

Effective Use of Development Finance for International Public Goods

SOME OF THE MOST PRESSING DEVELOPMENT goals can only be pursued across national borders. Examples include controlling disease, limiting climate change, containing financial instability, and safeguarding global peace. Action to provide such *international public goods*—and prevent the corresponding “bads”—can convey shared benefits beyond national boundaries. The results can be huge developmental gains. By contrast, inaction can allow the global spread of disease, financial crisis, and environmental damage. International public goods are thus key to a world vision of shared opportunity and global stability.

The demand for international public goods has grown apace with globalization. But the supply remains restricted because governments, businesses, and households, acting in isolation, typically do not take into consideration the benefits their actions bestow or the costs they impose on others. Further complicating matters, people in different countries may value these shared benefits and costs differently. This makes it hard to put in place coordinating mechanisms, based on market prices or otherwise, to pay for those benefits or recoup those costs. As a consequence, public goods are undersupplied, sometimes severely.

A supranational government backed by the power to tax could remedy this mismatch of demand and supply. But because no such entity exists, the commitment of public and private resources to international public goods requires the coordination of efforts across national borders. This process can be slow and hard to enforce. Another possibility is for one or a few leading nations, motivated by their own self-interest but also by broader global objectives, to provide these public goods for all (Kindleberger 1986). But the pre-

occupation of today’s leading nations with domestic policy objectives, now that the end of the Cold War has reduced geopolitical concerns, means that some other course must be pursued.

With demand for international public goods strong and rising, and supply not following automatically, international financial institutions and other official donors have been called on to step up their role (Kaul, Grunberg, and Stern 1999; Kanbur, Sandler, with Morrison 1999; International Financial Institutions Advisory Commission 2000; Sachs 2000a, 2000b; Summers 2000). The traditional system of official development assistance, however, is largely built around assistance to countries individually. The financing of international public goods has therefore tended to occur on an ad hoc basis, often in response to highly visible emergencies, such as the search for remedies for acquired immune deficiency syndrome (AIDS) and the reform of the international financial architecture. A more structured system for financing and governance of these goods is needed.

This chapter undertakes an inventory—the first comprehensive one of its kind—of international resource transfers for international public goods. It finds that, for all developing countries, transfers of the order of \$5 billion a year finance programs that generate multicountry benefits in the areas of health, environment, knowledge creation and dissemination, and safeguarding peace. In addition, official finance also funds national capacity and infrastructure in the amount of about \$11 billion a year—such funding facilitates the absorption of international public goods. Over the past three decades, with active support from private charitable foundations, donors have channeled more resources to the provision of in-

ternational public goods, even recently in the face of declining aid budgets. But those resources must work not only to achieve their immediate objectives—they must also leverage other resources to meet growing requirements in the pursuit of a sustainable and inclusive globalization.

The efficient provision of international public goods requires adherence to all the principles of aid effectiveness discussed in chapter 4 and, in particular, requires the design and implementation of high quality projects and programs. But there are additional challenges. This chapter discusses the potential for and the limits of a three-pronged approach:

- *Integrating country-based finance with global and regional programs.* The significant potential contribution of international public goods to the fight against poverty will only be achieved when their supply is coordinated with national development efforts. The provision of international public goods is not enough; also needed is the supportive infrastructure that enables poor countries to absorb and use those goods effectively.
- *Leveraging public resources with additional private money.* The large resource requirements can only be met by leveraging scarce official and philanthropic funds with additional private resources. In particular, official funds should be used strategically to mobilize or “pull in” private finance for activities that offer the eventual prospect of a commercially run business: examples are developing and distributing new drugs and vaccines, bridging the gap in information technology between rich and poor (the “digital divide”), and increasing agricultural productivity in developing countries.
- *Improving frameworks for responsible action.* But leverage in the narrow sense of mobilizing resources and attracting private sector funding is not enough. Most international public goods—including those aimed at preserving the global environment and maintaining international financial stability—depend for their provision on the actions of a multitude of individuals, businesses, and governments. A more sustainable and cost-effective approach involves aligning the incentives of countries and their citizens with the global public interest through the appropriate use of standards, treaties, and regulatory mechanisms.

The chapter concludes by discussing the implications of these new challenges for the official financial community, which, through a pragmatic and flexible approach to coalition building, will need to adapt to a world of many actors and decision points. The growing demand for international public goods provides, in principle, the opportunity to make a case for additional aid resources, but channeled, possibly, in new ways. International financial institutions will sometimes be in the role of convenors, bringing stakeholders together to decide on appropriate action; at other times they will defer to those with greater expertise and legitimacy.

Integrating country-based finance and global and regional programs

The provision of international public goods calls for policies and finance at various jurisdictional levels ranging from the local to the global. Here an important distinction is that between *core* and *complementary* activities. Core activities aim to *produce* international public goods. These activities include global and regional programs undertaken with a transnational interest in mind, as well as activities that are focused in one country but whose benefits spill over to others. Examples of multicountry programs are international agricultural research, efforts to create incentives to achieve breakthroughs in medical technology, and negotiations to develop rules and standards such as the bank solvency proposals advanced in early 2001 by the Basle Committee of Financial Regulators. An example of country-focused activities is an effective epidemiological policy to combat a disease in one country that also reduces neighboring countries’ exposure to that disease.

Complementary activities, in turn, prepare countries to *consume* the international public goods that core activities make available—while at the same time creating valuable national public goods. Traditional country-based financial flows to support domestic policy and institutional reform and investment in infrastructure are primarily motivated by the benefits expected within the country. But these flows and the national public goods they help create may also enhance the country’s ability to absorb the benefits of international public goods. For example, international agricul-

tural research goods cannot be effectively used in the absence of adequate domestic agricultural services and incentives. Thus core and complementary activities interact in the production and consumption of international public goods. For best results, they must go hand in hand.

This section provides an inventory of international resource transfers for pro-poor core and complementary activities. The exact demarcation of activities that fall into these categories is not easy to establish and, indeed, the extent to which a good has “public” characteristics remains fuzzy.¹ This chapter focuses on public goods most likely to yield high payoffs in poverty reduction in devel-

oping countries: eradicating contagious diseases, creating and disseminating knowledge, protecting the environment, safeguarding peace, and maintaining financial stability (box 5.1). While many of these endeavors require substantial investments, some, such as preventing financial crises, depend largely on establishing the right incentives and coordination of actions.

