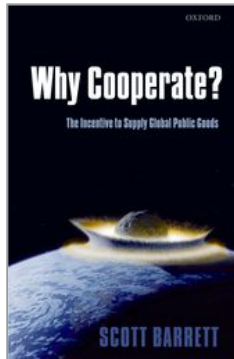


# Introduction: the incentives to supply global public goods

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## Why Cooperate?: The Incentive to Supply Global Public Goods

Scott Barrett

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### Abstract and Keywords

This introductory chapter sets out the purpose of the book and discusses the incentives involved in global public goods. Global public goods make people everywhere better off and include the prevention of nuclear proliferation, the suppression of killer pandemics, climate change mitigation, and fundamental scientific knowledge. Incentives are not directly given but can be molded by institutions.

*Keywords:* public goods, incentives, supply, scientific knowledge

Global public goods offer benefits that are both non-excludable and non-rival. Once provided, no country can be prevented from enjoying a global public good; nor can any country's enjoyment of the good impinge on the consumption opportunities of other countries. When provision succeeds, global public goods make people everywhere better off.

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Global public goods are thus universally to be desired. But because their provision benefits every country, even the ones that do not help to provide them, global public goods are often under-provided. Some are not provided at all.

Why should we care if global public goods are provided? We should care because our wellbeing, the wellbeing of future generations, and even the fate of the Earth depends on them being provided. Global public goods include the prevention of nuclear proliferation, the suppression of killer pandemics, climate change mitigation, and fundamental scientific knowledge. Failure to supply these global public goods exposes the world to great dangers. Providing them expands human capabilities.

The power of the concept lies not only in helping us to understand why *each* of these global public goods is under-provided, or even how their provision can be improved. It lies also in showing us that *all* these global public goods are under-provided for similar reasons. Preventing an outbreak of a new disease and keeping weapons of mass destruction out of the hands of terrorists— these appear to be unrelated challenges. They are certainly different challenges, but since both are global public goods, they constitute (p.2) data for a broader analysis. Learning how one kind of global public good has been provided may suggest ways in which another can be provided.

Since global public goods differ in fundamental ways, however, we cannot simply lump them together. We need to classify them. Securing “loose nukes” is more akin to preventing a new pandemic than to discovering a new scientific insight. Climate change mitigation is more like ozone layer protection than nuclear non-proliferation. A classification sensitive to the manner in which global public goods are supplied is especially helpful. It shows that some global public goods can only be supplied if every country cooperates; that many need the cooperation of only certain key countries; that most, but not all, require financing; that some can be supplied by mutual restraint or coordination; and that others demand only a single best effort.

This last kind of global public good—the kind requiring a single best effort—is the easiest to supply. It is therefore a good starting point for an introduction to the concept. I turn to it next.

## Single best efforts

Imagine this: an asteroid measuring several kilometers in diameter is heading towards the Earth. It is traveling at a speed of 25 kilometers per second (that's 90,000 km per hour). A collision is expected. Upon impact, or soon thereafter, billions of people will be killed. Many will die from the blast wave caused by the explosive impact. Most, however, will die from environmental changes caused by the blast. Some will die from tsunamis, global wildfires, and earthquakes. Others as a result of a planetary dust cloud that darkens the skies, terminating photosynthesis and cooling temperatures. Still more will die from acid rain and ozone depletion.<sup>1</sup> It is possible, perhaps even likely, that our species, *Homo sapiens*, will become extinct.

Fortunately, because of investments in science and technology made years earlier, the asteroid has been identified early; the collision will not occur for decades; we have time to prepare.

We can prepare for more than death. Given sufficient resources, engineers are confident that a spacecraft could be designed, built, and deployed to avoid a collision. The spacecraft might create a gravitational force capable of changing the asteroid's orbit. It might deflect (p.3) the sun's energy to create a “natural rocket” that pushes the asteroid off course. It might dock a nuclear-powered rocket to the asteroid, or a “solar sail,” to give the needed push. It might simply try to obliterate the asteroid. Whichever approach were tried (and this would be a technical matter, depending partly on the shape and composition of the space object, and its distance from the Earth), a collision could be avoided—the Earth could be saved—provided, that is, that the money needed to pay for asteroid defense were made available.

Preventing an asteroid collision is a global public good: if the Earth is “saved” for one country, it is saved for every country,

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including those countries that may not have contributed to the effort. Moreover, the satisfaction each country derives from its survival does not diminish the benefits enjoyed by other countries. Global public goods, as noted before, provide benefits that are both non-excludable and non-rival.

Ordinarily, we think of global public goods as being prone to free riding. After all, if every country benefits, whether it contributes or not, why should any country help to provide the good?

When the world's survival is at stake, however, this logic breaks down. Failure to supply this global public good would have such profound consequences that every country would be willing to sacrifice practically everything to secure its provision. Moreover, only a single successful intervention, a *single best effort*, would be required.<sup>2</sup> Indeed, and as I shall explain in Chapter 1, it is very likely that a large country—a country with the means and not only the desire to provide the public good—would be prepared to defend the world against a certain asteroid collision all by itself, even if other countries did nothing.

