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**GLOBAL PUBLIC GOODS  
ARGUMENTS FOR COLLECTIVE ACTION**

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**INTRODUCTION**

1. Globalisation is leading to closer links between nation states. The growth of trade, the progress of technology and the spread of liberalised financial markets all strengthen social and economic linkages. These changes are provoking discussion about the ability of countries to maintain social stability and promote economic welfare within their own borders. They are also leading to greater discussion of countries' responsibility beyond their borders. Globalisation is often portrayed as reducing the scope for nation states to control their own affairs but increasing the need for nations to act collectively in the interests of all nations.
2. This paper is concerned with the role of global public goods in debate about the need for international action by governments. Global public goods are goods or services which can only be provided efficiently at the international rather than national level. A clean environment is an example of a global public good. No government alone can provide a clean environment. Only collective action by governments can deliver this.
3. Arguments for collective action based upon global public goods rely on notions of efficiency. There is no moral dimension to such arguments. Unless there is collective action to ensure an adequate supply of such goods, then welfare in the global economy is not being maximised. National governments should act in consort to provide such goods because opportunities to increase the wellbeing of all participants in the world economy are unexploited, not because they are concerned with (for instance) international inequality. The fact that steps taken might improve the wellbeing of other, poorer communities is wholly incidental to the argument for action. The appeal of such a framework is that it can provide an argument for collective action which reinforces ethical or legal arguments along the same lines.

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4. We begin by looking at 'obligations' placed by international human rights law on nation states to take extra-national action in support of other nations.

## HUMAN RIGHTS AND OBLIGATIONS

5. Responsibility for the fulfilment of human rights generally lies with the nation state. But, the possibility of some responsibility falling with the international community has long been recognised. Some international human rights agreements bestow explicit obligations on nation states beyond their borders. For example, the Convention on the Prevention and Punishment of the Crime of Genocide places an explicit obligation on nations to intervene to prevent genocide (Robertson, 1999).

6. Other instruments place broad but undefined responsibilities on countries. Article 28 of the Universal Declaration of Human Rights states:

Everyone is entitled to a social and international order in which the rights and freedoms set forth in this declaration can be fully realised.

7. This suggests an extra-national responsibility without specifying the nature of such responsibility.
8. Furthermore, article 2(1) of the International Covenant on Economic, Social and Cultural Rights (CESCR) says that each state party to the covenant must "take steps individually and through international assistance and co-operation, especially economic and technical, to the maximum of its available resources, with a view to achieving progressively the full realisation of the rights in the present Covenant".
9. The need for international co-operation is also recognised elsewhere in the Covenant. Article 11 on the right to an adequate standard of living, including the right to be free from hunger, makes reference to international co-operation. Article 15 refers to the benefits of an international regime for contracts and co-operation in the scientific and technical fields. Also, article 22 allows the UN Economic and Social Council to bring to the attention of relevant bodies "the advisability of international measures likely to contribute to the effective progressive implementation of the present Covenant".
10. The Committee on Economic, Social and Cultural Rights issued a General Comment in 1990 to clarify the implications of article 2(1) (United Nations Committee on Economic, Social and Cultural Rights, 1990). This reiterated the demand in international human rights law for collective action:
11. The Committee wishes to emphasize that in accordance with Articles 55 and 56 of the Charter of the United Nations, with well-established principles of international law, and with the provisions of the Covenant itself, international cooperation for development and thus for the realization of economic, social and cultural rights is an obligation of all States. It is particularly incumbent upon those States which are in a position to assist others in this regard. The Committee notes in particular the importance of the Declaration on the Right to Development adopted by the General Assembly in its resolution 41/128 of 4 December 1986 and the need for States parties to take full account of all of the principles recognized therein. It emphasizes that, in the absence of an active programme of international assistance and cooperation on the part of those States that are in a position to undertake one, the full realization of economic, social and cultural rights will remain an unfulfilled aspiration in many countries. In this respect, the Committee also recalls the terms of its General Comment 2 (1990).

12. General Comment 2 of the Committee is concerned with international technical assistance measures, as referred to in article 22 of the CESCR, noting the need for UN bodies to take into account the impact of their activities on the fulfilment of rights. But the comment does not shed any light on how far development activities should go.
13. The Declaration on the Right to Development adopted by the UN General Assembly is also unclear about the extent of obligations (United Nations General Assembly, 1986). Article 3 of the declaration says:
14. States have the duty to co-operate with each other in ensuring development and eliminating obstacles to development. States should realize their rights and fulfil their duties in such a manner as to promote a new international economic order based on sovereign equality, interdependence, mutual interest and co-operation among all States, as well as to encourage the observance and realization of human rights.
15. This mantra continues in article 4. The right to development has a questionable status as a human right (Eide, Kraus & Rosas, 1995). Nevertheless, it is sometimes referred to as obligating rich, industrialised nations to take further actions in support of poor, developing nations.
16. Two related questions arise reading the various UN covenants and declarations regarding international obligations for fulfilling human rights.
17. First, what is the rationale behind asserting such an obligation? Presumably, the authors of the Universal Declaration of Human Rights deemed a moral obligation on richer states to take measures to improve the wellbeing of poorer states, and it is this obligation which underpins article 28 of the Declaration, from which other documents borrow? Certainly the General Comment on article 2(1) of the CESCR makes an implicit reference to redistribution from rich to poor countries, suggesting a moral underpinning to the call for international action.
18. Second, if the obligation on the part of nation states to co-operate to ensure the fulfilment of the full range of human rights is moral, how far does it extend? For example, what degree of international income inequality is acceptable in the face of massive and gross violations of the right to an adequate standard of living? Alternatively, should income and wealth be transferred up to the point at which this right is fulfilled in all nations? These questions go unanswered, perhaps necessarily.
19. One may make a distinct argument in support of international co-operation in the economic and other spheres by relying on economic efficiency rather than morality or legal 'obligation'. Such an argument relies on an area of economics concerned with 'public goods'. We now turn to a discussion of this, but first need to consider the idea of economic efficiency.

## **ETHICAL CONSIDERATIONS AND ECONOMICS**

20. In this section, we analyse the scope of international initiatives relating to economic, social and cultural rights within the framework of economics. That is, we ask how nation states are likely to act or ought to act regarding these issues if we consider only their economic motives. The question is particularly interesting for two aspects of modern economics. The first concerns the way in which modern economics treats actors or agents. An agent can be defined as an entity, whether an individual, a nation state or a multilateral co-operation, which is driven by a principle or an ethic and makes decisions based on this ethic.

21. In modern economics, the objective of an agent is strictly limited to the maximisation of personal happiness. That is, economic agents are assumed to be essentially selfish and not take into account the effect of their actions on others.
22. To treat nation states as economic agents is to say that when governments make decisions, whether in the domestic or international arena, they take into consideration only the implications of their actions for the well-being of the states that they govern. Specifically, one nation state will not come to the aid of another for purely humanitarian reasons. This cynical assumption may not be plausible but it is revealing: the following analysis shows that even when nation states are treated as selfish agents, there are economic reasons as to why they should, given their own assumed objectives and in a variety of instances, take collective action and specifically, provide assistance to fellow nation states. If one allows that nation states are not completely 'selfish' actors and would prefer improvements in circumstances in other parts of the world, independently of the benefits that such improvements would bring to them, then this serves to strengthen the argument for international co-operation in the concerned areas.
23. The second aspect of modern economics that concerns us is the traditional manner of ranking different social outcomes, based on the concept of "Pareto efficiency". If the 'selfish' nation states described above decide to take collective action on an issue, then it must follow that in an environment of co-operation, each is able to do better (i.e. its well-being is improved) or at least as well, than if they had each acted alone. If the nation states are adept at negotiating with one another and have all the relevant information at hand, then they will be able to reach an outcome that is "Pareto efficient". A Pareto efficient outcome is one for which, given the constraints of global resources and technological know-how, it would be possible to improve the wellbeing of any nation state only at the expense of another.
24. Thus, by defining nation states as self-interested agents, we have restricted ourselves to international co-operation on global issues where "Pareto improvements" can be made; that is, where it is possible to improve the well-being of at least some nation states without diminishing that of any. The following section identifies the set of issues or 'goods' that satisfy this restrictive criterion.
25. Why does ethics play such a limited role in modern economics? Amartya Sen, who has himself long advocated more emphasis on ethical issues in economic analysis, traces the reason to Lionel Robbins who argued in the 1930s that "interpersonal comparisons of different people's minds were 'meaningless' from the scientific point of view". (Sen, 1999). If such considerations are disallowed, then it becomes impossible to bring ethical considerations into formal analysis. Modern economics has adopted Robbins' verdict as an axiom. Sen sums up the result as follows: "I guess it is a reflection of the way ethics tends to be viewed by economists that statements suspected of being 'meaningless' or 'nonsensical' are promptly taken to be 'ethical'". (Sen, 1987). However, it is important to note that the limited role of ethical considerations in modern economics also reflects the fact that no credible alternative to the framework of Pareto optimality and self-interested agents has yet been found.