International resource transfers for core activities amount to about \$5 billion a year (table 5.1). Sources with a global or regional mandate—private charitable foundations and official donors channeling resources through trust funds—provide \$3 billion, typically as grants. In addition, as documented

Box 5.1 International public goods for poverty reduction

International public goods could yield a high payoff in terms of poverty reduction (World Bank 2000a). Where implemented effectively, their reach can extend beyond many national borders to lower the incidence of disease among the poor, broaden their range of economic opportunities through easier access to advances in knowledge, and reduce their vulnerability to environmental damage, violent conflict, and financial instability. In each case, however, action at the global level must be coupled with complementary national policies and programs.

Health. Infectious diseases severely disrupt economic life and exacerbate poverty in many developing countries. These diseases kill many adults in their more productive years, and the dislocation of families reduces investment in child development. Even when disease does not kill or threaten to kill, it often reduces economic activity well below its potential. Malaria, for example, continues to impose a high cost through lost workdays among employees afflicted with the disease. Malaria also is an example where global initiatives (vaccine development) can complement domestic public health delivery systems.

Knowledge. Modern information and communications technologies have greatly enhanced the potential for developing countries to tap into the global knowledge pool. These technologies can help bring people out of isolation and improve access to services and resources, empowering them and expanding their economic opportunities. Modern biotechnology has improved plant varieties and the genetic potential of livestock, allowing more flexible crop management and boosting productivity. This may accelerate the reduction of rural poverty (World Bank 2000a). Knowledge, however, is a public good only so long as it is accessible to all. Access is, in the first place, a function of education but can also be promoted by telecommunications connectivity and Internet applications.

Environment. Many tropical developing countries with a large number of poor are more vulnerable to projected climate change than are countries in the temperate zones. Global warming—which requires global containment efforts—is likely to adversely affect food production in the tropics and may increase the range of tropical contagious diseases. Action at the global level needs to complement national policies and programs. Local efforts are needed, especially in low-lying developing countries, such as Bangladesh, which are likely to be affected disproportionately by a possible rise in sea levels and lack the resources and infrastructure to cope with the resulting floods.

Peace. Violent conflict triggers instability and social dislocation, hampering growth and undoing progress in the reduction of poverty. As the experience of Africa demonstrates, civil war and domestic unrest can easily spread, destabilizing whole regions. Thus, successful efforts at maintaining peace, through emergency assistance and reconstruction activities, can in time be expected to yield development dividends as well. However, fungible aid must not be allowed to increase recipient governments’ budgetary leeway to step up offensive military expenditure.

Financial stability. Boom-and-bust economic cycles prevent countries from consolidating progress in poverty reduction, because it is the poorest who are most vulnerable to these swings (World Bank 2000a). The global benefits of the international financial architecture needs to be complemented by strengthening domestic financial systems (see discussion later in this chapter and also the concluding section of chapter 3). Creation of such international public goods as rules and standards to safeguard financial stability does not cost much money. It is intensive in negotiations, not capital. Such policies may thus have an even higher financial payoff in terms of poverty reduction than investment-intensive public goods such as those related to knowledge, health, and the environment.

Table 5.1 Sources of funding for core and complementary activities related to international public goods
(annual averages, 1994–98, billions of U.S. dollars)

Purpose of funds	Global and regional funding		Country-based finance		Total
	Foundations	Trust funds	Concessional	Nonconcessional	
Core activities	1	2	2	..	5
Complementary activities	..	..	8	3	11
Total	1	2	10	3	16

.. Negligible or not applicable.

Source: The Foundation Center (1997, 2001) and World Bank staff estimates using data from the OECD DAC, among others. See annex 5.1 for more details.

below, country-based concessional aid flows (grants and loans with a grant component of more than 25 percent) finance transfers in the amount of \$2 billion for those national public goods that also have cross-border implications.

A further \$11 billion a year is spent on complementary activities that fund domestic mechanisms and infrastructure that allow countries to absorb the benefits of international public goods. Thus, for example, funding is needed to build domestic public health infrastructure so that countries can benefit from international public goods such as drugs and vaccines to control infectious diseases. Environmental education, training, and administrative capacity at the local level are needed to complement international agreements to reduce pollution. These complementary activities are funded in part by concessional funds (\$8 billion) and in part by nonconcessional lending from multilateral financial institutions (\$3 billion).

The level of funding achieved for international public goods and supporting activities (\$16 billion) is significant in comparison with aid flows: aid flows net of technical grants are just over \$40 billion (around \$55 billion when technical grants are included), as reported in chapter 4.² No attempt is made here to calculate global requirements for international public goods, because such estimates are still surrounded by considerable uncertainty.³ Although global funding (for example, from foundations) may increase in coming years, it will surely remain small in relation to the need. The deployment of these resources must therefore be judged not only by whether they achieve their immediate objectives—they must also meet the higher standard of leveraging additional funds to meet the much larger requirements in the pursuit of sustainable globalization.

The likely course of country-based assistance is of equally serious concern. Although the share

of public goods funding in official development assistance has been on the rise, the continuing need to meet complementary expenditures will require an expanding aid envelope.

The funding of global programs

Private charitable foundations and official donors are the main sources of international resource transfers for global and regional programs. Other notable sources are allocations of net income by multilateral development banks and program spending by U.N. agencies. Whereas some private foundations have a long history in providing international public goods, donor countries have recently stepped up support of trust funds to channel resources toward these same objectives. The roles of foundations and trust funds can be summarized as follows:

- *Foundations*—sometimes referred to as venture capitalists for society's risky endeavors (Letts, Ryan, and Grossman 1997)—deal best with tasks that have the greatest global reach and the most uncertain payoffs in a distant future. They are thus most actively involved in generating and diffusing knowledge. Their activities, once they have borne fruit, are then taken over by the official community for widespread deployment.
- *Official trust funds* are a mechanism donors use to go beyond their traditional country-based activities. They add to the venture capital activity of the foundations. But they also act as the financing vehicles for global agreements, most importantly on the environment. Although global in intent, the financing is often directed to discrete, shorter-term country projects, such as improving energy efficiency.

In addition, multilateral agencies have the ability, albeit currently limited, to engage directly in mul-

ticountry programs. Although this ability has not been exercised to any significant extent in the past (and hence is not reflected in table 5.1), a shift to greater flexibility in this regard may generate further resources for regional initiatives.