This example is purely hypothetical. To our knowledge, a space object of this size is not heading towards the Earth—not in the near future, anyway. But knowing this should not offer much comfort. The actual problems we face, including the threat of a *possible* asteroid collision, or the more likely threat of a *smaller* impact—these problems are much more challenging. I discuss them, and other global problems like them, in Chapter 1.

## Weakest links

Some global public goods can only be provided with the active participation of *every* country.

**(p.4)** If you were born before the late 1970s, then, like me, you probably have a circular scar on your upper arm—an artifact of having been vaccinated in your youth for smallpox. Younger persons, including my own children, lack the scar. This is because smallpox was declared eradicated in 1979, and

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after that there was no need for people to be vaccinated. The eradication of smallpox was a singular achievement. To pull it off, the virus had to be eliminated within every village, every town, and every city—in every country of the world, all at the same time. Had even one country not eliminated smallpox, the entire effort would have failed.

Smallpox eradication is a *weakest link* global public good. It is a global public good because, like asteroid defense, it yields benefits that are both non-excludable and non-rival. Unlike asteroid defense, however, smallpox eradication required *universal* cooperation.

Though the eradication of smallpox did not “save the world,” its benefits have been immense. Persons born after 1979 were spared the pain of the bifurcated needle. They were also shielded from the risks associated with this live vaccine.<sup>3</sup> Children born in the poorest countries benefited the most: few such children used to be vaccinated for smallpox, and so millions of people born in poor countries are alive today because the effort to supply this global public good succeeded. As I explain in Chapter 2, smallpox eradication also proved an incredibly good investment. Indeed, it may be the best collective investment the world has ever made.

Why did we succeed in eradicating smallpox, even though the participation of every country was required? The main reason is that each country had an incentive to play its part in eradicating the disease *once assured that all other countries would play their part*.<sup>4</sup> In contrast to the incentives to defend the Earth from an on-coming asteroid, the incentives to eliminate smallpox within a country's borders were *conditional*. It only made sense for some countries to eliminate smallpox if they believed every other country would eliminate smallpox. Once that assurance had been given, however, the incentives to supply this global public good were strong.

As I shall explain later in this introduction, even with all these advantages, the effort to eradicate smallpox nearly failed. So this example, while inspiring, also serves as a caution. Indeed, despite a quarter century's advancement in science and medicine, a deterioration in security and public order in

certain parts of the world means (p.5) that, were we to attempt to eradicate smallpox today, we could not count on the effort succeeding.

## Aggregate efforts

Action to address global climate change, another global public good, is proving extremely difficult. So far, very little has been done to mitigate global climate change.

Why is that? There are many reasons; four are critical:

First, climate change does not threaten the survival of the human species.<sup>5</sup> If unchecked, it will cause other species to become extinct (though biodiversity is being depleted now due to other reasons). It will alter critical ecosystems (though this is also happening now, and for reasons unrelated to climate change). It will reduce land area as the seas rise, and in the process displace human populations. “Catastrophic” climate change is possible, but not certain. Moreover, and unlike an asteroid collision, large changes (such as sea level rise of, say, ten meters) will likely take centuries to unfold, giving societies time to adjust. “Abrupt” climate change is also possible, and will occur more rapidly, perhaps over a decade or two.

However, abrupt climate change (such as a weakening in the North Atlantic circulation), though potentially very serious, is unlikely to be ruinous. Human-induced climate change is an experiment of planetary proportions, and we cannot be sure of its consequences. Even in a worse case scenario, however, global climate change is not the equivalent of the Earth being hit by mega-asteroid. Indeed, if it were as damaging as this, and if we were sure that it would be this harmful, then our incentive to address this threat would be overwhelming. The challenge would still be more difficult than asteroid defense, but we would have done much more about it by now.

Second, different countries will be affected in different ways by climate change. Not all of the consequences of climate change will be for the worse. Some regions may benefit, at least from some perspectives (a rise in the productivity of agriculture—again, in some areas), at least through the medium term, provided climate change is “gradual.” Other

regions may lose badly. The countries most likely to be adversely affected are the poorest countries—the countries least able to mitigate climate change. They will be victims of this unfolding (p.6) process. Disaggregating the impacts matters because individual countries are causing greenhouse gas concentrations to rise, and only individual countries can slow or reverse this trend. By contrast, no country would benefit from an asteroid collision, just as no country benefited from smallpox. In these cases, the countries most affected also have (had, in the case of smallpox) both the incentive and the wherewithal to act. Climate change is different.

Third, mitigating climate change on a significant scale will also have consequences. It will be costly to reduce greenhouse gas emissions substantially. Doing so will require diverting resources from other good causes, including investments that could insulate the most vulnerable countries from climate change—investments that might yield greater benefits than mitigation. Doing so will also increase other risks, such as those associated with an expansion of nuclear power. As I explain later in this book, asteroid defense also entails opportunity costs and new risks. So did smallpox eradication. But the economics of supplying these global public goods are (were, for smallpox) much more favorable. It is harder to draw “red lines” under the climate problem.

Finally, reducing the world's greenhouse gas emissions depends on the *aggregate effort* of all countries. Unlike asteroid protection, a single country cannot stabilize atmospheric concentrations of greenhouse gases all by itself—certainly not by reducing its emissions unilaterally. And in contrast to smallpox eradication, the contributions by individual countries to stabilizing concentrations do not matter (Somalia's cooperation was essential to the success of the smallpox eradication campaign, but it is irrelevant to mitigating climate change). An assurance that some countries will reduce their greenhouse gas emissions may not inspire other countries to join them. Indeed, it could have the opposite effect. Free riding is likely to be a much bigger problem for climate change mitigation.

