty must be self-enforcing; and if earlier agreement is disadvantageous to one state at the start of the war, the state will not obey the treaty. In addition, states do send each other messages during wars, in which they abjure first use of a weapon like poison gas but threaten to retaliate in case of use by the enemy. The simplest explanation for multilateral treaties is that every state, or nearly every state, faces some of the same basic strategic interactions in any war, and so there are gains from multilateral negotiations rather than numerous bilateral negotiations. But one conjectures that these treaties have more influence on subsequent two-state wars than on multistate free-for-alls, where strategies of reciprocation are less likely to succeed.

### D. Offense and Defense

There is a difference between offensive technology and defensive technology. It is said that the machine gun was a decisive defensive weapon at the time, and the tank was a decisive offensive weapon. One might conjecture that the laws of war would be designed to discourage offensive technology and encourage defensive technology.

---

<sup>29</sup> Morrow, *supra* note \_\_\_, at \_\_\_.

The problem with this argument, however, is that offensive and defensive technologies should have similar effects on the depletion of joint income. A high offensive technology encourages each state to invest more in conflict: one dollar on offense now yields a higher share holding the other side's strategy constant. But the same argument applies to defensive technology. With highly effective defensive technology, each state will invest more in defense, thus diverting resources from productive uses. The logic is symmetrical.<sup>30</sup>

#### E. Ineffective Weapons

It is sometimes suggested that laws of war prevent states from using *ineffective* weapons, rather than effective weapons.<sup>31</sup> The laws against use of poison gas might have succeeded because poison gas was an ineffective weapon. Humane treatment of POWs might be a useful strategy for encouraging surrender. These arguments might be true, but it is hard to understand why states would bother to outlaw practices that have no military value. A state would unilaterally refrain from those practices and hope that the enemy is foolish enough to engage in them. There is no law against the bow and arrow; why should there be a law against poison gas that blows back onto friendly troops? It might be the case that these weapons have a very small military value, and so states comply with international law in order to enhance their reputations for being good international citizens; but if the cost of refraining from use is so small, the reputational gain should be minimal. The better interpretation is that states ban weapons and tactics that states believe, or fear, will be highly effective, and indeed that was their attitude about poison gas prior to World War II.<sup>32</sup>

---

<sup>30</sup> Grossman's model distinguishes offense and defense, and what for Hirshman is the "conflict technology" is for Grossman the advantage of offense over defense. But Grossman's model does not shed additional light on the laws of war.

<sup>31</sup> Richard A. Posner, *Some Economics of International Law: Comments on the Conference*, J. Legal Stud. (forthcoming 2002); this is also an implicit theme in Best, *supra* note \_\_; for example, where he argues that area bombing during World War II was illegal because it was both inhumane and less effective than precision bombing. *Id.*, p. 303.

<sup>32</sup> See Legro, *supra* note \_\_, at 158-59 (interwar military opinion held that gas had great military value).

## VI. Empirical Analysis

The Hague Peace Conferences of 1899 and 1907 collectively produced 23 conventions, declarations, and final acts. Forty-six states signed, ratified, or adhered to some or all of the seven 1899 documents by 1907. Forty-five states signed, ratified, or adhered to some or all of the sixteen 1907 documents by 1914. I analyzed these data statistically, focusing on the 1907 documents because there was greater variation in the states' responses.

The dependent variable was the number of documents which a state signed, ratified, or adhered to, minus the number of reservations. For the 1907 conference, the dependent variable could range from 0 to 16; in fact, the range was from 7 to 16. The dependent variable is thus a crude measure of a state's enthusiasm for the 1907 documents.<sup>33</sup> Independent variables are various economic, political, and demographic variables, as described below.

Let me begin with the humanitarian view. Because no one has provided a theory of humanitarianism, it is hard to derive a testable hypothesis. But one possibility is that democracies are more like to support laws of war than non-democracies are. To test this hypothesis, I use an index from 0 to 10 developed by political scientists, with a higher number representing more democratic institutions.