Foundations and private philanthropy. Motivated by the search for solutions to global problems, international grantmaking by foundations has been on the upswing (Carson 1997). Annual foundation giving for international programs that generate cross-border benefits or support complementary activities is now at least \$1 billion, having grown at roughly 8 percent a year in the 1990s (The Foundation Center 2001).⁴ A decade ago, international grants of private foundations, at about \$400 million, amounted to less than 1 percent of official development assistance. Today they are about 2 percent of official development assistance and about 20 percent of international resource transfers on public goods (table 5.1). With continuing prospects for growth, foundations are likely to increase their share and influence as providers of international public goods.⁵

Foundations are critical players in the generation and diffusion of knowledge, but they also contribute to peacemaking, public health, the environment, agriculture, and other priorities. Unconstrained by national boundaries, they see themselves as catalysts for change, helping to kickstart

risky projects (box 5.2). Like business investors, venture philanthropies seek maximum returns, but they measure those returns in terms of social impact rather than profits. Their advantage arises from their mandate and demonstrated willingness to invest early in unproven technologies with potentially widespread benefits.

A tacit division of labor between foundations and the public sector has therefore emerged. Foundations stress research and development. Their successful ideas are then embraced by governments and handed over to public agencies for their widespread implementation (Letts, Ryan, and Grossman 1997). This is illustrated by the early development of “green revolution” technologies, pioneered by the Rockefeller and Ford Foundations and later supported by official and private funding. Building on the foundations’ work in agriculture from the 1940s to the 1960s in Mexico and elsewhere, the system of agricultural research centers known as the Consultative Group for International Agricultural Research (CGIAR) was established in 1973. In recent years, foundations have been playing a similarly catalytic role in developing vaccines against infectious diseases. The International AIDS Vaccine Initiative—a global, nonprofit organization created by the Rockefeller Foundation in 1996—is working to speed the development and distribution of preventive AIDS vaccines.

Box 5.2 Foundations and the provision of international public goods

Until the end of World War II, private foundations were the major independent source of funds for medical research. The Rockefeller Foundation, established in 1913, sponsored schools of medicine and public health worldwide, establishing the concept of institutional support for research and medical education (Cueto 1994). To fight yellow fever, for example, the foundation sent scientists throughout Africa and Latin America to conduct research and test new approaches, and after three years its New York laboratories developed the first yellow fever vaccine.

Traditional foundation endowments from the Old Economy are today being complemented by those of the New Economy. Businessman and philanthropist Ted Turner donated \$1 billion to support U.N. efforts on global issues. The Bill and Melinda Gates Foundation has

pledged substantial resources to eradicating polio, immunizing children, and putting computers in schools. It has committed \$750 million to the Global Alliance for Vaccines and Immunization. It has also granted \$25 million to the International AIDS Vaccine Initiative and set up a \$75 million Malaria Vaccine Initiative.

Private corporations also make charitable contributions directly rather than through foundations. The Merck Corporation, for example, donated supplies of its drug ivermectin to the River Blindness control program in Africa. The Novartis Foundation is playing a key role in the Global Alliance for Leprosy Elimination. Other European foundations are leaders in cooperative endeavors devoted to environmental upgrading, the promotion of science and technology, and the preservation of world cultural heritage sites.

The infusion of money to certain “New Economy” foundations (box 5.2) and the growth in the number of private grantmakers in the United States, Europe, and Japan have recently raised the profile of foundations and private philanthropy in the financing of global public goods (The Foundation Center 1997, 2001). U.S. tax laws have long favored charitable giving by allowing such contributions to be deducted from taxable income. The 1986 reform of the federal tax code greatly increased the incentive of wealthy individuals to contribute to charity in lieu of paying an effective wealth tax of 60 percent or more (Schervish 2000). A significant share of this growing source of funds is expected to go to international programs, just as international corporate philanthropy increased when American, European, and Japanese corporations moved abroad (Smith 1994).

Traditionally, Europe has lagged behind the United States in business philanthropy. One reason is that the European welfare state is more established, addressing needs that are sometimes taken up by private initiative in the United States. For this reason also, tax incentives in Europe are less favorable toward giving than in the United States. Moreover, traditionally, corporate giving has not been regarded in Europe as enhancing a company’s reputation and thus its competitiveness. This may be changing, however. The European Commission now encourages businesses to form social partnerships, and the U.K. government is implementing tax reforms to encourage donations. Annual expenditures of the 143 foundations and corporate funders that are members of the European Foundation Centre increased 43 percent, to €4.8 billion, between 1998 and 1999 (European Foundation Centre 2000). International giving by Japanese foundations and corporate donors is similarly on the rise (Yamamoto 1997).

Trust funds. Official trust funds are a significant instrument for global and regional programs, contributing about \$2 billion a year—the equivalent of about 4 percent of official development assistance—to these activities. Operating primarily through grants, these funds are a critical and growing source of support for a broad range of programs with a transnational reach. But a special focus has been environmental preservation.

International agencies administer numerous single-donor and multipartner trust funds. For example, trust funds support many of the World

Health Organization’s pivotal global activities as well as those of other U.N. agencies. Among multilateral institutions, the World Bank manages the largest trust fund portfolio, with \$1.3 billion in cash contributions in 2000, about \$700 million of which is targeted to global and regional programs (see tables 5A.1 and 5A.2 in the annex).⁶ Other international organizations administer donor contributions worth another \$200 million for global and regional activities (table 5A.1).

Environmental programs dominate spending from the trust funds administered by the World Bank; smaller amounts go to programs in public health, knowledge creation, financial stability, and other areas (table 5A.2). The Global Environment Facility, the largest of these funds, is guided by international treaties and conventions. Its portfolio is concentrated on efforts to reduce ozone depletion, minimize climate change, preserve biodiversity, and prevent the degradation of international waters (box 5.3).

The World Bank’s Development Grant Facility (DGF) is an additional important resource for global programs, combining donor funds with a contribution from the Bank’s administrative budget. The DGF facilitates about \$1.1 billion a year for international public goods.⁷ When this figure is added to the \$900 million from single-donor and multipartner trust funds, the annual total channeled through official trust funds comes to about \$2 billion, as indicated in table 5.1.

Established in 1997 to put all global programs receiving World Bank grant funding under a single management umbrella, the DGF promotes 50 partnerships that address transnational development challenges not adequately supported through country lending operations (World Bank 2000b). The DGF makes its biggest contribution to the CGIAR, providing \$50 million of that organization’s budget of about \$350 million in 2000. Other projects funded by the DGF include the Global Water Partnership, the River Blindness Control program in Africa, the International AIDS Vaccine Initiative, the Roll Back Malaria program, the Consultative Group to Assist the Poorest (a micro-credit program), and the Global Corporate Governance Forum.