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Of course, countries can agree to limit their emissions collectively, as some have done in the form of the Kyoto Protocol. But that agreement only disguised the incentives to free ride; it did not correct them. Some countries, including Australia and the United States, declined to ratify the agreement. Others, including China and India, agreed to participate only on the condition that they did not have to reduce their emissions. Of the parties that are required to limit their emissions, some may fail to comply—or they may comply only by (p.7) means of a loophole that ultimately fails to reduce global emissions, thanks to the treaty's trading mechanism and gift of “hot air.”<sup>6</sup> Even by an optimistic assessment, the Kyoto Protocol will reduce global emissions of greenhouse gases very little. Indeed, it was designed to do no more than that.

As explained in Chapter 3, another global public good requiring an aggregate effort—protection of the ozone layer—has been supplied, nearly to the fullest extent possible. So it is not this property alone that determines success and failure. It is really the combination of *all* of the above four properties that makes climate change mitigation so hard to supply.

If one advantage of the concept of global public goods is to show us that different global challenges are related, another is to show us that a single problem like climate change has many dimensions requiring international cooperation. Kyoto's approach focuses only on the imperative to cut emissions. But countries will inevitably need to adapt to climate change, and adaptation is a domestic, regional, and international public good. We also need to undertake research and development into breakthrough energy technologies, and this involves supplying the global public good of knowledge. Once discovered, new energy technologies must be diffused around the world, and this will likely involve the setting of technical standards—another global public good. Finally, concentrations have climbed to a level that makes it necessary for us to contemplate the possibility of counteracting human-induced climate change with deliberate climate modification: another global public good. Discussion of these dimensions of the challenge are scattered throughout this book.



## Financing and burden sharing

For each of the global public goods discussed thus far, provision requires that something be done. This something—whether it be asteroid deflection, smallpox eradication, or climate change mitigation—has to be paid for; it must be financed. But how? That is the subject of Chapter 4.

Asteroid deflection can be self-financed by a large country with an incentive to provide the global public good all by itself. Such a country may not actually pay the full cost. Others might also contribute. But if a single country has an incentive to pay for asteroid deflection (p.8) *even if others do not contribute*, then we can be pretty sure that the global public good will be provided. After all, failure to do so would be suicide.

Smallpox eradication was different. It *required* international financing. Smallpox had to be eliminated everywhere, and dozens of poor countries lacked the resources—and, in some cases, the capability—to rid their populations of the virus. The rich countries had to pay a portion of this cost. Had they not done so, the effort almost certainly would have failed. As it was, the effort came close to failing. The reason was a persistent lack of funding.<sup>7</sup>

Why were the main beneficiaries of smallpox eradication so reluctant to pay for it? As noted before, an assurance that other countries would eliminate smallpox made each country want to participate in the global effort. Financing, however, is a little like climate change mitigation in the sense that it is the total effort—the aggregate of all financial contributions—that determines whether eradication can be fully funded.<sup>8</sup>

Eradication is unlike climate change mitigation in another sense. There can be a little or a lot of climate change mitigation, but eradication is binary, not continuous; it either succeeds or fails. Achieving eradication thus requires a fixed sum of money. If the burden of raising this money were shared so that every contributing state gained, given that eradication succeeded, then each such state would have an incentive to contribute its full share, given an assurance that all others

would contribute their full share. By this reasoning, international financing should not have been a problem. And yet we know that it was. Free riding thus appears to be a more complicated and challenging phenomenon than it is commonly taken to be.

The challenge of financing climate change mitigation is much greater. To make a material difference, fundamental new energy technologies will be needed. Moreover, these new technologies will have to be diffused globally. In the richer countries, where there already exists an installed base of capital, investment is especially needed to replace depreciating assets. In fast-growing countries like India and China, an even greater investment is needed in the near term (China is rumored to be adding a new coal-fired power plant every week). To reduce global emissions, the fast-growing poor countries need to be put onto a new kind of development path as a priority, and the richer countries transitioned onto the same path a little more gradually as their capital is replaced. The poor countries (p.9) cannot be expected to finance this investment all by themselves. A significant share of this cost will have to be financed by rich countries.

Financing this technological transformation will require an aggregate effort by the rich countries, and on a scale many times greater than the world has ever attempted before. Global climate change may or may not be the most important problem facing us today, but it is almost certainly the hardest one for the world to address.

## Mutual restraint and coordination

Some global public goods cost nothing, and yet may still be challenging to supply and sustain.

One of the most important global public goods is the norm against the use of nuclear weapons. Continued supply of this vital global public good requires *mutual restraint*, not financing. I discuss it, and other global public goods like it, in Chapter 5.

The global public good of the standard for determining time—a standard that both facilitates and is an expression of the

phenomenon we call “globalization”—also costs nothing to supply. Providing it requires only *coordination*. I discuss global public goods of this type in Chapter 6.