## **PUBLIC GOODS**

26. The specific economic concept that we shall use in our analysis is that of a 'public good'. A public good is characterised by two qualities called 'nonrivalry' and 'nonexcludability'. A good is said to be nonrival if its use by one individual does not, in any respect, diminish the amount available for use by another. One of the commonest examples of nonrival goods is knowledge. If a class of students learns Newton's laws of motion, then this does not diminish the availability of these ideas to others. By contrast, most goods that one would buy in the market are rival in

nature. If a person puts on a piece of clothing, for example, then another person will not be able to make use of it at the same time. A good is said to nonexcludable if it is difficult or impossible to prevent individuals from benefiting from it. Clean air is an example of a nonexcludable good. On the other hand, a bus service is an excludable good as it is possible to charge individuals for riding the bus.

27. Goods can be nonexcludable and nonrival to different extents. Knowledge, for example, is excludable up to a point, as it is possible to use copyrights and patent laws to prevent people from using it, but a house has more excludability. A mass transit system is nonrival up to a point; if the system becomes overloaded, people obviously derive less satisfaction from it than they would have otherwise. A meal, by contrast, is a good characterised by more rivalry. A good that features some degree of nonrivalry or nonexcludability will be prey to the difficulties that characterises all public goods. In this paper, the term 'public goods' will refer to all such goods.
28. A market can efficiently provide private goods but not public goods. To say that the provision of a public good by the market will be 'inefficient', it is meant that it would be possible to make a Pareto improvement to the market outcome – i.e. to choose a combination of production and consumption decisions for the public good that leaves some individuals in the society more content and none less content. The example of national defence can illustrate this point. The benefits of national defence are purely nonrival – as the benefit that one person derives from national defence does not diminish the benefit available to another, and nonexcludable – it is not possible to exclude people from the benefits of national defence. The nonexcludable nature of national defence means that private firms are unlikely to come forward to provide the service. By contrast, government can finance national defence through taxation. Provided the tax to each individual is no more than he or she would have been willing to pay for defence, the public provision represents a Pareto improvement over an absence of any defence.
29. A variation of the same kind of inefficiency is demonstrated by the 'free-rider problem'. Individuals, left to themselves, would be unwilling to pay for a public resource, since, given its nonexcludable nature, they would be able to benefit from it one way or another. An individual, who cannot be prevented from benefiting from a good, will have an incentive to leave the burden of providing it to others. For example, if individuals were asked to contribute funds to be used towards the maintenance of a publicly accessible road, then each is likely contribute less than the derived benefits (or so modern economics implies, given its assumption of selfish actors). Here is another instance where a government, operating for the benefit of the society as a whole will use taxation to ensure an efficient level of investment for the road.

## **GLOBAL PUBLIC GOODS**

30. A public good is 'global' in nature if it is characterised by nonrivalry and nonexcludability not only within a single state but across nation states as well. Clean air in a city is nonrival and nonexcludable among its inhabitants but the harm of global warming (a public 'bad' rather than a public good) will be nonrival and nonexcludable across all populations of the world. At the national level, it is the responsibility of the national government to supply the public good adequately. The immediate problem posed by global public goods is that there is no world government. Therefore, global public goods can be supplied adequately only through international co-operation. Whether international co-operation is feasible or not will depend, in turn, on the benefits of the global public good and the costs of co-operation to each nation state.
31. Public goods that are international in nature are not new. International peace, for example, has been a concern of nation states as long as they have existed. In the last few decades, however, the linkages among the different parts of the world have increased dramatically and this has given

rise to a large number of issues that transcend national boundaries. As ‘openness’ has come to be accepted as an important ingredient in attaining economic prosperity, international trade and cross-border financial flows have increased (e.g., Bordo, Eichengreen and Irwin (1999) describes the unprecedented extent of integration of commodity and financial markets today). Technological improvements have lowered the cost of transporting goods and people and of communication and this too has led to increased trade, travel, information flows and cultural exchanges. Increases in world population, and industrialisation has led to the use of natural resources in unsustainable ways, thus giving rise to further global issues.

## Global Equity

32. The obligation of nation states to promote economic and social rights around the world as specified in the International Covenant on Economic, Social and Cultural Rights would imply, given the unequal distribution of wealth in the world today, an obligation to take steps promoting global equity. We begin our analysis of international co-operation in the framework of global public goods by asking whether global equity itself is such a good. That is, we consider the argument that nation-states, ought to concern themselves with promoting global equity for reasons of self-interest. If we ignore moral reasons, can it be argued that rich nation states have an incentive to promote the wellbeing of less prosperous nations? The question, admittedly, stretches the concept of a global public good to an extreme for if one accepts that global equity is a global public good, then it follows that any effort that improves the well-being of poorer nation states is also beneficial for richer nation states; in effect the distinction between national goods and global public goods is blurred. Nevertheless it is a useful starting point for identifying to what extent economic obligations and moral obligations of nation states overlap. To say that global equity is global public good would be to assert that the two kinds of obligations overlap completely.
33. The question will also be relevant when the discussion turns to other international public goods later in the paper; the benefits of certain of which will accrue primarily to poorer countries while adequate provision of the good will require initiatives from the industrial world.
34. It is possible to argue that global equity is an *instrumental* global public good; i.e. it facilitates the provision of other global public goods and restricts the creation of global public bads. Countries with widely different levels of economic development are more likely to have different priorities and levels of resources, factors that will make international co-operation among them difficult. Consider the preservation of biodiversity in the Amazon basin. Rich countries rightly attach much importance to this issue but the local population whose livelihood depends on clearing forest areas to increase agricultural land will attach greater importance to its own economic survival. The difficulty or unwillingness of certain developing countries in meeting the targets for ozone-depleting substances set out in the Montreal Protocol (to be discussed later) illustrates the same point.
35. The issue is particularly important where the provision of the global public good is determined largely by the country that makes the least contribution. (Jayaraman and Kanbur, 1999). The quality of epidemiological surveillance world-wide, for example, will only be as good as in the country with the least resources and capabilities to cope with an epidemic. For the short term, such problems can be addressed by providing financial or technical support that enable poor countries contribute to the global public good. However, if the globe becomes more closely integrated over time, then a widening income gap between nation states will increasingly serve as an obstacle for the provision of certain types of public goods.

36. Even in the absence of specific global issues, economic hardship or turmoil in one region can have impact on another. At the end of 1999, conflict had created nearly 3 million refugees in Africa (UNHCR, 2000). Many of these refugees would have to seek a new home on other continents. The British government Department for International Development, notes that “Europe in particular has to cope with the consequences of the increasing flows of asylum seekers and economic migrants from Africa” (DFID, 2001). The African refugee problem can often be traced to the economic wellbeing of these nation states as “continuous economic decline plays a major part in state collapse and conflict (in Africa)” (DFID, 2001). On the other hand, economic prosperity can produce political stability and thus lessen the degree of negative spillovers to neighbouring regions. The desire of South-East European nations to gain membership in the European Union and, in turn, the willingness of the industrialised world to provide economic assistance to these countries reflect, at least in part, this thinking.
37. However, even if one accepts that promoting global equity is a global public good, it is unclear to what extent this assertion serves as an incentive to self-interested richer nation states to actively improve wellbeing in developing countries. Unlike certain other global public goods such as, say, the preservation of the ozone layer, global equity would benefit richer nation states only indirectly, and in a manner that is difficult to quantify. Therefore, a cost-benefit analysis by richer nations is unlikely to present a strong case for the promotion of global equity.
38. Rich nation states are much more likely to provide assistance to the developing world when their own interests are at stake. A brief look at the issue of ozone-layer depletion illustrates this point.