The most concrete result of the conflict model is a prediction that states will support laws of war that limit effectiveness but not laws that limit destructiveness. But although the distinction is conceptually clear—a neutron bomb is less destructive than conventional explosives of equal magnitude, but just as effective—I have not found data that reflect this distinction. So instead I focus on some subsidiary, and more ambiguous, hypotheses.

---

<sup>33</sup> Source: Carnegie Endowment for International Peace, *The Reports to the Hague Conferences of 1899 and 1907*, at 175-77, 898-901 (1917).

First, I hypothesize that militarily weaker states will more strongly support the laws of war when they involve expensive new technologies, as was the case with the Hague Conference, which can be traced to the emergence of frightening and expensive new weapons from the industrial revolution. Second, states that have recently been in wars will more strongly support laws of war, because they will have better information about the effectiveness of weapons. Third, economically powerful states will more strongly support the laws of war because they gain more from production than from military predation. Variable definitions and sources, and summary statistics are in the appendix, and the results, under alternative specifications, are in Table 1. (I could not test all the hypotheses in a single regression because of the low number of observations. Instead, I ran alternative specifications and here I report only five of them. In other regressions I obtained similar results albeit not always significant, and the reported regressions represent the stronger end.)

Table 1

1	2	3	4	5
	.11 (1.0)	.11 (1.1)	0.07 (0.7)	
<b>-.04 (-1.7)</b>	-.02 (-1.3)	<b>-.03 (-2.5)</b>		-.01 (-.9)
.07 (0.08)				-.02 (-.02)
<b>-.68 (-2.3)</b>	<b>-.36 (-1.7)</b>		<b>-.5 (-2.8)</b>	<b>-.41 (-1.8)</b>
<b>.0002 (1.9)</b>				
25	40	40	41	41
0.27	0.14	0.1	0.13	0.14
0.033	0.04	0.05	0.03	0.03

Note: dependent variable is number of 1907 conventions, declarations, etc., to which state agreed, minus reservations; population is logged; military expenditures is in pounds (not 1000s of pounds); in bold if statistically significant at 0.1 level or below.

The humanitarian hypothesis is not supported by the democracy variable. As for the conflict hypotheses, the military variable is consistent (but not robustly) with the weak state hypothesis; the war variable provides no support for the learning hypothesis;

and the population variable (robustly) contradicts the economic power hypothesis. The ships variable might reflect economic power, and if reliable, might be a better proxy for economic power (reliable GDP figures are not available), in which case the third hypothesis gains some support; but the ships variable will also be biased against landlocked nations.

I do not want to make much of either the negative or positive results. One can think of lots of reasons for not trusting the data (including the low number of observations, the unreliability of historical data, and the high degree of multicollinearity). But further research would be illuminating, and a natural place to look would be the Geneva Conventions, and in particular the length of time before a state ratified them, and the number of reservations.

### Conclusion

One cannot say with confidence that the laws of war constrain the behavior of states, but one can say that states see an advantage in entering treaties and conventions regarding the laws of war. This might be public relations, as is sometimes argued, but it is just as likely that states perceive a more concrete benefit if mutual compliance turns out to be possible and no harm done if mutual compliance does not occur. The benefit, should mutual compliance occur, is greater production and consumption for civilians than would occur if military investment were unconstrained. In this way, the laws of war (*jus in bello*) are consistent with other laws and agreements about war. Laws of war, and arms control agreements and limitations on the conditions under which war can be wage (*jus ad bello*), work together to reduce the total amount of resources devoted to predatory activities. The puzzle for the humanitarian theory—that humanitarian laws of war might increase suffering by encouraging war—is thus avoided.

## Appendix<sup>34</sup>

### A. Two Equal States.

There are two states ( $i = 1, 2$ ) with equal resources,  $r$  ( $r = r_1 = r_2$ ). Each divides  $r_i$  among productive effort,  $e_i$ , and fighting effort,  $f_i$ . Thus:  $r_i = e_i + f_i$ . They produce *joint* income of  $y$ , and we will assume  $y = e_1 + e_2$ . Each state's share of the income is a function of the amount invested in effort:  $p_i = f_i^m / (f_i^m + f_j^m)$ , where  $j \neq i$ . Thus, each state obtains income of  $y_i = p_i y$ .