Though neither of these types of global public good requires financing, they are otherwise very different challenges. Mutual restraint is much harder to sustain than coordination. The inhibition on the use of the bomb was not inevitable, and we cannot be sure it will last. By contrast, standardization of the measurement of time was to be expected (though the particular standard chosen was not inevitable) and is sure to last (today's standard may be changed, but *a* standard will continue to be chosen). Why the difference? The reason, as always, has to do with the incentives for providing these global public goods. Even if no other country has the bomb, there will be some countries that will seek to acquire it. By contrast, if every country obeys a single standard of time, no country will want to break from this consensus and choose a different standard for itself.<sup>9</sup>

To sum up, global public goods are not all alike, and the differences that distinguish one type from another create contrasting *incentives* for provision.<sup>10</sup>

## (p.10) Leadership

The biggest, the richest, and the mightiest states—the great powers— usually have the greatest incentive to supply global public goods. Their leadership is not always sufficient, but it is almost always necessary.

Which states do I mean? I mean the superpower, the United States, naturally.<sup>11</sup> But I mean other countries, too. Indeed, it is a conceit to believe that the U.S., and only the U.S., can supply most vital global public goods unilaterally.

Countries capable of developing asteroid defense include, in addition to the United States, the members of the European Space Agency, Japan, and Russia (soon other countries, such as China and India, will have a similar capability). The United States contributed more than any country to smallpox eradication, but that effort would never have succeeded without the support of the Soviet Union (indeed, the USSR

first proposed that this global public good be supplied), for it took place during the Cold War; and as I explain in Chapter 4, financing of this global public good may also have failed were it not for a last minute intervention by Sweden. Indeed, being a weakest link global public good, smallpox eradication could not have been achieved without the support of the weakest of states, Somalia and Sudan included. Finally, though it is inconceivable that an international effort to mitigate climate change on a significant scale can succeed without the United States, the U.S. will not join in such an effort without the participation of other states, including China, the European Union, India, and Japan, and perhaps more states as well.

In other areas, too, the superpower is not powerful enough. Whether the United Nations Security Council sanctions imposed on North Korea will have any effect depends mainly on China; the U.S. does not trade with North Korea. Cybersecurity also cannot be secured solely through unilateral measures. Users can defend themselves from attack, but it is also essential to go after the attackers. The “I Love You” virus, which attacked 60 million computers, including mine, in May 2000, was launched from the Philippines, which at the time had no cybercrime laws. To be able to prosecute and punish attackers, and so to deter them, global standards are needed, not just national defenses. That is the purpose of the Convention on Cybercrime, adopted in 2001. The United States Senate has an allergic-like reaction to most treaties but it ratified this one in late 2006.

**(p.11)** Though the incentives for the great powers to supply global public goods are often strong, they can be overridden by other motivations, or tripped up by free riding. The benefits of supplying global public goods can also be overlooked, or misinterpreted, or neglected for reasons of incompetence or ideology. The leadership of the key states cannot always be relied upon. We know that.

We also know that, when there is a dissonance of interests, when different countries are affected differently by the supply of a global public good, or perceive the challenge differently, more than the interests of the great powers need to be recognized. As Franklin Roosevelt noted in his 1945 State of

the Union Address, “International cooperation on which enduring peace must be based is not a one-way street...In a democratic world, as in a democratic nation, power must be linked with responsibility, and obliged to defend and justify itself within the framework of the general good.”<sup>12</sup> Looked at somewhat differently, though the supply of most global public goods requires the active participation of the United States, the U.S. can achieve much more when it has the support of other states. In many cases, as noted before, the support of other states is vital. The important point is this: when the opportunities to supply a global public good are seized by the great powers, motivated only by self-interest, but acting “within the framework of the general good,” the entire world benefits.

## Development

In many if not most cases this benefit is latent; it is a *potential* benefit. Often, to ensure that the benefit is actually realized, complementary domestic public goods must also be supplied. For example, the discovery of a new vaccine, the knowledge of which is a global public good, promises little benefit to a country that is unable to pay for it, or that lacks the domestic institutions needed to recognize the benefit of paying for it. This is why human progress requires not only improved international institutions, necessary to facilitate the supply of global public goods, but also effective domestic institutions, necessary to ensure that the benefits of this supply are fully exploited and widely shared.

Another problem: human development, even in its most basic of forms, is sometimes held back by the under-supply of *regional and international public goods*—goods that *uniquely* benefit the poor and (p.12) weak states. In these cases, the great powers lack the incentive to lead. If they are to play a role, their motivation must be compassion, not self-interest. Compassion is always to be applauded, but we know that self-interest is usually the more reliable impulse.

Of course, the great powers would benefit *indirectly* were these shortcomings defeated—strengthening the most fragile states, for example, facilitates provision of weakest link global

public goods. But overcoming *these* deficiencies is *itself* a global public good; and one that, because it requires financing, is open to free riding.

When a failed state's own leadership and institutions are the problem, the challenge is even greater. Should its sovereignty be respected? Or should it be challenged when the country's leadership fails to fulfill its responsibilities, to its own people, to its neighbors, and to the rest of the world? And which countries should decide whether sovereignty ought to be respected in particular cases? These are difficult questions. They are particularly difficult because of the need to enforce whatever is agreed. It is usually the enforcement of the decision (or the credible threat to enforce it), rather than the decision itself, that supplies the global public good.