### **Ozone Layer Depletion**

39. In the mid-1970s atmospheric scientists recognised that CFC gases released into the atmosphere can cause ozone layer depletion. Since the early 1980s, thinning of the ozone layer has indeed been observed in colder regions of the world, particularly over the Antarctic. The increased ultra-violet radiation that would result from ozone layer depletion is likely to lead to adverse health effects including skin cancers, eye cataracts, and weakening of the immune system as well as reduced productivity of agricultural and fishery productivity (UNEP, 1997). Most of the world’s population will suffer from these effects, albeit in different ways and to different extents; i.e. the effects of ozone layer depletion are nonrival across the globe. Conversely, the benefits of a halt to the process of ozone layer depletion will be available to all nations, whether they take measures to such effect or not; i.e. the benefits are nonexcludable across the globe. Therefore, ozone layer depletion is a global public bad and the reversal of the process a global public good.
40. In the late 1970s, several industrialised countries took unilateral measures to restrict the production and use of CFCs, even before scientific evidence on ozone-layer depletion was conclusive. In 1977, initiatives at the international level began through the United Nations Environment Programme. This led to the signing of the Montreal Protocol in 1987 which called for a 50% reduction in the production of CFCs by 1999. The Montreal Protocol was soon shown to be inadequate. Later amendments called for more stringent measures, including a full-phase of the CFCs, and an increase in the list of substances covered by the protocol. At the same time, the number of signatories to the protocol increased from 30 originally to 175 countries by late 2000.
41. The Montreal Protocol has been relatively successful. Why? Barrett (1999) offers an explanation. The economics of ozone layer depletion are conducive to international co-operation. A study by the US Environmental Protection Agency, USEPA, put the cost to the United States from abatement of ozone depleting substances as specified in the original Montreal Protocol at US\$21 billion. By contrast, even if the United States were to implement the protocol unilaterally, the benefits would be over US\$1 trillion. If other industrialised countries and 65% of the developing

countries complied as well, then the benefits to the United States would be over US\$ 3.5 trillion (USEPA, 1988a, 1988b). The scenario for other industrialised countries are likely to have been similar. Thus industrialised countries had a strong incentive to reduce the use of ozone-depleting substances; for larger economies such as the United States even unilateral action would have been beneficial. Furthermore, it was in the interest of industrialised countries to offer technical and financial assistance to developing countries to encourage them to participate in the process as well.

42. Indeed, although developing countries that sign the Montreal Protocol are subject to an emission ceiling, the industrialised countries have agreed to compensate them for the incremental costs of compliance. It is in the interests of industrialised countries to offer such incentives because the benefit to them from the protection of the ozone layer exceeds the costs of a global phase-out of ozone-depleting substances. To sum up in theoretical terms, international co-operation has taken place on the issue of ozone-layer depletion because co-operation has led to a situation where all parties are better off; i.e. to an outcome that is a Pareto improvement. The idea that co-operation between industrialised nations and developing nations are more likely to take place when the industrialised nations have something to gain from the process is also supported by the history of international epidemiological surveillance, which we discuss next.

### **Epidemiological Surveillance**

43. The outbreak of epidemics has been an important cause of death throughout history. Until the end of the 19th century, more soldiers died from disease than combat. The surveillance of epidemiological diseases makes it possible for the international community to act promptly to control a disease outbreak at its source whenever there is such an outbreak. Global epidemiological surveillance and the disease control efforts that it makes possible are global public goods as the benefits are nonexcludable and nonrival across countries.
44. A brief look at the history of international co-operation on epidemiological surveillance reveals a clear pattern. The strength and effectiveness of international surveillance at any point in time was closely tied to the interest of a subset of countries in such efforts; specifically, serious efforts at international epidemiological surveillance were made only when industrialised countries perceived a serious threat from disease outbreaks in developing countries. The summary is drawn largely from Zacher (1999) where the historical trends in international epidemiological surveillance are discussed in more detail.
45. The Organisation Internationale d'Hygiène Publique (OIHP), created in Paris in 1907, gathered information on outbreaks for distribution to member states as one of its central functions. This was the first such organisation with a nearly global reach. The OIHP was dominated by the countries of Western Europe and therefore reporting was required only for diseases that these countries feared would spread from Asia, Africa, Latin America and Eastern Europe – cholera, plague, yellow fever, typhus and relapsing fever. There is little indication, however, that the information the OIHP collected and disseminated was greatly valued. One important reason is that the European powers knew a great deal about health conditions in their colonies and the United States was familiar with health conditions in Latin America. After the Second World War, the World Health Organisation (WHO) assumed the OIHP's surveillance tasks. During this period, the incidence of the international transmission of cholera, plague, yellow fever and typhus, relapsing fever and smallpox – particularly from developing to industrial countries – declined as a result of medical advances and preventive measures. This was also an era when it was increasingly believed that a drug could be developed to combat any infectious disease. Thus, the WHO members retained a casual attitude towards surveillance regulations.



46. The 1990s witnessed important outbreaks of new and old diseases in developing countries – cholera in Peru in 1991, Rift Valley fever in Egypt in 1994, plague in India in 1994 and Chile in 1995, Ebola in Zaire and Gabon in 1996, Hantavirus in Chile in 1997, Rift Valley fever in Kenya in 1998, and Avian flu in Hong Kong in 1998. A surge of publications on infectious diseases in industrialised countries stressed that it is impossible to prevent infected people from entering foreign countries and argued instead that early detection and control of diseases were needed at their source. As a result of an increasing recognition of the problem of drug-resistant diseases, major industrialised countries began to take a serious interest in controlling the international spread of infectious diseases.
47. Because of the new concern over outbreaks of infectious diseases, efforts at international health surveillance at the World Health Organisation have increased in recent years; the Division for Emerging Communicable Diseases was set up in 1995 and the organisation is improving information dissemination about disease outbreaks. Industrialised countries are increasingly playing an important role in the renewed efforts at international health surveillance. National institutions of the United States, France and the United Kingdom have strong surveillance capabilities in developing countries. Research laboratories in these countries serve a vital function in diagnosing diseases and prescribing responses during an outbreak. The US Centres for Disease Control (CDC) were central to international responses to most major outbreaks in recent decades.
48. The increased efforts at international epidemiological surveillance by industrialised countries in recent years has been beneficial effects for developing countries. But the increased efforts have come about largely because of self-interest rather than any sense of moral obligation. When self-interest is lacking, international co-operation is likely to proceed at a slower pace. If the benefits of a global public good will accrue largely to poorer countries, as in the case of vaccine research, or the costs involved in supplying the good are high as in the case of global warming, then economic incentives alone are unlikely to be sufficient to lead to international co-operation and moral concerns will have to give impetus to the process. We look at the case of global warming next.

## **Global Warming**

49. Even if there is wide consensus that the issue in question is a global public good (or bad) – i.e. all countries are affected by it, disagreement as to how the costs should be distributed can serve as an obstacle to international co-operation. The case of global warming illustrates this.
50. A recent UNEP report on global climactic change estimates that the global average surface temperature has increased over the 20th century by about 0.6 C ; the extent of snow cover has decreased by about 10% since the late 1960s and the global average sea level rose between 0.1 and 0.2 metres over the 20th century. The report states that most of the climactic changes that have occurred during the last fifty years are very likely due to increased industrial activity, leading to a rise in atmospheric concentrations of greenhouse gases that contribute to global warming (UNEP, 2001). A report from the US National Academy of Sciences reaches similar conclusions (National Research Council, 2001).
51. While there is still uncertainty about the full impact of global warming, it is very likely that the process will adversely affect human and ecosystems, particularly in the long-term. Global warming is a global public bad as its adverse effects will be nonrival and nonexcludable across all nation states.

52. It was not until the 1980s that a near consensus began to emerge about the direction of climate change and the need to reduce growth in atmospheric concentrations of greenhouse gases (Barrett, 1999). Discussions at the international level led to the signing of the Kyoto protocol in 1997 which requires industrialised countries to reduce greenhouse gas emissions by 8% from the levels in 1990 for the years 2008-12. The protocol, however, will not come into force till it has been ratified by 55 countries that together accounted for at least 55% of the total emissions from industrialised countries in 1990. Thus far, no industrialised nation has ratified the protocol.
53. An important reason for the slow pace of international co-operation on the issue of global warming is the high cost of tackling the problem. While the Kyoto Protocol requires industrialised countries to lower greenhouse gas emissions by 8% relative to levels in 1990, emissions around the world would actually have to be lowered by more than 60% just to stabilise their concentration at the current level (IPCC, 1990). The cost of meeting the targets will be particularly high for the United States where emissions would have to come down by about 30% in 2012 relative to the current trend. Models indicate that this will cost the US between 1% to 2% of GDP by the year 2010 (US Cabinet-Level Climate Change Working Group, 2001).
54. The Global Climate Change Conference at the Hague in November 2000 focused on “flexibility mechanisms” that would give nation states alternate ways to meet the requirements of the Kyoto Protocol. Such mechanisms could include the trading of emission permits, and credits for investments that help developing countries clean up the environment, and for reforestation. Negotiations broke down at the Hague because of differences between the United States and the European Union concerning the extent to which such flexibility mechanisms could substitute for meeting the emission targets. The United States, for whom satisfying the requirements of the Kyoto Protocol would be most costly, would have preferred the maximum possible use of flexibility mechanisms while the European side wanted actual emission rates in the United States to be lowered (Economist, 2001). More recently, the US president George Bush announced that the United States would not ratify the Kyoto Protocol at all, thus posing a serious threat to the future of the agreement (Economist, 2001). One major criticism of the protocol by the Bush administration is that it does not set any emission targets for developing countries where the major part of increases are likely to occur in the future (US Cabinet-Level Climate Change Working Group, 2001).
55. The present fate of the Kyoto protocol contrasts with the relative success of the Montreal protocol which deals with ozone layer-depletion. As Barrett (1999) makes clear, this is in large part because the economics of global warming are considerably less favourable. Since the cost of rectifying the problem is much higher in the case of global warming, there is also greater dispute as to how they should be distributed among nation states.
56. Two further aspects of global warming are worth noting. First, as with vaccine research which we discuss later, there is a moral dimension to the issue of global warming. While poorer nations have fewer resources as well as lower institutional and technological capability to cope with the adverse effects of global warming, a larger part of their economies are in climate-sensitive sectors such as agriculture, fisheries, etc (IPCC, 2001b). On the other hand, per capita emissions have historically been and still are much higher among industrialised countries than in the developing world. These factors would seem to reinforce the moral obligation on the part of rich states to address the problem of global warming. However, in this case, the moral argument is likely to play a smaller role in the decisions of nation states than in the case of vaccine research. This is because the cost of lowering greenhouse gas emissions is an order of magnitude greater than the funds that would be necessary to stimulate vaccine research.
57. Ironically, the fact that poorer countries would tend to suffer more from global warming while richer countries are more responsible may in fact have served as a disincentive for international