Each state maximizes its share of the income given the other state's strategy of maximizing its own share. The reaction curves (except for corner solutions) are:

$$f_i / f_j^m = m(e_1 + e_2) / (f_1^m + f_2^m)$$

It follows that:  $f_1 = f_2 = m e_1 = m e_2 = r - m e_1$ . It is clear that as  $m$  increases, the share of income devoted to fighting increases, the share devoted to productive effort declines, and income declines.

Let  $r_i = 100$ . (Thus joint resources are 200). If  $m = 1$ , then each state devotes 50 to fighting and 50 to production. Income is thus 100, and each state ends up with 50. Conflict dissipates 100.

Now let  $m = 2$ . Then each state devotes twice as much to fighting as to production. Given initial resources of 100, each state devotes 67 to fighting and 33 to production. Income is thus 66, and each state ends up with 33. Conflict dissipates 134.

The states would be jointly better off if they could agree to limit  $m$  (or  $f$ ). Technically, limiting  $m$  means preventing either side from improving weapons and tactics

---

<sup>34</sup> Sections A and B are based on simplified versions of the model in Hirshleifer, *supra* note \_\_; section C contains a modified version of that model.

in such a way that would increase its share of the income if the other side did not also improve weapons and tactics.

### B. Two Unequal States

Now let  $r_1 > r_2$ . Hirshleifer shows that under certain conditions, the poorer state can obtain a (relative) advantage from conflict with a richer state. Formally,  $y_1 / y_2 < r_1 / r_2$ . Here is his numerical example:

Let  $(r_1, r_2) = (200, 100)$ , and  $m = 1$ . From the reaction curves,  $(f_1, f_2) = (75, 75)$ ,  $(e_1, e_2) = (125, 25)$ , and  $(y_1, y_2) = 75, 75$ . Thus, the states go from a relationship of inequality to a relationship of equality.<sup>35</sup>

However, at a sufficiently high  $m$  the original relationship of inequality will be sustained or made more extreme. Consider, for example, the case where  $m = 3$ . If there were an interior solution, state 2 would need to invest more than 100 in  $f_2$ ; with the resource ceiling state 2 will invest 100 only. State 1's best response is to choose  $f_1 = 113$ . Thus:  $(e_1, e_2) = (89, 0)$ , and  $(y_1, y_2) = (49, 40)$ . Here, the rich state retains a relative advantage, although not as high as when it began. But as  $m$  increases, the rich state will obtain an increasingly large portion of the initial income, and eventually will improve its relative position. Thus, if military technology is relatively low, and resources are not too unequal, rich states will seek to limit military technology, and poor states will not; if military technology is relatively high, and resources are sufficiently unequal, poor states will seek to limit military technology, and rich states will not.

### C. Destructiveness

We can add a variable  $v$ , for destructiveness, and alter Hirshleifer's model in the following way. For state 1 (and similarly for state 2), let:

---

<sup>35</sup> This is Hirshleifer's example, p. 53.

$$y_1 = \left( \frac{f_1}{f_1 + f_2} \right) \frac{e_1 + e_2}{(f_1 + f_2)^{\frac{\nu-1}{\nu}}}$$

The destructiveness variable,  $\nu \geq 1$ . If  $\nu = 1$ , then the model is the same as Hirshleifer's (with  $m = 1$ ), which assumes no destructiveness. For a higher  $\nu$ , the surplus declines in proportion to the amount invested in military capital.

Using constrained optimization, the reaction curve for state 1 (and similarly for state 2) is:

$$\frac{\nu f_1}{f_1 - \nu(f_1 - f_2)} = \frac{e_1 + e_2}{f_1 + f_2}$$

One can see that when  $\nu = 1$ , Hirshleifer's reaction curves obtain. It is also clear that total productive investment (that is, joint income) is increasing in  $\nu$ , that is, with destructiveness. For the equal resources case,  $e_i = \nu f_i$ .