Compounding these problems is another tendency. All states lose when global public goods are under-provided, but the great and even middle powers can often compensate for such failures by investing in substitute public goods at the local and national levels (for example, by building dikes to adapt to climate change rather than by reducing emissions to prevent climate change). Poor and weak states cannot make the same substitutions. When international cooperation fails, it is often the poor and weak states that lose the most—another reason why the challenge of supplying global public goods needs to be seen “within the framework of the general good.”

All of these considerations suggest a complex relationship between the supply of global and domestic public goods. I address it in Chapter 7.

## Domestic public goods

Incentives are not entirely given; they can be molded and redirected by institutions. Indeed, this is what institutions are meant to do—the reason institutions exist in the first place. But can institutions (p.13) overcome the incentive problems that block the provision of global public goods?

To understand this, it will help to consider the related challenge of financing a *domestic* public good like national defense. Imagine that this public good had to be financed

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voluntarily. How much would people—the citizens of a state—contribute?

Each person would probably figure (rightly) that his own contribution would make little difference to the overall supply of defense. In a population of, say, a million people, each person's contribution would be such a tiny fraction of the total as not to matter. So, why contribute? Of course, each person would also know that, if everyone failed to contribute, or contributed only a nominal amount, then the nation would be vulnerable to attack, and everyone would be worse off as a consequence. But in the end, each person can only determine his own actions. The temptation to contribute very little would thus be strong. It might prove irresistible.

Free riding is only a tendency. Some people will contribute because they believe it is the right thing to do, whether or not others contribute.

Probably more people will condition their choice on the behavior of others, or on the behavior they expect of others. Each such person may apprehend that others will not contribute enough to justify making a sizable contribution herself. That is, each such person may fear that she will get back (in terms of the value she derives from the *overall* level of defense provided) less than she gives (her *own* contribution). Put more positively, each such person may be inclined to contribute more only if she were assured that others would contribute more. Why do people pay their taxes? One reason is the fear of being fined for not paying, but another is the belief that most other residents are paying *their* taxes.<sup>13</sup> Taxation, reinforced by a system of fines and a compliance norm, is an institution that facilitates the supply of public goods. It helps to overcome the deficiencies of volunteerism.

Consider the challenge of supplying a local public good as simple as the village clock, which in centuries past provided a single measure of time to an entire community, a means by which all its members could coordinate their joint activities. How was maintenance of the village clock financed? Volunteerism proved an unreliable source, as noted by a decree from 1618: (p.14) Some years ago in Arzberg

[Germany] they had a clock made which strikes a bell. The residents of Nichtewitz and Kaucklitz are supposed to contribute, the owners of a hide of land 1/2 Reichstaler, gardeners 1 local taler, but they are unwilling to do so. Previously their excuse was that they couldn't hear the clock. Now they have admitted that they can hear it but still they don't want to pay: they are to pay their share; where they don't the authorities shall make them.<sup>14</sup>

Volunteerism failed even in this village setting.<sup>15</sup> Intervention by the “authorities” was needed to ensure that the public good was provided. In 1618, the authorities represented a duke or prince or the emperor. Today, of course, they represent the state.

## Domestic institutions

Assume that tax collection can be relied upon, and consider a different choice. Imagine that voters were asked in a referendum whether to support a tax to finance national defense. It seems likely that many of the same persons who would contribute little if anything voluntarily would vote in favor of the referendum, even though they would have to pay a sizable tax if the referendum passed. Why? The reason is that, in voting yes, the voter not only increases the likelihood that *he* will have to pay the tax. He also increases the likelihood that *everyone else* will have to pay the tax. The combination of the vote and the tax— essential domestic institutions—thus change the incentives facing the citizenry; they make the citizens want to contribute more; they ensure that the national public good is supplied in greater abundance.

Local and national public goods are often supplied by means other than taxation. The public good of clean air, for example, is typically supplied by regulation—by governments commanding polluters to reduce their emissions, backed by the threat to punish violators. And while taxation is needed to finance national defense, in many countries, especially in times of war, this is supplemented by conscription. Similarly, during a public health emergency, individuals suspected of being infected, and of posing a danger to others, can be placed under quarantine. Even in the absence of a crisis,



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governments routinely require that children be vaccinated. This is not just to protect these children. It is to prevent the conditions that would allow an epidemic to emerge and threaten others: another public good.

(p.15) So, it is really the government's power of compulsion, preferably held in check by democratic institutions, that causes local and national public goods to be supplied. Together, this combination has the potential to make the members of a society better off *collectively*.

The combination cannot, however, be relied upon to make every member better off *individually*. A mother may choose to have her children vaccinated when the vaccine is safe and the probability of infection is high. She may decline to do so when the vaccine poses a greater risk than the disease itself. And yet if every mother chooses in this way, “herd immunity” in the general population will be compromised. So there is a rationale for government intervention—but grounds also for citizen resistance. The tension is inescapable.

It also has a long history. Use of the world's first vaccine, for smallpox, swept through Europe soon after its “discovery” in 1798, but many parents refused to vaccinate their children, and epidemics recurred. Why would parents decline to vaccinate their children? One important reason is that the vaccine was risky. It killed about one out of every 14,000 people vaccinated.<sup>16</sup> The best outcome, from the perspective of every parent, was for *other* children to be vaccinated. This way, your child would be spared both the risk of infection and the risk of a bad reaction to the live vaccine. The problem, of course, is that if every parent behaved in this way, the disease would continue to be present.