co-operation on the issue. If richer countries were more vulnerable to climate change, they would have been more willing to bear the cost of rectifying the problem and therefore, more able to co-operate at the international level.

58. The second factor worth noting is that global warming is not only a global public good but also an intergenerational public good. The costs of reducing greenhouse gas emissions, by changing habits and investing in more environment-friendly technologies, will have to be borne by the present generation. But the benefits of taking effective measures today, or alternately the costs of not taking them, will be felt largely by future generations. Therefore, the willingness of the present generation to tackle the issue of global warming will depend on its concern about the well-being of future generations. Studies about the costs and benefits of greenhouse gas emissions reflect the importance of the factor. Nordhaus (1991, 1994) estimates that the benefit of lowering carbon dioxide emissions will be US\$7 per tonne for the period 2001-10. Cline on the other hand estimates that the benefit could be as high as US\$154 per tonne (IPCC, 1996). A primary reason for the differences in their estimates is that Nordhaus uses much higher discount rates (4-5%) than Cline (2%); i.e. the well-being of later generations is given much less importance in Nordhaus' model. One can argue that the present fate of the Kyoto Protocol reflects limited concern about the wellbeing of future generations among national governments today. After all future generations are not able to vote yet and it is the current voting population that would have to bear the costs of rectifying the problem of global warming. However, the same argument would need to apply to the more successful Montreal Protocol.

### **The International Criminal Court**

59. It is possible to consider the International Criminal Court as a global public good. The Rome statutes of the ICC cover genocide, crimes against humanity and war crimes. Once the court is established it will act against individuals charged with any of these crimes, though only when national criminal justice systems have proved ineffective.
60. The ICC will be created once 60 states have ratified or acceded to its statutes (the distinction need not concern us here). Thereafter it will have automatic jurisdiction only in those states which have ratified. Jurisdiction elsewhere will require a UN Security Council referral under Chapter VII of the UN Charter covering international security. In considering the role of the ICC in providing a public good we leave aside considerations of jurisdiction or questions of whether jurisdiction already exists for crimes covered by the ICC. Instead, for illustrative purposes, we consider the ICC in the abstract.
61. Imagine a world in which the ICC acts as a successful deterrent. Such a world would be one in which the 'bads' of genocide, crimes against humanity and war crimes were prevented. In such a world, everyone would enjoy the absence of the threat of such crimes. No person's enjoyment of this would preclude another's enjoyment. Similarly, if the court had jurisdiction in all countries, no person could be excluded from the enjoyment of its protection. Therefore, the benefits of the ICC are both nonrival and nonexcludable. Hence the ICC can be described as providing a global public good.
62. Perhaps more realistically, the ICC may serve as a means to prevent impunity for such crimes. By the same reasoning, one could then argue that the ICC provided the global public good of an absence of impunity.
63. The cost to nation states of providing the public good of a world absent crimes against humanity is the ratification cost of the ICC statutes together with the loss of sovereignty this implies. Parliamentary time to pass the necessary legislation, crowding out other important work, is a

component of such costs. Another is the possible loss of public support for the government for taking this step. Balanced against this is the public support which the court might have in the country. If the ICC had truly universal jurisdiction, the incentive to ratify would presumably diminish as governments could defer ratification and free ride on ratification by other nations. Thus, a moral lead taken by some governments, perhaps those with the greatest domestic support for the court, would be necessary to overcome the free rider problem. Without universal jurisdiction, the free rider problem is less pronounced. In this case, the benefits of ratification are largely domestic. Nevertheless, there are positive spillover effects for other countries when a nation ratifies the ICC statutes as the number gets closer to the 60 states needed to see the court set up.

## **INTERNATIONAL FINANCIAL STABILITY AS A GLOBAL PUBLIC GOOD**

64. An important aspect of globalisation is growing capital flows between countries and the related development of financial markets. Such markets serve an important purpose in a market economy by facilitating the shift of funds from savers to borrowers, improving the allocation of resources in the economy. This applies as much to the global economy as to a national economy. Open capital markets can be useful to developing countries as they enable a poor country to access pools of capital which are not available domestically.
65. But there is a downside to developed and open capital markets. Capital flows and markets create the potential for financial instability, which can be costly. Moreover, spillovers from financial instability throughout the global economy can be dramatic, increasing the costs to the 'real' economy (as opposed to financial). In recent years the threat from financial instability has been highlighted by a succession of crises, in Mexico, in parts of Asia, and in Russia. In each case the effects were felt across the world.
66. In order to see how international financial stability may qualify as a global public good, we need to examine the nature of financial markets.
67. Financial asset prices can change for a number of reasons. For example, shifting weather patterns may affect the fair, market-clearing price of commodities traded on exchanges. Similarly, changing consumer tastes may make the share price of one company too high versus that of another, competitor company. Shifts in interest rates by national central banks can have similar effects on all asset prices, by altering the cost of credit. A government might change its fiscal policy by increasing the tax rate on company profits, say, which would change the fair value for company share prices and also the exchange rate of that country. A change in government may alter the likelihood of a default on debt obligations, which would affect bond prices and, via an implied rise in interest rates, share prices also.
68. Such movements in asset prices can be regarded as 'rational'. There is no reason to frown on changes which can be identified as having their origin in any of these causes or a multitude of other shifts in 'fundamentals'.
69. Another rational reason for asset prices to change is if investors alter their perceptions about the prospects for interest rates, inflation or growth in the economy. If investors become more concerned, for instance about growth, they might mark down share prices as expectations of company profits are lowered. But they might push share prices down further because of heightened uncertainty surrounding the economic outlook. In this case the risk premium on the asset price increases, i.e. investors demand extra compensation for holding risky assets.

70. All changes in risk premia are not irrational. Human beings are by nature usually risk averse and increases in risk premia arising from changing economic circumstances are reasonable. But sharp changes in risk premia may be irrational. There is considerable evidence that financial markets react excessively to information, even though the degree of over-reaction is extremely hard to pinpoint (Shiller (2000) provides an accessible introduction to the possibility of irrational movements in asset prices based upon investor behaviour as well as a review of the vast evidence on this subject). The implied changes in risk premia in many financial asset prices appear irrational by any conventional behavioural benchmarks.
71. The spread of financial volatility from one country to another is known as ‘contagion’ among economists. Such terminology suggests this is a bad thing. This is not necessarily so. The correlated movements of asset prices across countries may be rational, based upon a reassessment of the risks faced by one country’s economy based upon new information about another, similar economy. Such movements would, of course, lead to changes in the underlying real economy. But these effects would, in turn, be a correct reflection of changing financial prices.
72. Contagion becomes a concern when the original swings in asset prices in a country are excessive and are mirrored in overseas financial markets. Thus, national financial instability is transmitted internationally. This may threaten the health of many national economies besides the country in which the shock originated. For example, a slump in share prices across countries may weaken domestic consumer confidence and lead to lower consumer spending. In turn, this might weaken the governments’ tax base and induce investors to charge governments more for borrowing. Domestic government budgets may get cut as governments are unable to access capital markets to borrow funds to finance domestic spending. If similar countries in an economic region face tension, this can become self-reinforcing as the export prospects of each deteriorates. Invariably, severe tension and pressure on exchange rates goes hand in hand with such events, often provoking sharp changes in the health of banking systems.
73. Note that some of the swing in asset prices will be rational, a response to the original shock and its overseas impact. Similarly, if this shock was international, say a jump in oil prices because of a reduction in supply from oil producers, some of the correlated movements in asset prices will be rational.
74. One needs to distinguish between rational movements in assets prices, which is not financial ‘instability’, and irrational movements. The latter may be characterised as instability and is both unwarranted and unwelcome.
75. International financial instability caused by contagion is unwelcome precisely because it can create real costs without an underlying, rational cause. When such spillovers become large, one may talk of financial instability as a ‘bad’. In turn, the absence of the threat of such irrational spillovers is a public good. If the threat of financial instability is removed globally, one may talk of financial stability as a global public good – all countries and consumers benefit and no-one is excluded from the benefits. Although a global public good, the scale of benefits from financial stability will vary considerably across countries and households.
76. It is important to stress that too much financial stability can be a bad thing. First, changes in financial asset prices are important signalling devices which lead to changes in the allocation of resources in an economy. This is a vital role in any market economy. Second, international financial stability comes at the cost of enormous bailouts of countries or the promise of such bailouts if necessary. Large amounts of taxpayers’ money has been devoted in recent years to bailing out investors who recklessly invested in particular financial markets or countries. This