#### D. Summary Statistics

The dependent variable is the number of conventions, declarations, or acts to which a state consented, minus the number of reservations. The statistics are divided into a table for the "enthusiastic states" (dependent variable  $> 13$ ), and the "less enthusiastic states."<sup>36</sup>

---

<sup>36</sup> Democracy variable from the Polity II dataset: <ftp://isere.colorado.edu/pub/datasets/p4/p4vksg.asc>. Wars since 1870 are from Melvin Small and J. David Singer, *Resort to Arms* 82-99 (1982). The Great Powers (Italy, France, Austria-Hungary, Germany, Russia, Japan, and the United States) are taken from Jack S. Levy, *War in the Modern Great Power System* 48 (1983). All other data are from the Correlates of War Project at the University of Michigan: <http://www.umich.edu/~cowproj/dataset.html>. The baseline was 1900, though not all data were available for that date; if not data within ten years were used.

yes – res > 13

<b>Variable</b>	<b>Obs</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
dependent	19	15	0.666667	14	16
democracy (0–10)	19	2.947368	2.676517	0	10
population (1000s)	21	7203.952	11506.23	417	46798
urban population	21	538.5238	931.5033	0	3175
military expenditures (1000s of £'s)	20	2468.1	4502.113	35	16242
war in last 30 yrs (yes=1)	21	0.428571	0.507093	0	1
merchant ships	12	2504.417	4037.851	1	12639

yes – res < 14

<b>Variable</b>	<b>Obs</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
dependent	26	11.5	1.581139	7	13
democracy (0–10)	25	3.28	3.576777	0	10
population (1000s)	24	38234	88454.73	240	425577
urban population	23	2560.174	4286.775	0	14207
military expenditures (1000s of £'s)	23	14591.22	27494.24	87	119587
war in last 30 yrs (yes=1)	26	0.461539	0.508391	0	1
merchant ships	15	4895.4	7896.372	1	23333

Readers with comments should address them to:

Eric A. Posner  
University of Chicago Law School  
1111 East 60th Street  
Chicago, IL 60637  
[eposner@uchicago.edu](mailto:eposner@uchicago.edu)

Chicago Working Papers in Law and Economics  
(Second Series)

1. William M. Landes, Copyright Protection of Letters, Diaries and Other Unpublished Works: An Economic Approach (July 1991)
2. Richard A. Epstein, The Path to *The T. J. Hooper*: The Theory and History of Custom in the Law of Tort (August 1991)
3. Cass R. Sunstein, On Property and Constitutionalism (September 1991)
4. Richard A. Posner, Blackmail, Privacy, and Freedom of Contract (February 1992)
5. Randal C. Picker, Security Interests, Misbehavior, and Common Pools (February 1992)
6. Tomas J. Philipson & Richard A. Posner, Optimal Regulation of AIDS (April 1992)
7. Douglas G. Baird, Revisiting Auctions in Chapter 11 (April 1992)
8. William M. Landes, Sequential versus Unitary Trials: An Economic Analysis (July 1992)
9. William M. Landes & Richard A. Posner, The Influence of Economics on Law: A Quantitative Study (August 1992)
10. Alan O. Sykes, The Welfare Economics of Immigration Law: A Theoretical Survey With An Analysis of U.S. Policy (September 1992)
11. Douglas G. Baird, 1992 Katz Lecture: Reconstructing Contracts (November 1992)
12. Gary S. Becker, The Economic Way of Looking at Life (January 1993)
13. J. Mark Ramseyer, Credibly Committing to Efficiency Wages: Cotton Spinning Cartels in Imperial Japan (March 1993)
14. Cass R. Sunstein, Endogenous Preferences, Environmental Law (April 1993)
15. Richard A. Posner, What Do Judges and Justices Maximize? (The Same Thing Everyone Else Does) (April 1993)
16. Lucian Arye Bebchuk and Randal C. Picker, Bankruptcy Rules, Managerial Entrenchment, and Firm-Specific Human Capital (August 1993)
17. J. Mark Ramseyer, Explicit Reasons for Implicit Contracts: The Legal Logic to the Japanese Main Bank System (August 1993)
18. William M. Landes and Richard A. Posner, The Economics of Anticipatory Adjudication (September 1993)
19. Kenneth W. Dam, The Economic Underpinnings of Patent Law (September 1993)
20. Alan O. Sykes, An Introduction to Regression Analysis (October 1993)
21. Richard A. Epstein, The Ubiquity of the Benefit Principle (March 1994)
22. Randal C. Picker, An Introduction to Game Theory and the Law (June 1994)
23. William M. Landes, Counterclaims: An Economic Analysis (June 1994)
24. J. Mark Ramseyer, The Market for Children: Evidence from Early Modern Japan (August 1994)
25. Robert H. Gertner and Geoffrey P. Miller, Settlement Escrows (August 1994)
26. Kenneth W. Dam, Some Economic Considerations in the Intellectual Property Protection of Software (August 1994)
27. Cass R. Sunstein, Rules and Rulelessness, (October 1994)