Official finance for regional public goods

Many environmental, natural resource management, riparian, and health issues are regional in na-

Box 5.3 The Global Environment Facility: objectives and new challenges

Set up as a pilot program in 1991 with a commitment from donors of \$1 billion, the Global Environment Facility (GEF) has since had two replenishments: the first, in 1994, added \$2 billion, and the second, in 1998, added a further \$2.6 billion. But with the financial implications of environmental preservation so large, the GEF's role remains largely catalytic.

Financing incremental cost. The GEF is a source of incremental financing and risk taking, and thus GEF resources typically mobilize substantial additional funds. Although the facility pays most or all of the costs for small technical assistance projects, its resources often leverage four or five times as much in local investment and external contributions. GEF funding is provided in the form of guarantees and concessional loans as well as grants.

Pursuing global-local linkages. Although the environmental benefits the GEF pursues are global in scope, GEF funding always supports sustainable development at the local level by addressing economic, environmental,

and social needs such as reduced air pollution and local job creation. Local benefits are the immediate driving force behind GEF projects.

Promoting market outcomes. Many GEF projects are premised on market-oriented outcomes in cooperation with both private and governmental partners. In collaboration with the International Finance Corporation (an affiliate of the World Bank Group), the GEF provides funding in the form of subordinated debt, which is used to leverage outside funds to support renewable energy enterprises on commercial terms.

Shifting from project to programmatic funding. The GEF's focus on specific projects has not always yielded the desired results, either because of institutional shortcomings or because projects have not always been embedded in a broader national strategy for environmental protection. Building institutional capacity and strengthening national strategies for preservation are likely to receive more attention in the future (Global Environment Facility 2000).

ture and difficult to address through uncoordinated efforts in individual countries that invite free riding. Regional approaches can spawn efficiency gains in fields as diverse as transport, electric power, telecommunications, law enforcement, and the regulation of financial markets. The regional and subregional harmonization of policy can help small countries overcome their size disadvantage, which often deters investment. Regional institutions and initiatives have a role to play in recasting the international financial agenda and supplying services for preventing and managing financial crises (Ocampo forthcoming).

Yet regional public goods have so far had only limited success in attracting international assistance (Cook and Sachs 1999). One reason is the difficulty in securing neighboring countries' cooperation. Another is that most international assistance agencies are organized according to country relationships. They lack the instruments, tradition, and incentives for regional cooperation. Finally, some financial institutions are constrained by the requirement to obtain sovereign guarantees for their loans.

Clearly, the potential merits of more active and open regionalism warrant action to overcome these difficulties. Limited though it may be, the

experience of international agencies with regional projects to date deserves to be studied for lessons on development diplomacy, the nature of cooperative solutions found, and the design of financing modalities (see box 5.4).

Two recurring problems in the financing of regional projects are obtaining sufficient grant funding for shared project components and technical assistance, and determining the appropriate lending arrangement. Multilateral financial institutions cannot easily use their basic financial instrument, a government-guaranteed loan, because it is difficult to work out which countries should pay which proportion of the costs of borrowing. In the World Bank's very limited portfolio of regional loans going back to the 1960s, three modalities have been used, each with its own advantages and disadvantages: loans to multinational entities such as subregional development banks and special-purpose companies created for the project; individual coordinated loans to participating sovereign borrowers (arguably the most successful arrangement); and single-country loans with a regional objective, sometimes secured by special guarantee arrangements such as a sovereign guarantee by a nonborrowing project beneficiary (Ferroni and Hassberger 2000).

Box 5.4 The Inter-American Development Bank and regional public goods

The Inter-American Development Bank (IDB) has long been active in both grant-funded regional initiatives such as regional technical cooperation and, to a lesser extent, regional lending. Two examples of its successful involvement are Fontagro and SIEPAC.

Fontagro is a regional consortium designed to promote agricultural research of relevance to Latin America and the Caribbean. It is financed principally by an endowment fund provided by its regional member countries and institutions. The IDB supports the consortium's secretariat and facilitates countries' contributions to Fontagro through IDB loans. Fontagro seeks to channel a continuous flow of resources to regional agricultural research, accelerate applied research at the national level by supplying technologies of a public good nature and cross-country relevance, and promote national, regional, and global cooperation in research. Fontagro is also intended to strengthen the representation of the Latin American

and Caribbean region in decisionmaking forums where international agricultural research is being planned and financed.

The SIEPAC (Sistema de Interconexión Eléctrica Para América Central) project seeks to foster the creation of an integrated regional market for electricity in Central America. It supports the establishment of legal, institutional, and technical mechanisms, setting the stage for privately operated power generation and undertaking necessary investments to upgrade the infrastructure for the distribution of power (transmission lines, substations, and a regional center for the coordination of transactions). The project consists of a technical cooperation component and an investment program. Its financing, including an IDB loan of \$171 million approved in 1997, is extended to two regional project entities, the Council for the Electrification of Central America and the owner of the interconnected grid, Empresa Propietaria de la Red, S.A.

Country-based official assistance

Country-focused official assistance supports development spending in poor countries that generates both local and cross-border benefits and enhances the countries' capacities to absorb international public goods. This assistance may be concessional (grants and concessional loans) or nonconcessional.

Concessional assistance. Core and complementary concessional expenditure on international public goods has grown steadily as a share of official development assistance (figure 5.1). This assistance supports a wide range of expenditures, certain designated categories of which have been identified as contributing to the provision of public goods (see annex 5.1 for methodological annotations and data sources). To illustrate, expenditures on contagious disease control fall into the core category, since they convey some cross-border benefits. Complementary expenditures benefiting health include spending to purchase drugs and vaccines, train personnel, and upgrade basic health infrastructure, including sanitation and safe water supply. Similarly, in the area of the environment, financing for forestry, biodiversity protection, research, development of alternative energy sources, and other categories is considered core expendi-