activity creates a moral hazard as investors come to believe they will always be bailed out should they invest incautiously because policymakers will take steps to prevent asset price volatility.

77. Despite the wealth of literature on financial instability and attempts to estimate its costs, it is rare to find explicit reference to financial stability as a public good. The General Manager of the BIS, Andrew Crockett, provides an exception in Crockett (1998). Even Crockett uses the language of public goods almost as an afterthought. He first argues:
78. The growth in the volume of financial transactions and the increasing integration of capital markets have made institutions in the financial sector more interdependent and have brought to the fore the issue of systemic risk. International capital flows, though generally beneficial for the efficient allocation of savings and investment, now have the power in unstable conditions to undermine national economic policies and destabilise financial systems.
79. He continues: “The central case for making the health of the financial system a public policy concern rests on two propositions: first, that, left to itself, the financial system is prone to bouts of instability; and second, that instability can generate sizeable negative spillover effects (externalities)”.
80. The notion of financial services as a ‘public good’ is made belatedly:
81. Financial stability is a public good in that its ‘consumers’ (that is, users of financial services) do not deprive others of the possibility of also benefiting from it.
82. Crockett makes his case in the abstract, without distinguishing either national or international financial markets or economies. Therefore, his explicit reference to financial stability as a public good may be taken to be an implicit reference to international financial stability as a global public good.
83. Wyplosz (1999) identifies financial stability as a good public good and spends considerable time looking at national policies to improve stability in the wake of recent turbulences. Yet none of the policies on offer can insulate a country entirely from events overseas - or from sudden shifts in investor sentiment.
84. An institution already exists to ensure financial stability, namely the International Monetary Fund. The IMF has pursued financial stability as a goal of public policy since its creation long before academics began to talk of public goods or global public goods.
85. Inevitably a large part of the debate about financial stability concerns technical solutions to limit the threat of destabilising capital flows. Similarly, there is considerable interest in how to design the IFIs so as not to fan the flames of instability. Policy proposals in this area are largely technical, concentrating on the impact of operations of IFIs on market dynamics or whether to establish an explicit international lender of last resort (see, e.g., Fischer (1999) and Goldstein (2001)).
86. Recognising the role of financial stability as a public good contributes little to such debates. They are intimately tied in with the question of how much stability in financial asset prices is desirable. In principle this could be helped by public goods considerations, as the cost of providing financial stability is balanced against the cost of instability. Key inputs to this analysis would be (i) a measure of instability; (ii) a measure of the cost of instability; (iii) an assessment of the cost of providing stability. These are extraordinarily difficult issues to address and little concrete progress has been made to date by economists working in the area.

87. Tensions about government contributions to the IMF, and thus who shoulders the burden of securing financial stability, are also unlikely to be reduced by recognition of the public goods characteristics of stability. Such tensions are in part a manifestation of the free rider problem with public goods. But they are also a function of unequal distributions of income and wealth.
88. Characterising international financial stability as a global public good clarifies the nature of the 'good' being sought and the need for collective action to secure an adequate supply. This clarification is welcome and has subtly shifted language in the IMF, but it is difficult to envisage any resulting policy changes.
89. One can illustrate this with a simple experiment. We searched for the term 'global public good' on the IMF's website. Although the website archives news and articles back to 1995, the search yields just three uses of the term prior to 2000. Since the beginning of 2000 there are 44 items which include the phrase. Clearly, the IMF has embraced the language of global public goods in describing its work.
90. Yet the business of the IMF has remained unchanged. Similarly, the operations of the IMF have been largely the same. Certainly the IMF has gone through considerable soul-searching in the wake of the Asian and Russian crises of 1997-98. But its fundamental operations have not altered to date. The shift in language must be seen as an ex post rationalisation of the functions of the IMF.
91. Describing the business of the IMF as a global public good may serve two purposes. First, it may make the institution more palatable both internally and externally. Second, it provides a clear argument for the functions of the IMF based upon the interests of each of its members.
92. The current Managing Director of the IMF, Horst Kohler, gave an illustration of the tendency to embrace the GPG literature recently. Discussing prospects for the global economy, Kohler said:
93. The IMF, for its part, can make its greatest contribution to continued world economic expansion: ... third, by safeguarding the stability and integrity of the international financial system, as a global public good. (Kohler, 2001).
94. The assertion that such stability is a global public good is presented as argument in favour of the stability being safeguarded. It is an affirmation of the importance of the work of the IMF, rather than any addition to our understanding of this work and its impact. Such finessing is likely to remain the limited contribution from the emerging global public good literature to financial stability.

## **KNOWLEDGE CREATION AS A GLOBAL PUBLIC GOOD**

95. Knowledge is an ideal example of a public good. A mathematical theorem or the idea behind penicillin, for example, can be applied to multiple situations at no extra cost. Thus, they are nonrivalrous in nature. Moreover, once a piece of knowledge is made public, people cannot be excluded from its benefits; i.e. it is nonexcludable. The more specialised types of knowledge, such as the design of a new machine or a piece of software are only partially excludable as they rely on the rules and enforcement of intellectual property rights.
96. It has long been recognised in economics that the creation of knowledge, or innovation, plays a crucial role in economic development. Adam Smith pointed out that wealth was created not only through the accumulation of capital, i.e. machines that can be used to produce goods, but also through ideas about how raw materials could be transformed into finished products. A large part

of the improvement in the well-being of individuals, particularly in industrialised nations, that have taken place during the last two centuries are due to increases in knowledge – about more efficient systems of production, new consumer goods such as the automobile, or advances in medical sciences that have improved the quality of health and life expectancies. The development of such ideas, it can be argued, is a global public good and is undersupplied by national governments and private firms. The World Development Report 1998-99 provides a detailed analysis of this notion. Here, we highlight the key ideas.

97. A major part of knowledge creation in the world today takes place in industrialised countries. High-income nations together with the newly industrialised economies of Asia together account for 90% of the world-wide expenditure on research and development (World Bank, 1998). In these countries, while basic research usually takes place in government and academic institutions, research at the later stages of product development, or the application of a certain knowledge is driven by the private sector. The fruits of basic research can have wide applicability across nation states. An excellent example is the Internet which was conceived, in its basic form, at the Advanced Research Projects Agency, a US government research centre, in the 1960s. However, a national government acting on its own, would not take into account the possible benefits of basic research to other countries.
98. Private firms, particular multinational companies, can ignore national boundaries – they will pursue research in any direction where they perceive sufficient world-wide demand to cover the costs of research and development. However, in order for a private firm to invest in a research activity, it needs to be able to capture some of the rewards of that research. This requires the protection of intellectual property rights, which are often not adequate in developing countries. Weak intellectual property rights is one of the reasons for the lack of sufficient research into vaccines for diseases that primarily affect developing countries, an issue we address in more detail later in this section. Other forms of knowledge, because of their very nature, cannot be protected through intellectual property rights. This is particularly true of agricultural research and explains why the private sector did not play a greater role in the green revolution, as the World Development Report 98/99 notes: “...the knowledge embodied in the seed of a new plant variety is not easily appropriated by any breeder, seed company, farmer, or even country... Farmers had only to collect the seeds from the plants growth from the original seeds and replant them. That meant no repeat business for seed developers, and not enough profit to make their effort worthwhile” (World Bank, 1998).
99. It is important to distinguish between the need for knowledge and the effective demand for knowledge. The latter exists only if there are buyers who are able to pay for the knowledge. Since research activities in the private sector are driven by effective demand, privately developed technologies are usually geared towards the needs of high-income countries. Although these technologies can then be implemented in developing countries at no additional cost, they are unlikely to satisfy all the specific needs of these countries. “Most developing countries and particularly those in the tropics, face profound problems in public health, agriculture and environment that will require new scientific and technological approaches that cannot simply be ‘borrowed’ or taken from advanced economies” (Cook and Sachs, 1999). The diverging needs of advanced and developing countries is particularly well-illustrated by the nature of current AIDS research. “Market-based incentives are biased in favour of developing a profitable treatment for AIDS, and against developing an inexpensive vaccine to prevent it. The reason is that effective demand for new treatments is strong, coming from AIDS patients in high-income economies, whereas demand for a vaccine from those at a high risk in developing countries is weak” (World Bank, 1998).
100. Thus, there are many instances where international organisations and co-operation among nation states have an important role to play in the creation of knowledge. The green revolution,