28. David Friedman, More Justice for Less Money: A Step Beyond *Cimino* (December 1994)
29. Daniel Shaviro, Budget Deficits and the Intergenerational Distribution of Lifetime Consumption (January 1995)
30. Douglas G. Baird, The Law and Economics of Contract Damages (February 1995)
31. Daniel Kessler, Thomas Meites, and Geoffrey P. Miller, Explaining Deviations from the Fifty Percent Rule: A Multimodal Approach to the Selection of Cases for Litigation (March 1995)
32. Geoffrey P. Miller, Das Kapital: Solvency Regulation of the American Business Enterprise (April 1995)
33. Richard Craswell, Freedom of Contract (August 1995)
34. J. Mark Ramseyer, Public Choice (November 1995)
35. Kenneth W. Dam, Intellectual Property in an Age of Software and Biotechnology (November 1995)
36. Cass R. Sunstein, Social Norms and Social Roles (January 1996)
37. J. Mark Ramseyer and Eric B. Rasmusen, Judicial Independence in Civil Law Regimes: Econometrics from Japan (January 1996)
38. Richard A. Epstein, Transaction Costs and Property Rights: Or Do Good Fences Make Good Neighbors? (March 1996)
39. Cass R. Sunstein, The Cost-Benefit State (May 1996)
40. William M. Landes and Richard A. Posner, The Economics of Legal Disputes Over the Ownership of Works of Art and Other Collectibles (July 1996)
41. John R. Lott, Jr. and David B. Mustard, Crime, Deterrence, and Right-to-Carry Concealed Handguns (August 1996)
42. Cass R. Sunstein, Health-Health Tradeoffs (September 1996)
43. G. Baird, The Hidden Virtues of Chapter 11: An Overview of the Law and Economics of Financially Distressed Firms (March 1997)
44. Richard A. Posner, Community, Wealth, and Equality (March 1997)
45. William M. Landes, The Art of Law and Economics: An Autobiographical Essay (March 1997)
46. Cass R. Sunstein, Behavioral Analysis of Law (April 1997)
47. John R. Lott, Jr. and Kermit Daniel, Term Limits and Electoral Competitiveness: Evidence from California's State Legislative Races (May 1997)
48. Randal C. Picker, Simple Games in a Complex World: A Generative Approach to the Adoption of Norms (June 1997)
49. Richard A. Epstein, Contracts Small and Contracts Large: Contract Law through the Lens of Laissez-Faire (August 1997)
50. Cass R. Sunstein, Daniel Kahneman, and David Schkade, Assessing Punitive Damages (with Notes on Cognition and Valuation in Law) (December 1997)
51. William M. Landes, Lawrence Lessig, and Michael E. Solimine, Judicial Influence: A Citation Analysis of Federal Courts of Appeals Judges (January 1998)
52. John R. Lott, Jr., A Simple Explanation for Why Campaign Expenditures are Increasing: The Government is Getting Bigger (February 1998)