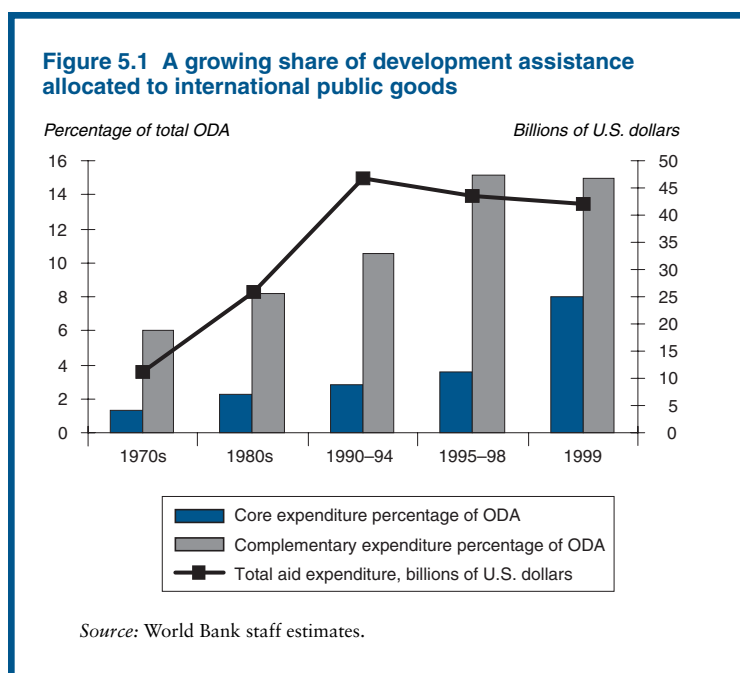
ture, whereas that for administration, training and education, and other aspects is categorized as complementary. Expenditures (such as helping refugees, landmine clearance, and demobilization) are "core" expenditures that convey cross-border benefits by preventing the eruption of conflicts or the relapse of hostilities. Civilian expenditures that improve judicial and legal systems, accountability, and enforcement of human rights, also tame the risks of civil wars and thus play a complementary role in safeguarding peace and security (box 5.5).

In the second half of the 1990s, core concessional spending was about \$2 billion a year. As a fraction of total official development assistance it rose from about 1.5 percent in the 1970s to 4 percent in the late 1990s (figure 5.1). In 1999 core spending was nearly 8 percent of official development assistance, reflecting mainly increased expenditure for peacekeeping operations (figures 5.1 and figure 5.2a). Funding for health, the environment, and peacekeeping has grown significantly, while that for knowledge generation and dissemination has stagnated.

A far more significant part of official development assistance—estimated at about \$8 billion a year in the late 1990s—is channeled to complementary expenditure. This component rose from

about 7 percent of all official development assistance in the 1970s to more than 15 percent in the late 1990s. These expenditures have been quite resilient in the face of declining aid flows since the mid-1990s. They are particularly important in the health domain, where the control of infectious diseases requires significant supporting infrastructure. Some highlights (figures 5.2 and 5.3):

- Core and complementary aid allocated to health has grown the fastest. Much of that growth has come in the form of complementary expenditures to improve water, sanitation, and waste management. Spending on family planning and reproductive health has also increased.
- Spending on environmental programs—prominent in the use of official trust funds—has also grown rapidly through country-based aid, boosted mainly by stronger support for biodiversity preservation and for upgrading environmental administration.
- Spending for reconstruction and postconflict peacebuilding grew in the late 1990s (box 5.5). It peaked in 1999, displacing part of concessional assistance allocated to health (figure 5.2a).



- Spending on knowledge generation and diffusion, on the other hand, has been sluggish, with complementary spending on educational facilities and training severely curtailed.

Box 5.5 Safeguarding peace: the role of development and relief assistance

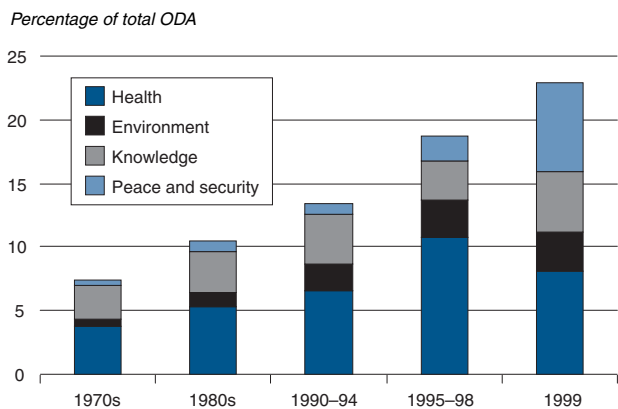
What is the role of aid in maintaining peace? And why are there different estimates for expenditures on peacekeeping?

Where conflict has ravaged, aid has a role to play at the crossroads of relief and development (World Bank 2000d). The evidence is that the chances of a relapse into conflict are the highest immediately after the end of hostilities. At such times, aid can finance the demobilization of former combatants, the removal of mines, the sustainable return and reintegration of refugees and internally displaced persons, and the restoration of governance institutions to support the rule of law and build a just and open society (United Nations Development Programme 2000).

When conflicts erupt, donors, relief agencies, and other aid partners intervene under U.N. leadership to respond to urgent humanitarian and stabilization needs. Such interventions account for a substantial part of the resources devoted by the international community to peacekeeping. Expenditures on such activities create both international public goods (core expenditures) and necessary domestic infrastructure (complementary expendi-

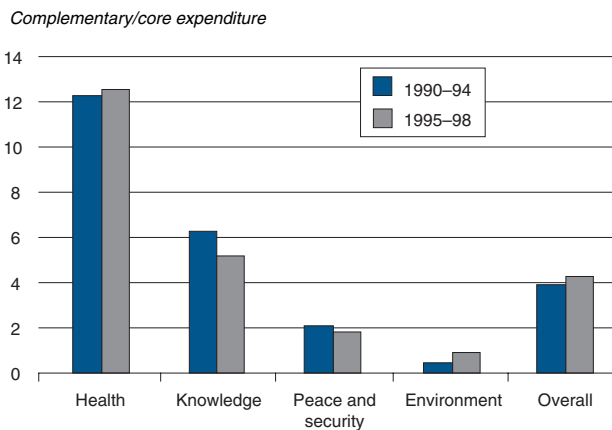
tures). As recorded in official development assistance statistics (figures 5.2 and 5.3), in the late 1990s, core expenditures for peace increased to an estimated \$280 million per year on average, almost twice as much as in the early 1990s, and this figure edged up even further in 1999; complementary spending amounted to \$550 per year, on average. These estimates are lower than actual estimated U.N. expenditure on peacekeeping. For example, in fiscal 2000 the cost of the 15 ongoing U.N. peacekeeping operations worldwide was estimated at between \$2.6 billion and \$3 billion. The difference between the aid and U.N. statistics largely reflects a difference in accounting methodology. Aid flows for safeguarding peace are measured on an incremental cost basis. This involves an assessment of the extra cost necessary to convert ongoing expenditures on defense programs into international operations for peacekeeping, through deployment of military and civilian personnel according to U.N. authorizations. Only this cost over and above regular defense spending is measured as a component of aid. By contrast, the U.N. budget on peacekeeping operations records total (ongoing plus incremental) costs.