described in some length in the World Development Report 98/99, provides an excellent example. During the decades following the Second World War, agricultural output increased dramatically in the developing world through the introduction of more productive seed varieties. The Consultative Group for International Agricultural Research played a key part in this movement through its sponsorship of agricultural research around the world. Another example is the Global Environment Facility, set up in 1991 to conduct research on global environmental problems. In some instances, the private sector may be better equipped, in terms of funds and research capabilities, than international institutions to provide the required knowledge but lack the incentives to do so. In such cases, the global community can take measures to create the necessary incentives for the private sector.

## Vaccine Research

101. The case of research for developing new vaccines illustrates how knowledge for the purpose of development can be undersupplied by the private sector and national governments. Clearly, for moral reasons, the international community should make efforts to speed up the development of vaccines that can save millions of lives in developing countries each year. But the analysis of the case of vaccine research in the framework of public goods shows that because of the very nature of the good, it is essential that the international community steps in to ensure adequate amounts of vaccine research just as, say, it is essential that a national government takes the initiative to maintain a clean and healthy environment as no other entity has the ability to fill this role.
102. The subject is discussed at length in Kremer (2000a). Here, we focus on the main ideas to illustrate how the concept of a global public good can shed light on a global issue.
103. Nearly five million people world-wide die of malaria, tuberculosis and AIDS each year. A majority of these deaths are in African countries. The World Health Organisation estimates that each year there are 300 million clinical cases of malaria and 1.1 million deaths from malaria. Almost all the cases are in developing countries, and almost 90% in Africa (WHO, 1999). Young children and pregnant women are particularly at risk. Resistance is spreading to the major drugs used for treating malaria and for providing short-term protection to travellers (Cowman, 1995). Morbidity and mortality from malaria have also been increasing during the last two decades because of deteriorating health systems, growing drug and insecticide resistance, periodic changes in weather patterns, civil unrest, and human migration. It is probable that malaria has significant adverse effects on the aggregate economy. Gallup and Sachs (1999) find that between 1966 and 1995, countries with a high incidence of malaria at the start of the period – primarily African countries – grew 1.2% slower than those that did not.
104. There are more than 33 million people infected with HIV world-wide, 95% of whom live in developing countries. An estimated 5.8 million people were newly infected in 1998, 70% of whom live in sub-Saharan Africa. HIV/AIDS was the fourth leading cause of mortality world-wide in 1998, resulting in 2.3 million deaths, 80% in sub-Saharan Africa (WHO, 1999; UNAIDS, 1998, Jordan Report, 2000). Although significant progress has been made developing effective therapies for those infected with HIV, the cost and health infrastructure needed to ensure appropriate use of these treatments preclude their use in most of the developing world where the disease burden is the greatest (Jordan Report, 2000). The World Health Report 1996 points out that “AIDS is unlike most other infectious diseases ... [in that] ... it incapacitates and kills young and middle-aged adults who are at their most productive”.
105. *M. Tuberculosis*, the bacterium that causes tuberculosis infects approximately two billion people world-wide (one in every three persons) (Jordan Report, 2000). Each year, approximately 1.9 million people die from active tuberculosis (WHO, 1999). With the spread of HIV, tuberculosis

has begun to pose an even more serious threat than before. HIV-positive individuals are at a higher risk of developing active tuberculosis and M. Tuberculosis spreads the progression and severity of AIDS in HIV-positive individuals. Of the 1.9 million people who die from tuberculosis each year, 400,000 are infected with HIV (Kremer, 2000a). The existing BCG vaccine, which is widely used, has only limited effectiveness against tuberculosis and a more effective vaccine is lacking at present. Although 98% of deaths from tuberculosis currently take place in developing countries, the spread of drug-resistant tuberculosis and tuberculosis/HIV co-infections means that the disease is increasingly becoming a problem for developed countries as well.

106. In the long-term, these diseases can be dealt with successfully only through the development of effective vaccines. The eradication of smallpox is commonly put forward as an example of the potential of vaccines. 2 million people died of smallpox every year, before a successful vaccination programme led to the eradication of the disease in the 1970s. Recent experimentation with trial vaccines suggests it may now be possible to develop effective vaccines for malaria, tuberculosis and HIV (See Kremer, 2000a). Yet, relative to the enormous impact that successful vaccines would have in many countries, the amount of research in this area until now has been minimal.
107. Most vaccine research, particularly at the later stages of development, is conducted by the private sector. However, like the global public goods discussed earlier, vaccines research is characterised by nonrivalry and nonexcludability. Therefore, research projects for developing new vaccines that are beneficial for the society as a whole may not be taken up under the present system. We take a closer look at the characteristics of nonrivalry and nonexcludability to see why this would be the case.
108. Vaccine research is nonrival, because a new vaccine will be beneficial to populations across the world. The development of a new vaccine, effectively creates knowledge, which can be used in additional countries at no additional cost. Thus, once a vaccine has been developed, it is beneficial from the point of view of society as a whole to provide the knowledge for producing the vaccine to whoever has need for it. Such an outcome, however, is not possible if the research into vaccines is being conducted privately. A private firm that develops a drug or a vaccine will need to generate sufficient revenues from its sale to cover its research expenses. For this reason, a high price is generally charged for a new vaccine which puts it beyond the reach of the poorest. For example, when the Hepatitis B vaccine was first introduced, it was priced at \$30 per dose compared to the combined cost of the standard six vaccines on WHO's immunisation programme of \$0.50 (Robbins and Freeman, 1988).
109. Although in theory new vaccines can be made nonexcludable through the use of patents, this is not always the case in practice as intellectual property rights laws are in the hands of national governments. The decision of the South African government to purchase low-cost drugs for the treatment of AIDS from whichever firm is able to provide it at the lowest price, irrespective of patent rights, is a case in point. Although supplying a drug at manufacturing cost would be socially optimal, the fact that governments, in certain instances, may ignore intellectual property rights will keep drug firms away from projects where they may not be able to recoup their research costs. In the case of rich countries, where intellectual property rights are well protected and governments are able to pay for expensive drugs, excludability of the knowledge generated through medical research by private firms will remain intact. But in poorer countries, the effective nonexcludability can halt research into drugs and medicines that are primarily in demand only in these countries. That is what has happened in the case of vaccine research for AIDS, malaria and tuberculosis.

110. Another issue that has a consequence similar to that of nonexcludability is the “time inconsistency” problem, discussed at length in Kremer (2000a). National governments are the major purchasers of vaccines which they then provide to the local population at a subsidised rate. Once a vaccine has been developed, a government has a strong incentive to force the private firm to deliver the doses at manufacturing cost; i.e. at a price that would enable firms to cover the cost of manufacturing the medicine but not the cost of research. Private researchers anticipate this move by governments and this therefore acts as a further disincentive into vaccine research. Again, this is a problem that is much more likely to be prevalent among poorer countries where funds are limited than in rich countries. It is also behaviour that a small country is more likely to engage in than a large country. If, for example, the US government behaves in this way, it will effectively cut off the flow of research as it would constitute a large portion of the world market. However, a small country is unlikely to have a significant impact on the global market for the drug. Thus, such countries have an incentive to act as free-riders. However, when the drug is in demand in a large number of small countries, each country, acting on its own, will opt to free-ride, and the outcome will be the loss of effective demand to the private firms.
111. The social benefit from developing vaccines is likely to be much greater than the profits that private firms will be able to generate from such endeavours. Kremer (2000a) estimates that the social benefits of vaccines may be ten to twenty times the private benefits appropriated by vaccine developers. Because private firms will take only their own benefits into account when choosing projects, they will pass up any line of research that may be cost-effective for the society as a whole but unprofitable for them.
112. The global public good that vaccine research would create is knowledge that can be used for development. The textbook solution for such a problem is for the government to supply the good and finance it through taxation. Indeed, basic scientific research is generally conducted by the government or academia supported by donations rather than the private sector. For two reasons such a solution has not arisen in the case of vaccine research. First, it has usually been seen that research into developing vaccines using public funds is inefficient at the later stages, and second, there is no international government with the responsibility and financial support to play such a role. We examine the two issues in turn.
113. The process of vaccine development can be divided broadly into two phases: basic research and clinical development. Academic and government research centres are better suited than the private sector for carrying out basic research. At the initial stages of vaccine development, overall progress will be much more rapid if results are immediately shared among different researchers. This is more likely to happen among grant-funded academics and scientists in government laboratories who have career incentives to publish their results quickly.
114. On the other hand, private sector researchers are better positioned to conduct vaccine research at the later stages of development. This is not only because large pharmaceutical companies are better able to bear the costs of large scale clinical trials but also because the private sector is more adept at selecting research projects. Pharmaceutical firms whose rewards depend on creating a successful product will pursue a line of research only if they believe the scientific prospects are promising and likely to lead to the development of a vaccine. In the public sector, scientific administrators will have more difficulty in assessing the prospects of different lines of research, because scientists funded by grants have an interest in exaggerating the prospects of their specific projects. Moreover, academic researchers may have career incentives and intellectual interests that orient them to fundamental science. By contrast, the later, more applied stages of vaccine development include activities that are time-consuming but not intellectually interesting or career-promoting. A private firm, whose survival depends on being able to generate profits, is likely to be more focused on the vaccine at the later stages of development.