53. Richard A. Posner, *Values and Consequences: An Introduction to Economic Analysis of Law* (March 1998)
54. Denise DiPasquale and Edward L. Glaeser, *Incentives and Social Capital: Are Homeowners Better Citizens?* (April 1998)
55. Christine Jolls, Cass R. Sunstein, and Richard Thaler, *A Behavioral Approach to Law and Economics* (May 1998)
56. John R. Lott, Jr., *Does a Helping Hand Put Others At Risk?: Affirmative Action, Police Departments, and Crime* (May 1998)
57. Cass R. Sunstein and Edna Ullmann-Margalit, *Second-Order Decisions* (June 1998)
58. Jonathan M. Karpoff and John R. Lott, Jr., *Punitive Damages: Their Determinants, Effects on Firm Value, and the Impact of Supreme Court and Congressional Attempts to Limit Awards* (July 1998)
59. Kenneth W. Dam, *Self-Help in the Digital Jungle* (August 1998)
60. John R. Lott, Jr., *How Dramatically Did Women's Suffrage Change the Size and Scope of Government?* (September 1998)
61. Kevin A. Kordana and Eric A. Posner, *A Positive Theory of Chapter 11* (October 1998)
62. David A. Weisbach, *Line Drawing, Doctrine, and Efficiency in the Tax Law* (November 1998)
63. Jack L. Goldsmith and Eric A. Posner, *A Theory of Customary International Law* (November 1998)
64. John R. Lott, Jr., *Public Schooling, Indoctrination, and Totalitarianism* (December 1998)
65. Cass R. Sunstein, *Private Broadcasters and the Public Interest: Notes Toward A "Third Way"* (January 1999)
66. Richard A. Posner, *An Economic Approach to the Law of Evidence* (February 1999)
67. Yannis Bakos, Erik Brynjolfsson, Douglas Lichtman, *Shared Information Goods* (February 1999)
68. Kenneth W. Dam, *Intellectual Property and the Academic Enterprise* (February 1999)
69. Gertrud M. Fremling and Richard A. Posner, *Status Signaling and the Law, with Particular Application to Sexual Harassment* (March 1999)
70. Cass R. Sunstein, *Must Formalism Be Defended Empirically?* (March 1999)
71. Jonathan M. Karpoff, John R. Lott, Jr., and Graeme Rankine, *Environmental Violations, Legal Penalties, and Reputation Costs* (March 1999)
72. Matthew D. Adler and Eric A. Posner, *Rethinking Cost-Benefit Analysis* (April 1999)
73. John R. Lott, Jr. and William M. Landes, *Multiple Victim Public Shooting, Bombings, and Right-to-Carry Concealed Handgun Laws: Contrasting Private and Public Law Enforcement* (April 1999)

74. Lisa Bernstein, *The Questionable Empirical Basis of Article 2's Incorporation Strategy: A Preliminary Study* (May 1999)
75. Richard A. Epstein, *Deconstructing Privacy: and Putting It Back Together Again* (May 1999)
76. William M. Landes, *Winning the Art Lottery: The Economic Returns to the Ganz Collection* (May 1999)
77. Cass R. Sunstein, David Schkade, and Daniel Kahneman, *Do People Want Optimal Deterrence?* (June 1999)
78. Tomas J. Philipson and Richard A. Posner, *The Long-Run Growth in Obesity as a Function of Technological Change* (June 1999)
79. David A. Weisbach, *Ironing Out the Flat Tax* (August 1999)
80. Eric A. Posner, *A Theory of Contract Law under Conditions of Radical Judicial Error* (August 1999)
81. David Schkade, Cass R. Sunstein, and Daniel Kahneman, *Are Juries Less Erratic than Individuals? Deliberation, Polarization, and Punitive Damages* (September 1999)
82. Cass R. Sunstein, *Nondelegation Canons* (September 1999)
83. Richard A. Posner, *The Theory and Practice of Citations Analysis, with Special Reference to Law and Economics* (September 1999)
84. Randal C. Picker, *Regulating Network Industries: A Look at Intel* (October 1999)
85. Cass R. Sunstein, *Cognition and Cost-Benefit Analysis* (October 1999)
86. Douglas G. Baird and Edward R. Morrison, *Optimal Timing and Legal Decisionmaking: The Case of the Liquidation Decision in Bankruptcy* (October 1999)
87. Gertrud M. Fremling and Richard A. Posner, *Market Signaling of Personal Characteristics* (November 1999)
88. Matthew D. Adler and Eric A. Posner, *Implementing Cost-Benefit Analysis When Preferences Are Distorted* (November 1999)
89. Richard A. Posner, *Orwell versus Huxley: Economics, Technology, Privacy, and Satire* (November 1999)
90. David A. Weisbach, *Should the Tax Law Require Current Accrual of Interest on Derivative Financial Instruments?* (December 1999)
91. Cass R. Sunstein, *The Law of Group Polarization* (December 1999)
92. Eric A. Posner, *Agency Models in Law and Economics* (January 2000)
93. Karen Eggleston, Eric A. Posner, and Richard Zeckhauser, *Simplicity and Complexity in Contracts* (January 2000)
94. Douglas G. Baird and Robert K. Rasmussen, *Boyd's Legacy and Blackstone's Ghost* (February 2000)
95. David Schkade, Cass R. Sunstein, Daniel Kahneman, *Deliberating about Dollars: The Severity Shift* (February 2000)
96. Richard A. Posner and Eric B. Rasmusen, *Creating and Enforcing Norms, with Special Reference to Sanctions* (March 2000)