Figure 5.2a Rising support for the environment, health, and peacekeeping: core plus complementary expenditures



Source: World Bank staff estimates.

Figure 5.2b Stronger complementary expenditure on health and knowledge



Source: World Bank staff estimates.

- Core spending on agricultural and livestock research has also been stagnant.

Concessional official assistance for public goods (both core and complementary) accounts for a larger share of total assistance in low-income countries than in middle-income countries (figure 5.3a). Health is the largest spending category in low-income countries, mainly driven by infectious disease control and improvements in water, sanitation, and waste management. Development assistance for peace and security increased over time in low-income countries, almost matching in 1999 the amount of aid allocated to health (figure 5.3b).

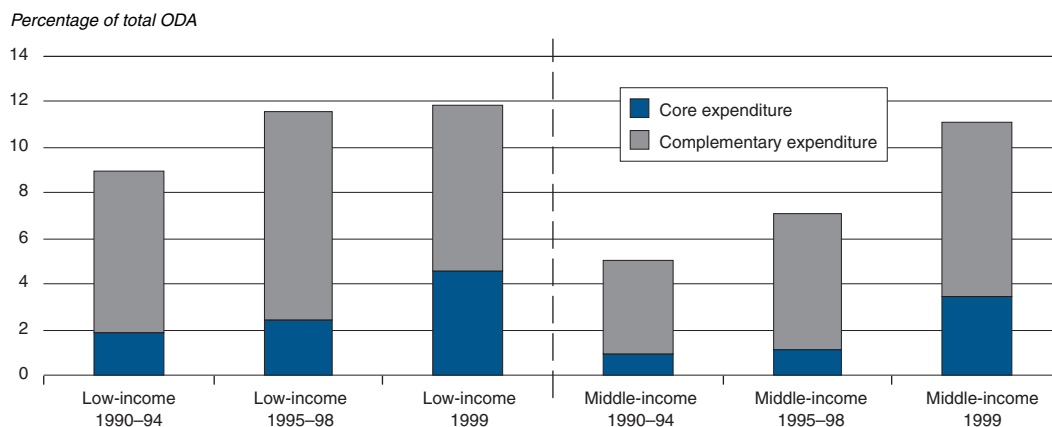
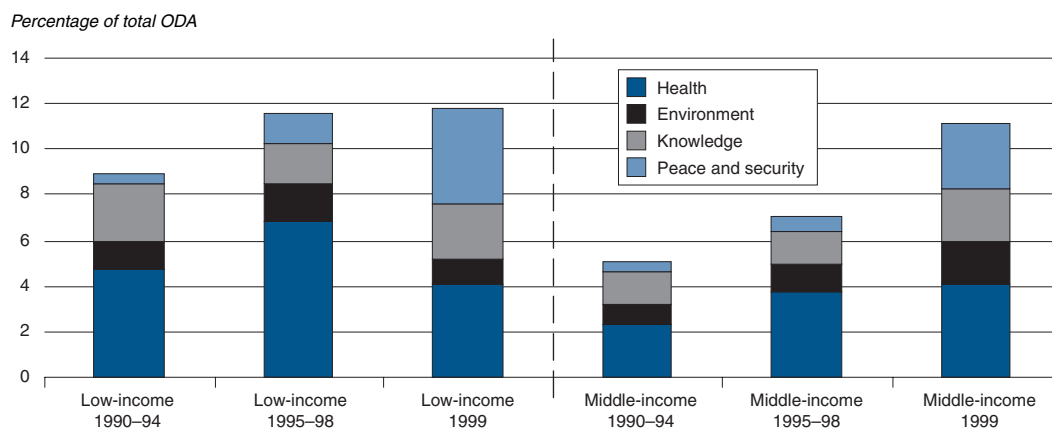
Multilateral nonconcessional lending. Multilateral financial institutions provide three financing functions in support of low- and middle-income countries' contributions to international public goods. First, they channel resources from their net income to trust funds that make grants available for international public goods, as already discussed. Second, they lend to countries for projects in the areas of environmental protection, health, and knowledge generation and diffusion. Such lending has been around \$3 billion a year (8 percent of new lending by such organizations), and although some potential for further lending may exist, most countries are likely to borrow only a limited amount on nonconcessional terms for such activities. Noncon-

cessional lending from multilateral organizations has largely been for complementary expenditures. Of the \$3 billion a year, the International Bank for Reconstruction and Development (IBRD, part of the World Bank Group) contributes about half. Loans for environmental protection and health, the largest categories, draw about equal amounts.

Third, a substantial share of multilateral lending, including from the IBRD, is for structural adjustment.⁸ Since such nonconcessional flows tend to run countercyclically to private capital flows (see World Bank, *Global Development Finance 2000*), they may indirectly support the financing of international public goods. By stabilizing a country's external financial position, they prevent continued financial distress and limit the possibility of contagion. They may also help to cushion national spending when economic downturns put national budgets under pressure (see World Bank 2000e for the Thai experience).

Leveraging official and philanthropic resources

Private foundation and official resources are scarce, and the claims on their use are many. Leveraging these resources can expand the envelope of funds available for the provision of international public goods. The goal of such leveraging is

Figure 5.3a Support for international public goods is strong in low-income countries**Figure 5.3b Core plus complementary expenditures by purpose and income group**

Source: World Bank staff estimates.

to attract commercially oriented resources. But this can prove a challenge because the financial risks involved in the provision of such goods can be large.

Recently some approaches have been suggested to “pull in” additional private resources. These are designed to reduce the risks to entrepreneurs by creating publicly funded demonstration projects, ensuring a minimum eventual market size, or, more generally, creating an enabling environment for the expanded supply and use of the goods in question. Such a “pull” approach is distinguished from the more traditional “push” approach, in which the public sector takes upon itself the financing and management responsibilities. The “pull” approach,

although attractive from a fiscal and efficiency viewpoint, creates important new challenges in building and sustaining complex public-private partnerships, backed by enabling regulations. It is likely that the push and pull approaches will continue to coexist—with the former typically used for the earliest and riskiest parts of the development process, and the latter taking over as commercialization possibilities improve.

The possibilities of leverage

The possibilities for leveraging and for commercial stakeholder participation more generally depend on the nature of the public good (table 5.2).