115. The above discussion indicates that the private sector has an important role to play in vaccine development. However, as it is uncertain at present that pharmaceutical companies would be able to recoup the costs of research by marketing vaccines for malaria, tuberculosis and HIV, they lack the incentive to participate in the vaccine development process. Because the benefits of the vaccines will not accrue to any single country, national governments acting on their own are unlikely to come forward to offer private firms the necessary incentives.
116. For this reason, international co-operation is necessary on the issue, as is the case with other international public goods. In recent years, international organisations, aid agencies and philanthropic institutions have stepped up efforts to promote research into vaccine development for malaria, tuberculosis and HIV. The Global Alliance for Vaccine Initiative (GAVI), a newly formed coalition that includes representatives from the World Health Organisation, UNICEF, the World Bank and the pharmaceuticals industry, aims to increase the use of existing vaccines and accelerate research and development of vaccines against diseases that primarily affect developing countries. The World Bank is currently considering a proposal to create a US\$1 billion fund to help countries purchase specific vaccines if and when they are developed. The U.S. administration's budget proposal in 2000 included a \$1 billion fund to be used for tax credits to pharmaceutical companies for vaccine sales. Such programmes would effectively increase the size of the market for vaccines and provide incentive to the private sector to focus on vaccines for malaria, tuberculosis and HIV.
117. International efforts are also being made to promote vaccine research through direct funding. The International AIDS Vaccine Initiative (IAVI) subsidises research on HIV vaccines. In return, IAVI secures rights that help ensure that a successful vaccine will be sold in developing countries at a reasonable price. For its vaccine development efforts, the IAVI has thus far secured commitments totalling US\$230 million, with major contributions from the World Bank, the Gates, Rockefeller, Sloan and Starr foundations and five national governments in the industrialised world. The European Commission is considering providing tax-credits and low-cost loans to the private sector to promote research into vaccines against malaria, tuberculosis and HIV (European Commission, 2001).
118. It is clear, then, that the international community has an important responsibility in generating sufficient research into vaccines against malaria, tuberculosis and HIV for reasons of economic efficiency. But is vaccine research in this particular instance a global public good? Vaccines for malaria and tuberculosis will be enormously beneficial for developing countries, but of little direct benefit to industrialised countries where the diseases are not prevalent. The need for a vaccine against HIV is much less pressing in rich countries, where effective therapies for infected individuals are now possible, than in the developing world. Nevertheless, the development of effective vaccines for these diseases requires financial and technical support from the industrialised world. Can it be argued that rich countries have, not only a moral reason, but an economic reason as well to promote vaccine research?
119. We shall consider this argument. Because of increased trade and travel around the world, health is increasingly taking on a global dimension. Infectious diseases in developing countries, are perceived to pose a growing threat to the industrialised world, as discussed in the section on epidemiological surveillance above. The anecdotal evidence supports this: the World Health Report (1996) describes how the Asian tiger mosquito, which can act as carriers of the encephalitis virus as well as dengue and yellow fever, made its way to the United States in cargoes of rubber vehicle tyres shipped from Asia and then to spread to 23 different states. Chens, Evans and Cash (1999) note the outbreak of a local cyclospora epidemic in the United States through imported fruits and vegetables. Thus, it would seem that the control of infectious diseases, even if they primarily affect developing countries, will have indirect benefits for the industrialised world.

120. The industrialised world may also have strategic reasons to be concerned about the spread of infectious diseases, particularly AIDS, in the developing countries. A recent Brookings Institute policy brief argues the loss of skilled and able persons in African countries as a result of HIV/AIDS could be sufficiently severe to make it difficult for these countries to build transparent and accountable governments and professional armies that can maintain regional peace; as a result, international stability would be threatened (Barks-Ruggles, 2001). The United States has classified HIV/AIDS as a national security risk. (World Bank, 2001).
121. These indirect benefits are difficult to quantify. Therefore, it is unclear if these ‘selfish’ factors by themselves would provide industrialised countries enough justification to supply the funds that would be needed to develop vaccines for malaria, tuberculosis and HIV. The IAVI’s vaccine development plan through 2007 will require US\$550 million (IAVI, 2000). For the pharmaceuticals industry, an annual market of about US\$250 million is likely to be necessary to motivate substantial research for a vaccine (Kremer, 2000b). It is conceivable that the indirect economic benefits from vaccine development do not justify the costs for the industrialised countries and that ‘sufficient’ funding will be allocated towards vaccine research only if moral arguments play a part in the decisions made by rich countries. Again, it is impossible to ascertain whether this is true. But it is interesting to note that, in recent years, national governments of rich countries have often put forward moral arguments rather than strategic ones to support key initiatives and plans regarding the development of vaccines for developing countries. This observation would at least suggest that as far as the general population of the industrialised world is concerned, moral arguments are found more acceptable, and, in this manner, play an important role in the decisions of governments.<sup>2</sup>
122. While it is certainly arguable that the development of vaccines for malaria, tuberculosis and HIV are global public goods, it is also clear that they benefit some countries more than others. In Africa, as the study by Jeffrey Sachs suggests, malaria may be significantly slowing down the pace of economic growth, while in the industrialised countries, it is, at best, one of many diseases that need to be kept in check. Unfortunately, the countries that most need the vaccines are also least able to pay for it. Collective action on a global issue can be prompt when the nations who have the most resources also have much to lose from inaction, as it has been in the case of ozone-layer depletion. If not, adequate provision of the global public good could require some countries to contribute more towards the cost than they would benefit from supply of the good. In such circumstances, economic rationale alone would not be sufficient and a sense of morality would be needed for the global initiative to take place.
123. Nevertheless, the concept of global public goods reveals a powerful reason for collective action on vaccine research. In the case of international financial stability, it adds little to the debate, because the need for collective action has been well recognised – at least since the International Monetary Fund was created – and the focus has shifted to areas where the theory of public goods does not shed any further light. In the case of vaccines, by contrast, it is only in the last few years that the need for a global initiative has begun to be recognised. Therefore, the concept of global public goods addresses one of the key elements of the debate on vaccine research at present.
124. Also significant, this case study highlights an area where there is a strong rationale for international development assistance. During the 1980s and 1990s, international development efforts have usually focused on projects at the national or local level rather than at the

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<sup>2</sup> US President Clinton, outlining plans of the US government to promote research into vaccines for developing countries at a Millennium Vaccine Initiative meeting on March 2<sup>nd</sup>, 2000, emphasised that the diseases in question “kill both people and progress in the world’s poorest countries”. The European Commission’s programme of action to combat malaria, tuberculosis and HIV, declares that its underlying objective is “to foster sustainable development designed to eradicate poverty in developing countries” [European Commission, 2001].

international level. That is, development assistance has aimed to provide national public goods. A statement implicit in such actions is that governments in developing countries are, for one reason or another, incompetent to provide national public goods and therefore, international authorities ought to step in. Aid from the IMF and the World Bank was tied to specific policies that the government would need to adopt (Cooks and Sachs, 1999). Recent studies indicate that where governments may lack the competency to provide national public goods, international agencies are unlikely to be able to fill the gap. Burnside and Dollar (1997), for example, conclude that there is generally no correlation between aid flows and development; the reason is that while aid has a positive impact when it flows into good policy environments, it typically does not do so or induce such environments to emerge. Thus, international development assistance that intends to supply national public goods becomes merely an income transfer from richer to poorer countries. Vaccine research offers a case where the rationale for international development assistance is much stronger and the efforts are likely to be more effective. Because vaccine research is an international public good, no government, however competent at the national level, will provide it sufficiently. The task that is required of international agencies is not transferring resources from richer to poorer countries, but rather serving a function that no institution at the national level can serve because of the very nature of the good.