How then to encourage more vaccination? In Britain, an 1840 act offered the vaccine free of charge—the country's first free medical service. That incentive, however, proved inadequate, and so the authorities tried a different approach. In 1853, parliament made smallpox vaccination compulsory, with violators being subject to fines. When epidemics continued, the visible and strong hand of the government pressed more firmly. The fines were increased and penalties were added for

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repeat violations. These responses, however, only hardened social resistance. Eventually, the state backed off. In 1898, parliament passed a new Vaccination Act, giving parents the right to refuse to vaccinate their children. The consequence: a quarter of a million certificates were awarded to “conscientious objectors” in the first year.<sup>17</sup>

The United States government has recently encountered a similar resistance. Of the half million health and emergency workers targeted for smallpox vaccination, fewer than one in ten consented. To these (p.16) individuals, the risk of the vaccine seemed greater than the risk of a bioterrorist attack.

Conflicts of this kind are to be contrasted with the government's role in enforcing purely private decisions. Contracts restrict the freedoms only of those individuals and other legal persons who consent to be bound by them. Governments do not compel individuals to enter into private contracts, but they do enforce such agreements once they have been voluntarily entered into. In doing so, governments provide a service that even libertarians recognize as being valuable. Contract enforcement allows parties to overcome problems of mistrust that otherwise would prevent them from transacting. Government compulsion is needed to make markets work efficiently. It is only when government enforces outcomes in the public sphere that tensions arise.<sup>18</sup>

Of course, some local and national public goods are supplied without the aid of compulsion. At least seven million people (mainly mothers) volunteered to collect donations from over 100 million Americans to help finance development of the world's first polio vaccine. The March of Dimes, as the campaign was known, provided ten times as much research funding as the government-funded National Institutes of Health.<sup>19</sup>

Such exceptions, however, only prove the rule: there are *some* situations in which government compulsion *is* vastly superior to volunteerism. Indeed, a lesson of the effort to develop and test polio vaccine was the need to strengthen government regulation of the process.<sup>20</sup>

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To summarize: the institutions of government, though imperfect, can sometimes improve on volunteerism. When they do, these domestic institutions work by restructuring the relationships among the members of a society, by changing the rules of the game of their interaction.<sup>21</sup> Global public goods must somehow be supplied by a similar means. But that task, as I shall now explain, is much, much harder.

## International anarchy

The conditions that apply at the international level are very different: there is no world government with the power to tax, to conscript, to regulate, or to quarantine; there are instead nearly 200 national governments, each recognized by international law as being sovereign. The institutions every society relies on to supply essential national (p.17) public goods do not exist at the global level. Global public goods must be supplied by alternative means. Sovereignty essentially implies that they must be supplied voluntarily.

I noted previously that volunteerism can be, and sometimes is, effective in supplying domestic public goods. It may even succeed in supplying some *global* public goods. Indeed, the example I gave before applies here as well. The knowledge of how to vaccinate against polio, financed mainly by voluntary contributions rather than by taxes, is actually a global public good (the Salk and Sabin vaccines were not even patented). So the need to supply global public goods voluntarily need not spell disaster. However, sovereignty does make it harder for states to supply global public goods than domestic public goods.

To see this, imagine that climate change were a purely national phenomenon. Then every country would bear the full cost of acting, and reap the full reward. Moreover, no state would need to worry that, as it cut its own emissions, other countries might respond by increasing their emissions—whether for reasons of free riding or by virtue of their trade relations.<sup>22</sup>

There might seem an obvious antidote to sovereignty. If the power of compulsion were given to an international authority,

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if a world government were established, then global public goods could be supplied by the same means employed domestically. Would we not be better off with a world government?

As an abstract proposition, the answer must be yes (for why else do we have government at the national level?), but the peoples of the world are diverse, and would resist being bound by a single set of institutions. In democracies, minorities do not rise up against the majority so long as the beliefs and values of the majority are similar to their own (of course, giving minorities legal protections also helps). As these differences increase, however, majority rule loses its broad appeal; it becomes a means of oppression, a stimulant to nationalism. It is not necessary for every nation to be represented by its own state, but as more nations are gathered under the control of a single state, it becomes harder for the state to maintain legitimacy and even control.<sup>23</sup> The breakup of the Soviet Union and Yugoslavia, and the more recent independence of East Timor, are all expressions of this tendency. So, in the opposite sense, is the reunification of Germany. Also relevant is evidence showing that local public goods are supplied in greater abundance when there are fewer ethnic divisions.<sup>24</sup>

At the global level, the differences among peoples are, by definition, at their maximum, which is why sovereignty proves a strong (p.18) attractor in the international system.

Sovereignty protects minorities. It requires that global rules be established by unanimity. It demands that other rules be adopted by the consent of the countries to which they apply. So long as values and beliefs are strongly associated with national identity, and so long as these continue to diverge, the number of states is likely to remain large. Similarly, the willingness of states to submit to a global majority will continue to be circumscribed. Of course, in Europe sovereignty has been eroded; some (but not all) decisions today are made by a qualified majority of the European Union member states. But further enlargement is resisted by some members (and championed by others) for the simple reason that, as the Union expands to encompass more countries, reflecting a greater diversity of values, beliefs, and interests,

efforts to further *deepen* European Union integration may be set back. At some point, this tradeoff may cause enlargement to stop (especially as enlargement requires unanimous consent). When looked at in this way, the European Union is not so much an exception to the rule as an expression of the same phenomenon.