Table 5.2 Production technologies of public goods and their institutional implications

Technology	Examples	Institutional implications
<i>Best-shot</i> : the most concerted effort determines the public good level	Finding a cure for AIDS Neutralizing an insect pest Engineering the next green revolution	Incentives in the form of prizes, or assured compensation, can shift the risk of product development to the private sector. Complex public-private partnerships and supporting regulations are required.
<i>Summation</i> : the (weighted) sum of individual contributions determines the public good level	Curbing air pollution Reducing global warming Cataloging species	Cannot typically rely on voluntary action at the national level. International treaties can create the property (trading) rights needed for provision of the public good. But systems of taxes and penalties that limit the free-rider problem are also required.
<i>Weakest-link</i> : the smallest effort determines the public good level	Containing river blindness Limiting the spread of insurrections Ensuring international financial stability	Capacity building is required in poor countries. Partnerships among various participants can circumvent collective action problems. Incentives are critical to limit moral hazard (cheating) that puts others at risk.

Source: Adapted from Sandler 2000.

It is useful in this context to consider three types of international public goods. *Best-shot* goods, which depend on focused technical expertise and benefit from economies of scale, are organized for production and delivery in a “mission-oriented” manner. Traditionally, such goods have been supplied through the “push” model, with the public sector sponsoring and assuming the full financial risk of the enterprise. However, recent proposals suggest that best-shot goods can benefit from “pull” measures.

“Pull” measures operate by recognizing that the public sector continues to bear some of the responsibility for financing public goods even as it seeks to harness the flexibility and entrepreneurship of the private sector. This is achieved by shifting some of the risk of product development to the private sector. “Pull” measures, however, are not conventional subsidies. Rather, they are in the nature of contingent contracts. Payment is due only if services are delivered.

In contrast, *summation* and *weakest-link* goods, which depend on the actions and contributions of widely dispersed individuals, are not suitable for either the “push” or the “pull” approach, except in limited operations. Instead such goods require a wide-reaching set of global partnerships. Official agencies play essentially a catalytic role, and the pragmatic mobilization of global coalitions through informal partnerships, standards, and treaties becomes more prominent. The discussion of summation and weakest-link goods is deferred to the next section.

Best-shot goods: from push to pull

The “push” approach has traditionally been used for best-shot public goods that require a high degree of technical expertise and where high fixed costs of production are associated with significant technical and market risks. Knowledge and knowledge infrastructure are best-shot public goods, of which the Internet is an example. The Internet was created by the U.S. Department of Defense and its Advanced Research Projects Agency. Its use exploded through private initiative once the network and its protocols were established. And its usefulness for developing countries can be greatly enhanced through a further push on portals and navigation standards for low-income communities (box 5.6). Such a push can not only fund early fixed costs but also generate demonstration effects that subsequently pull in new private initiatives.

“Pull” mechanisms through contingent contracts can be both effective and efficient because they pay for the output of research (the public good itself), not for the inputs (Kremer 2000). Prizes of various kinds have long been used to lower the costs of inventions while eliciting those inventions most responsive to the needs of final consumers. For example, the Harrison chronometer to measure longitude and the means to control cholera were the results of prize competitions (Cooper 2000a). When guided by “pull” incentives, researchers and inventors are likely to be more focused in designing their projects. The history of malaria demonstrates how efforts to develop a vaccine were thwarted for a long time because of unrealistic expectations and a

Box 5.6 The Development Gateway

The knowledge revolution offers an opportunity to redraw the development challenge. Local-to-global connectivity is beginning to empower local communities and poor people by strengthening their capacity to network and be heard. It also enhances their ability to access services and resources from beyond the local community. It enables the public sector to serve the citizenry more effectively through e-government solutions, now being practiced in a growing number of developing countries. And it greatly expands economic opportunities for the poor, not only through e-commerce, but more fundamentally by contributing to the better functioning of markets in an environment of enhanced information and transparency. A key task for the development community today, in cooperation with the private sector, is to foster access to the technologies powering the Internet and the ability to share knowledge.

The Development Gateway, an Internet portal to local and global knowledge on development issues, promotes networking and transactions among communities of practice in development. A multipartner initiative proposed by the World Bank with collaboration from public and private organizations and civil society worldwide, the Gateway operates under an open, decentralized architecture with shared standards. It will contribute to effective development by facilitating access to best practice and networking among nongovernmental organizations, local communities and leaders, government officials, donors, and businesspeople. Innovative technologies for sharing data on development activity will enhance the coordination of aid and the harmonization of policies and practices among donors.

lack of focus under a more diffuse incentive structure (Desowitz 1991).

But more than a prize is needed. Stronger country capacities to absorb and pay for the public good, credible technical standards, and public sector commitments to regulatory stability are all essential for a powerful “pull” effect.

Combining push and pull in agricultural research

The early work of the CGIAR epitomizes the “push” approach. But today’s biotechnology revolution implies adopting a “pull” strategy—both for the CGIAR (box 5.7) and for agricultural research by developing countries themselves. And the greater reliance on “pull” incentives in turn requires stronger technical standards and partnerships among the various stakeholders.

Private industry has dominated agribiotechnology research, accounting for approximately 80 percent of all research and development (R&D) in that field (Persley 1999). Because of the high cost of this R&D, private sector efforts have been targeted on genetically improved plants much more suited to large-scale commercial farming than to smallholder farming in developing countries. Plants and diseases common to tropical areas have received the least attention. Yet biotechnology applications in agriculture could bring far-reaching development dividends (Serageldin and Persley 2000).

To reap these dividends, a combination of push and pull is required. Government-sponsored plant and livestock breeding programs would be a powerful “push” mechanism to redress incentives. Traditional mechanisms to encourage private sector efforts operate through financial and tax incentives for R&D, credit schemes for farmers to pay for proprietary technology, and insurance to reduce the risks of adopting new technology. Their success, however, has been limited. For the “pull” approach to be effective, increased efforts are also needed to improve rural infrastructure, technology dissemination services, and safety (by raising the ability of developing countries to implement genetic technologies and standards to assess food allergens and other health risks).

Public-private partnerships between industrial and developing countries could complement these incentives for R&D (Serageldin and Persley 2000). Developing countries could contribute adapted germ plasm, and the private sector the proprietary gene to enhance the product. In such a new role, the CGIAR and other international research institutions could help build trust to make equitable partnerships effective.