## ASSESSMENT

125. Certain services are usually deemed to be public goods within the nation state, e.g. transport, defence, the rule of law. Free markets, left to themselves, would produce an inadequate supply of such goods. This is not a subjective statement about the merits of free markets, but follows from the definition of a public good.
126. Pressure on governments to act to supply such goods may stem from the national political process or, in some instances, national laws may compel governments to act. But the existence of a market failure and the scope for government action does not compel a government to supply a public good. Nevertheless, governments usually do assume the responsibility to provide public goods at the national level.
127. It is more questionable whether mechanisms exist at the international level to ensure adequate supply of global public goods. Certainly governments could act collectively, but turning this possibility into an obligation to act is more problematic. Stiglitz suggests the leap in the argument from 'could' to 'should' may be straightforward:
128. The concept of global goods is a powerful one. It helps us think through the special responsibilities of the international community. National public goods provide one of the central rationales for national collective action and for the role of government. Efficiency requires public provision, and to avoid the free rider problem, the provision must be supported by compulsory taxation. Similarly, global public goods provide a central rationale for international collective action. (Stiglitz, 1998a).
129. Despite Stiglitz's optimism, it is important to ensure the international community has sufficient voice and authority to carry out the policies necessary to deliver global public goods in sufficient quantity. One mechanism for this would be an international government with taxation and spending powers in all countries. Though unrealistic, such an idea would give the international community sufficient voice. It would also provide a means to get round the problem of allocating fairly the costs of global public goods.
130. The value placed by a country on a global public good should influence the contribution it makes to meeting the cost of the good. Within the literature on public goods, one can use the

willingness of agents to pay to allocate costs. A “Lindahl equilibrium” describes one possibility in which each agent contributes costs according to his or her willingness to pay. This leads to the economically efficient outcome (Sandmo, 1987).

131. A key problem to overcome is the incentive on countries to free ride on others. A corollary of this is the incentive for a country to understate how much it values the global public good in question. Processes or institutions are needed to compel national governments to reveal their desire for a global public good and act collectively to create an adequate supply. One possibility is that, after recognition of the need for a global public good, countries could establish an independent body responsible for its supply and for the allocation of costs. This would avoid the free rider problem by binding nations to the decisions of this body. There are instances of such an approach being used. For example, the WTO can be regarded as a body whose responsibility it is to ensure adequate provision of the public good of an open and free trading system (Stiglitz (1998b) makes an analogy between this trend in the global economy and the development of the US economy during the 19th century). The dispute settlement mechanism of the WTO may be seen as the body which resolves free rider problems by ensuring that all nations meet the costs of this system. Another example, discussed above, is the International Criminal Court. Ratification of the statutes of the court cedes sovereignty for some categories of crime.
132. There is a growing list of supra-national bodies whose operations imply a dilution of national sovereignty in return for the establishment of a level playing field and public good from which all can benefit. Creating an independent supra-national body is appealing as it prevents the free rider problem and can allocate costs according to rules agreed in advance. However, there may be serious difficulties and conflicts in determining who should bear what proportion of costs when these rules are drawn up.
133. A low supply of a public good need not indicate an economic inefficiency which sufficient co-operation would remove. Instead, it may indicate that a higher supply is not in everyone’s interest, specifically that the benefits which would accrue from higher supply are too low relative to the costs involved. The economically efficient outcome underpinning the idea of public goods is when the costs of supplying more of the good is balanced by the interests of all parties in greater supply.
134. Recall that the notion of economic efficiency is a situation in which the welfare of any individual can only be improved by worsening that of someone else. In the case of vaccine research, rich, industrialised countries would need to help fund the vaccine research (alternatively, the shareholders of pharmaceutical companies would need to pay). This would help pay for a certain level of research. But the benefits to these countries of a vaccine for, say, malaria may be too low to provide the incentive to meet the entire cost.
135. One might say that this is wrong from a moral standpoint. But from the benchmark for efficiency used by economists in analysing public goods such a statement is not possible. This suggests an important conclusion. Where there are clear economic efficiency gains to be had from the provision of a global public good, it is in the interests of all parties to collectively supply this good. Certainly the allocation of costs may remain a thorny issue, but it is in the interests of everyone not to let this obstruct the provision of the good. Hence, collective action to provide the good is likely. Yet, the supply of the good may still prove low from a moral standpoint.
136. Where collective interests meet the harsh reality of national interest, the latter is likely to be the winner. In this case, the moral case for action must be stressed.
137. The framework of global public goods may be seen as a useful adjunct to the legal obligations for collective action discussed above. These obligations are born of a moral sense of duty. The

rationale for global public goods is entirely grounded in notions of efficiency. Thus, it provides a complementary rationale to many traditional calls for collective action.

138. There is a tendency to discuss global public goods along with other aspects of policy and not to distinguish their distinctions from other aspects of policy. The effect of this is to lump efficiency arguments in with moral and ethical arguments. Such conflation may be deliberate, as in the following remarks made by former IMF Managing Director, Michel Camdessus:
139. ...better integration of the poorest countries into the international system will produce public goods benefits for other countries through increased trade and expanded opportunities for investment. However, the public goods issue is broader than the potential for symmetric benefits. At the national level we all recognize the public responsibility to assist the less fortunate to become more productive members of our societies. A similar ethic applied at the global level suggests that the public good requires meaningful efforts to reduce disparities of income, resources, and opportunities that are substantially greater than typically exist within our national societies. In the face of widening divergences between the richest and the poorest countries, and with generally declining amounts of assistance forthcoming from the richer countries, it seems clear that more needs to be done to redeem this aspect of the international public good. (Camdessus, 1999).
140. Camdessus' comments mix genuine public goods arguments with ethical arguments about the public good or wellbeing. To remove scope for confusion, the latter may more helpfully be termed the welfare of society. To argue for a course of action based on notions of welfare and ethics is distinct from promoting a course of action on efficiency grounds. It is not clear what purpose is served by mixing the two. Indeed, greater confusion about policy is likely.
141. An obvious question is whether arguments based upon global public goods will lead to any change in policy? For example, might rich nations increase the aid they provide to poorer nations if they realise some aspects of the assistance they provide are in their own interest? Although aid cannot be regarded as a global public good, some aid may be motivated by a desire to ensure greater supply of public goods.
142. An argument for collective action based upon the existence of global public goods is not an argument for increased aid. Some aspect of the collective action which needs to be taken to deliver the public goods might involve the provision of aid. But this tells us nothing about the appropriate level of aid.
143. The need for collective action to supply global public goods provides an argument for aid based on self-interest. However, self-interest is already an important motivation for aid. Much aid is 'tied', that is conditional on the purchase of certain goods and services from the donor country. This could be justified if tied aid was as effective as untied aid. Instead, research suggests tying aid reduces its effective value by around 25%. Therefore, the rationale for tying aid must be seen as self-interest on the part of the donor government, who wishes to boost the demand for domestic industry and services.
144. Besides the tying of aid, the pattern of aid flows suggests a strong element of self-interest. Research into the pattern of aid finds "considerable evidence that the pattern of aid giving is dictated by political and strategic considerations" (Alesina and Dollar, 1998). According to Alesina and Dollar, "Factors such as colonial past and voting patterns in the United Nations explain more of the distribution of aid than the political institutions or economic policy of recipients. Most striking here is that a non-democratic former colony gets twice as much aid as a democratic non-colony".



145. Particular patterns of giving aid emerge for each of three large donors, the US, Japan and France. The “US has targeted about one-third of its total assistance to Egypt and Israel; France has given overwhelmingly to its former colonies; and Japan’s aid is highly correlated with UN voting patterns (countries that vote in tandem with Japan receive more assistance)”. Alesina and Dollar continue: “These countries’ aid allocations may be very effective at promoting strategic interests, but the result is that bilateral aid has only a weak association with poverty, democracy, and good policy”.
146. Devising an argument for aid based upon self-interest and global public goods misses the point that self-interest is already an important consideration in giving aid. Another argument based on self-interest may not produce any material increase in aid flows. Nevertheless, it is possible that the developing literature on global public goods will lead to some adjustment of the type of aid provided.
147. The growing literature on global public goods offers a means to bridge the divide between the design of policy on economic grounds and policy born of moral responsibility and legal obligation. It adds economic persuasion to the moral suasion traditionally used to encourage international action by nation states. Giving substance to the policy which follows from this is a remaining big challenge.

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