97. Douglas Lichtman, Property Rights in Emerging Platform Technologies (April 2000)
98. Cass R. Sunstein and Edna Ullmann-Margalit, Solidarity in Consumption (May 2000)
99. David A. Weisbach, An Economic Analysis of Anti-Tax Avoidance Laws (May 2000, revised May 2002)
100. Cass R. Sunstein, Human Behavior and the Law of Work (June 2000)
101. William M. Landes and Richard A. Posner, Harmless Error (June 2000)
102. Robert H. Frank and Cass R. Sunstein, Cost-Benefit Analysis and Relative Position (August 2000)
103. Eric A. Posner, Law and the Emotions (September 2000)
104. Cass R. Sunstein, Cost-Benefit Default Principles (October 2000)
105. Jack Goldsmith and Alan Sykes, The Dormant Commerce Clause and the Internet (November 2000)
106. Richard A. Posner, Antitrust in the New Economy (November 2000)
107. Douglas Lichtman, Scott Baker, and Kate Kraus, Strategic Disclosure in the Patent System (November 2000)
108. Jack L. Goldsmith and Eric A. Posner, Moral and Legal Rhetoric in International Relations: A Rational Choice Perspective (November 2000)
109. William Meadow and Cass R. Sunstein, Statistics, Not Experts (December 2000)
110. Saul Levmore, Conjunction and Aggregation (December 2000)
111. Saul Levmore, Puzzling Stock Options and Compensation Norms (December 2000)
112. Richard A. Epstein and Alan O. Sykes, The Assault on Managed Care: Vicarious Liability, Class Actions and the Patient's Bill of Rights (December 2000)
113. William M. Landes, Copyright, Borrowed Images and Appropriation Art: An Economic Approach (December 2000)
114. Cass R. Sunstein, Switching the Default Rule (January 2001)
115. George G. Triantis, Financial Contract Design in the World of Venture Capital (January 2001)
116. Jack Goldsmith, Statutory Foreign Affairs Preemption (February 2001)
117. Richard Hynes and Eric A. Posner, The Law and Economics of Consumer Finance (February 2001)
118. Cass R. Sunstein, Academic Fads and Fashions (with Special Reference to Law) (March 2001)
119. Eric A. Posner, Controlling Agencies with Cost-Benefit Analysis: A Positive Political Theory Perspective (April 2001)
120. Douglas G. Baird, Does Bogart Still Get Scale? Rights of Publicity in the Digital Age (April 2001)
121. Douglas G. Baird and Robert K. Rasmussen, Control Rights, Priority Rights and the Conceptual Foundations of Corporate Reorganization (April 2001)
122. David A. Weisbach, Ten Truths about Tax Shelters (May 2001)