To be sure, the existing arrangements will not persist indefinitely. The differences that divide people today will probably lessen over time—advances in technology and integration by trade should help see to that. But this process of developing shared values will take time (and may suffer setbacks). There is a reason that the international system is organized the way it is; there is a reason states exist and a supranational authority does not; there is a reason there are almost 200 states and not 20 let alone one.<sup>25</sup> As imperfect as the present arrangement may be, centralization of authority, today, cannot be relied upon to improve global wellbeing. Even if wellbeing could potentially be improved according to some criteria (such as a utilitarian perspective), it will not be embraced any time soon. As matters now stand, too many players have too much to lose from such an arrangement.

The challenge today is thus for countries to increase the supply of global public goods within the *existing* anarchic international setting.

## International institutions

Unilateralism, the default *modus operandi* of states in the international arena, can sometimes be effective. So, potentially, can (p.19) “coalitions of the willing.”<sup>26</sup> My main concern in this book, however, lies with those situations in which such responses fail—situations in which wellbeing everywhere could be improved if only the behavior of states could be changed. Lacking a supranational authority capable of compelling states to behave differently, the only alternative available is *international cooperation*—a kind of organized volunteerism.

International cooperation is developed and sustained by international institutions. Like their domestic counterparts,

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international institutions restructure the incentives that determine individual behavior. The difference is that, in the absence of a world government, international institutions have to do this with one hand tied behind their back.

A variety of institutions fulfill this function:

Customary law is an informal institution; it develops spontaneously rather than by deliberate construction and negotiation. Its great advantage is that it applies generally. Its great disadvantage is that it requires unanimous consent.

Treaties are different. They apply only to the states that consent to be bound by them. They therefore reflect a kind of selective volunteerism. Treaties can be stronger than custom, but at the cost, usually, of applying to a narrower set of countries.

Supply of global public goods can also be promoted by organizations created by treaties, the most important example being resolutions passed by the United Nations Security Council. Resolutions passed under Chapter VII of the United Nations Charter are legally binding on all states. This exception to the rule of consent applies to the limited sphere of peace and security, but is subject to veto by any of the five permanent members. Getting these great powers to agree on a matter of importance can be a colossal challenge. No wonder very few meaningful resolutions escape the veto (or are offered for a vote in the first place). Enforcement of Security Council resolutions is another obstacle.

Regulations adopted by the members of the World Health Organization are more democratic—and for that reason may be considered to be more legitimate. Under Article 22 of the WHO Constitution, regulations are binding on all WHO members except those that specifically reject them (or that insist upon making reservations). In contrast to a treaty, the presumption is therefore that all states are “in,” rather than “out.” This has real advantages. If there is a coordination aspect (p.20)

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**Table I.1. Simple Taxonomy of Global Public Goods**

	Single Best Effort	Weakest Link	Aggregate Effort	Mutual Restraint	Coordination
Supply depends on...	The single best (unilateral or collective) effort.	The weakest individual effort.	The total effort of all countries.	Countries not doing something.	Countries doing the same thing.
Examples	Asteroid defense, knowledge, peacekeeping, suppressing an infectious disease outbreak at its source, geoengineering.	Disease eradication, preventing emergence of resistance and new diseases, securing nuclear materials, vessel reflagging.	Climate change mitigation, ozone layer protection.	Non-use of nuclear weapons, non-proliferation, bans on nuclear testing and biotechnology research.	Standards for the measurement of time, for oil tankers and for automobiles.
International cooperation needed?	Yes, in many cases, to determine what should be done, and which countries should pay.	Yes, to establish universal minimum standards.	Yes, to determine the individual actions needed to achieve an overall outcome.	Yes, to agree on what countries should not do.	Yes, to choose a common standard.
Financing and cost sharing needed?	Yes, when the good is provided collectively.	Yes, in some cases.	Yes, with industrialized countries helping developing countries.	No.	No.

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	Single Best Effort	Weakest Link	Aggregate Effort	Mutual Restraint	Coordination
Enforcement of agreement challenging?	Not normally.	Yes, except when provision requires only coordination.	Yes.	Yes.	No, though participation will need to pass a threshold.
International institutions for provision	Treaties in some cases; international organizations, such as the UN, in other cases.	Consensus (World Health Assembly) or Security Council resolutions, customary law.	Treaties.	Treaties, norms, customary law.	Non-binding resolutions; treaties in some cases.

(p.21) to a regulation, this approach helps to ensure fuller participation. Psychology may also play a role. There is evidence that retirement savings are higher when individuals are enrolled automatically in a savings plan.<sup>27</sup> Perhaps participation in an international agreement is subject to a similar behavioral inertia. Non-binding resolutions passed by the World Health Assembly and various standards organizations also help to supply global public goods. Lacking legal force, these recommendations may seem shallow. They need not be. When cooperation requires only coordination, non-binding resolutions do not have to be enforced.

Norms, like custom, can be universal; but unlike custom they lack legal force. In legalistic societies, norms can seem quaint. At the international level, they can move mountains: the taboo on the use of nuclear weapons, mentioned previously, is a norm of supreme importance. So is the emerging norm of the “‘responsibility to protect’...people suffering from avoidable catastrophe—mass murder and rape, ethnic cleansing by forcible expulsion and terror, and deliberate starvation and exposure to disease.”<sup>28</sup>

All of these institutions, when they work, do so by making it in the *interests* of states to *change* their behavior. To do this,



they weaken the incentives that impede the provision of global public goods, and strengthen the incentives that facilitate provision. Understanding how and when international institutions can do this is fundamental to our future success in supplying global public goods. It is the subject of the book's concluding chapter.

## Overview

This book addresses many different global public goods, and it is important not only to understand each of these but to see the connections among them. The accompanying table (Table I.1) provides a taxonomy of different global public goods, a summary of the book's main conclusions. It shows where the trees stand in the forest: a guide for the chapters that follow.

Notes:

(1.) For a comprehensive analysis of these effects, see Toon et al. (1997).

(2.) In the literature, this is usually referred to as a “best-shot” public good. However, supply of a best-shot public good is normally taken to equal the largest effort by an individual country. By my interpretation, supply of a “single best effort” global public good is determined by the best effort, whether undertaken individually or collectively. As we shall see, many single best efforts involve and may even require collective action.

(3.) As I shall explain later, the younger generations are unfortunate in one respect: having not been vaccinated previously, they are more vulnerable to a new smallpox outbreak. The people who were previously vaccinated are also vulnerable, however, because the immune response stimulated by the vaccine diminishes over time.

(4.) Technically speaking, this makes eradication a coordination game. It is possible, though perhaps unlikely, that eradication could require enforcement; see Barrett (2003).

(5.) James Lovelock (“James Lovelock: The Earth is About to Catch a Morbid Fever that May Last as Long as 100,000

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Years," *The Independent*, January 16, 2006; <http://comment.independent.co.uk/commentators/article338830.ece>) predicts that, "before this century is over billions of us will die and the few breeding pairs of people that survive will be in the Arctic where the climate remains tolerable." His prediction is not contingent. My own interpretation of the evidence draws from the reports of the Intergovernmental Panel on Climate Change and peer-reviewed scientific papers.

(6.) All these points are discussed in more detail in Chapter 3.

(7.) See Barrett (2006d).

(8.) From this perspective, financing is akin to a global public good requiring an aggregate effort; see Barrett (2006a: 365).

(9.) The global public good of the standard for determining the time is similar to smallpox eradication. The supply of both requires coordination. One difference is that smallpox eradication required financing. Another difference is that it is only essential for "enough" countries to switch to a new standard for determining the time for it to be in the interests of other countries to switch. For smallpox, it may only pay a country to eliminate the disease at home if *all* other countries eliminate it.

(10.) Hirshleifer (1983) was the first to point this out. Samuelson (1954) developed the seminal analysis of public goods requiring aggregate efforts.

(11.) My colleague, Michael Mandelbaum, explains the role played by the United States in supplying global public goods; see Mandelbaum (2005).

(12.) <http://www.presidency.ucsb.edu/ws/print.php?pid=16595>

(13.) For evidence of the latter effect, see Scholz and Lubell (1998).

(14.) Dohrn-van Rossum (1996: 154–155).

(15.) Cooperation at the local level can succeed; see Ostrom (1990); and Baland and Platteau (1996). However, in these situations, the state has the potential to intervene, and local

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communities are different from the “international community.” Care must be taken in extrapolating from the local to the global level. See Barrett (2005: 16–17).

(16.) Glynn and Glynn (2004: 153).

(17.) Glynn and Glynn (2004: 163).

(18.) This point, of course, is fundamental to Nozick's (1974) advocacy of the minimal state.

(19.) Offit (2005: 24 and 54).

(20.) Offit (2005: 178–179).

(21.) I am drawing here from North (1990: 3).

(22.) If the marginal damage of climate change were increasing in the level of emissions, then as some countries cut their emissions, the incentive for other countries to do so would fall. This is the free rider effect. If reductions in emissions raised production costs, comparative advantage in the emission-intensive industries would shift to other countries. This is the international trade (leakage) effect. See Barrett (2005).

(23.) Interestingly, Collier and Hoeffler (1998) find that highly fractionalized societies are no more prone to civil war than homogeneous ones. Intermediate cases are the more problematic. For an alternative view, see Fearon and Laitin (2003).

(24.) See Alesina et al. (1999).

(25.) For a perspective on the number and size of states, see Alesina and Spolaore (1997).

(26.) “Coalitions of the willing” involve no legal obligations, and apply only to the countries that give their consent. They are an expression of like-mindedness rather than a form of multilateralism. Examples include the multinational force operating in Iraq and the Proliferation Security Initiative, which imposes no obligations on its members to provide operation support for interdiction of suspected shipments of

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weapons of mass destruction, and which relies on reciprocal ship-boarding agreements for inspections, rather than a more universal restriction on freedom at sea.

(27.) Madrian and Shea (2001).

(28.) High Level Panel on Threats, Challenges, and Change (2004: 52).



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