123. William M. Landes, What Has the Visual Arts Rights Act of 1990 Accomplished? (May 2001)
124. Cass R. Sunstein, Social and Economic Rights? Lessons from South Africa (May 2001)
125. Christopher Avery, Christine Jolls, Richard A. Posner, and Alvin E. Roth, The Market for Federal Judicial Law Clerks (June 2001)
126. Douglas G. Baird and Edward R. Morrison, Bankruptcy Decision Making (June 2001)
127. Cass R. Sunstein, Regulating Risks after ATA (June 2001)
128. Cass R. Sunstein, The Laws of Fear (June 2001)
129. Richard A. Epstein, In and Out of Public Solution: The Hidden Perils of Property Transfer (July 2001)
130. Randal C. Picker, Pursuing a Remedy in *Microsoft*: The Declining Need for Centralized Coordination in a Networked World (July 2001)
131. Cass R. Sunstein, Daniel Kahneman, David Schkade, and Ilana Ritov, Predictably Incoherent Judgments (July 2001)
132. Eric A. Posner, Courts Should Not Enforce Government Contracts (August 2001)
133. Lisa Bernstein, Private Commercial Law in the Cotton Industry: Creating Cooperation through Rules, Norms, and Institutions (August 2001)
134. Richard A. Epstein, The Allocation of the Commons: Parking and Stopping on the Commons (August 2001)
135. Cass R. Sunstein, The Arithmetic of Arsenic (September 2001)
136. Eric A. Posner, Richard Hynes, and Anup Malani, The Political Economy of Property Exemption Laws (September 2001)
137. Eric A. Posner and George G. Triantis, Covenants Not to Compete from an Incomplete Contracts Perspective (September 2001)
138. Cass R. Sunstein, Probability Neglect: Emptions, Worst Cases, and Law (November 2001)
139. Randall S. Kroszner and Philip E. Strahan, Throwing Good Money after Bad? Board Connections and Conflicts in Bank Lending (December 2001)
140. Alan O. Sykes, TRIPs, Pharmaceuticals, Developing Countries, and the Doha "Solution" (February 2002)
141. Edna Ullmann-Margalit and Cass R. Sunstein, Inequality and Indignation (February 2002)
142. Daniel N. Shaviro and David A. Weisbach, The Fifth Circuit Gets It Wrong in *Compaq v. Commissioner* (February 2002) (Published in *Tax Notes*, January 28, 2002)
143. Warren F. Schwartz and Alan O. Sykes, The Economic Structure of Renegotiation and Dispute Resolution in the WTO/GATT System (March 2002, forthcoming *Journal of Legal Studies* 2002)
144. Richard A. Epstein, HIPAA on Privacy: Its Unintended and Intended Consequences (March 2002, forthcoming *Cato Journal*, summer 2002)

145. David A. Weisbach, Thinking Outside the Little Boxes (March 2002, forthcoming *Texas Law Review*)
146. Eric A. Posner, Economic Analysis of Contract Law after Three Decades: Success or Failure (March 2002)
147. Randal C. Picker, Copyright as Entry Policy: The Case of Digital Distribution (April 2002, forthcoming *The Antitrust Bulletin*)
148. David A. Weisbach, Taxes and Torts in the Redistribution of Income (April 2002, Coase Lecture February 2002)
149. Cass R. Sunstein, Beyond the Precautionary Principle (April 2002)
150. Robert W. Hahn and Cass R. Sunstein, A New Executive Order for Improving Federal Regulation? Deeper and Wider Cost-Benefit Analysis (April 2002)
151. Douglas Lichtman, Copyright as a Rule of Evidence (May 2002)
152. Richard A. Epstein, Steady the Course: Property Rights in Genetic Material (May 2002)
153. Jack Goldsmith and Cass R. Sunstein, Military Tribunals and Legal Culture: What a Difference Sixty Years Makes (June 2002)
154. William M. Landes and Richard A. Posner, Indefinitely Renewable Copyright (July 2002)
155. Anne Gron and Alan O. Sykes, Terrorism and Insurance Markets: A Role for the Government as Insurer? (July 2002)
156. Cass R. Sunstein and Adrian Vermeule, Interpretation and Institutions (July 2002)
157. Cass R. Sunstein, The Rights of Animals: A Very Short Primer (August 2002)
158. Cass R. Sunstein, Avoiding Absurdity? A New Canon in Regulatory Law (with Notes on Interpretive Theory) (August 2002)
159. Randal C. Picker, From Edison to the Broadcast Flag: Mechanisms of Consent and Refusal and the Propertization of Copyright (September 2002)
160. Eric A. Posner, A Theory of the Laws of War (September 2002)