Combining push and pull for vaccines

Controlling the spread of infectious diseases such as AIDS would be greatly facilitated by the availability of a vaccine, a best-shot good whose production re-

Box 5.7 Biotechnology and the CGIAR

The surge in private agricultural research and development and the promise of biotechnology pose some strategic challenges for the Consultative Group for International Agricultural Research (CGIAR). CGIAR centers could continue to rely on “pre-biotech” procedures used to develop green revolution technologies. They would then limit themselves to the production of technology on the basis of enabling resources in the public domain (public gene banks and unpatented research processes). Given the dramatic increase in the patenting of biotechnology, however, such an approach would severely constrain research. The centers might therefore consider partnerships with owners of exclusive rights to the needed enabling technology. They have several options:

- They could rely on the goodwill of patentholders to make available enabling technology for exclusive use in markets of little interest to the patentholder (such as poor farmers in poor countries). Private patentholders have extended such goodwill in recent years, but there is no guarantee that they will continue to do so.
- They could exchange or purchase exclusive or non-exclusive rights. Such an exchange would likely imply the need for centers to protect the technology they develop in order to have something to trade. A purchase of rights, on the other hand, might exceed the centers’ budgets.
- Another possibility is to work around the territorial nature of patents by limiting research to countries where patents on living materials are not granted—and indeed, most countries hosting centers do not. But commercialization of the resulting technology in countries where exclusive rights exist for underlying technologies could result in lawsuits.

There are, in short, no easy solutions, but the imperative of generating technology for poor farmers unable to pay for proprietary resources means that all possibilities must be explored.

Source: Adapted from Pinstrip-Andersen 2000.

quires a substantial amount of high-cost research with an uncertain outcome. Because the incidence of human immunodeficiency virus (HIV)/AIDS is highest in many developing countries with a low ability to pay, the incentives to invest in R&D are weak, since the developer might not be able to directly recoup the costs.⁹ Low purchasing power and low childhood immunization rates create the presumption that the market for an AIDS vaccine in developing countries would not be large enough to warrant the investment. Even though the cost of all four basic childhood vaccines is under \$1 per child, coverage remains low in the poorest countries. And an AIDS vaccine is likely to be much more expensive.

As with agricultural research, the solution to the problem of vaccine and drug development is likely to require both “push” and “pull” measures. Recent “push” mechanisms for vaccines have operated through networks of governmental and non-governmental organizations, with representation from the private sector. The Medicines for Malaria Venture (box 5.8), the International AIDS Vaccine Initiative, and similar networks draw funds from private foundations and official trust funds to finance vaccine and drug development.

Several “pull” approaches are under consideration. Under a U.S. government proposal, every dollar

of vaccine sales would be matched by a one-dollar tax credit.¹⁰ Setting up an HIV vaccine purchase fund, financed by donors and developing countries, would also signal a commitment to pay for a vaccine and stimulate private sector research. A “replenishing fund” has been proposed using International Development Association resources and other multilateral concessional funds (Ainsworth and others 1999).¹¹ Providing contingent loans and guarantees to developing countries to purchase a future vaccine that would meet donors’ standards is another option to stimulate private sector R&D. Traditional country-based programs, by creating a greater likelihood of vaccine use, can also pull the development of vaccines.

Kremer (2000) has proposed donor commitments of about \$250 million a year, with a further \$90 million in copayments from governments purchasing the vaccines. Based on present technical parameters, these commitments could be used to increase an average life span by a year for about \$10 a year, much less than the \$100 that the World Bank considers justified on economic and social grounds. Thus, \$340 million could add 34 million person-years of life—a major payoff. The copayments, graduated by country income per capita, would create a market test: governments would buy the vaccines only if they were expected to be effective.

Box 5.8 The Medicines for Malaria Venture

The Medicines for Malaria Venture (MMV) is a public-private partnership to discover and develop new antimalarial drugs and assist in their commercialization. The program targets products at low-income populations in countries where the disease is endemic.

MMV acts as a not-for-profit business, combining aspects of a “virtual” pharmaceutical research and development (R&D) company and a venture capital fund. It has begun to finance and manage a portfolio of R&D projects

for discovering and developing antimalarial drugs. Its goals are to register one new antimalarial drug every five years, to ensure commercialization of these products at affordable prices, and to become partially self-sustaining through royalty income in the long term. Having estimated that it will need up to \$30 million a year to achieve its objectives, MMV will seek to retain patent protection for its discoveries and will license projects for commercialization to private firms.

For further information see www.malariamedicines.org.

Some major uncertainties surround global “pull” initiatives, however. Is the international community willing to lock in large amounts of capital for a long period, if it means reducing the availability of resources for other development priorities? Will the promise of funds be credible enough to bring about the necessary effort in research? Will the processes for evaluating qualification for receipt of such funds be simple enough to minimize disputes? These uncertainties reveal why country-specific development assistance and policy dialogue should continue. Indeed, such country programs—by building the infrastructure needed to deliver vaccines and provide supporting medical and sanitation services—may exert the strongest “pull” on vaccine development.

Incentives for responsible action

When global outcomes result from the uncoordinated actions of many individuals, institutions, and governments, the unintended consequences can sometimes be financially serious. But additional financial resources do not always help achieve the needed coordination. Coordinated action requires incentives, not just for the sake of efficiency, but also for inclusiveness. Maintenance of the international trade regime is only the most evident example.

The policy goal is to achieve “rules of the game” that promote efficiency, transparency, and equity in access.¹² To that end, the global community uses a variety of devices, including standards, treaties, and supporting regulations. Standards are important because they define the boundaries of permissible action and help create transparency.

However, standards can sometimes be used to exclude rather than to include, as has been highlighted in recent discussions on labor and environmental standards in international trade (see World Bank 2000a). Treaties can set rules of the game in a way that is more binding than standards, but with a few important exceptions (such as fisheries treaties and the Montreal Protocol for Ozone Reduction) they have been difficult to accomplish. Regulatory oversight of global activities has been successful in some areas (such as air traffic control) but more contentious in others (such as international antitrust and competition policy).

Given the complexity of these issues and their varying relevance to different international public goods, the rest of this section focuses on two examples: international financial crises and global warming. The objective is to illustrate the process, the possibilities, and the challenge of achieving coordinated action. However, these examples are also chosen because of their global importance. Although international financial crises and disastrous consequences from global warming are low-probability events, their costs, if they transpired, could be catastrophically high. Those costs would also be disproportionately borne by the poor. Therefore the global community has a strong interest in mitigating these risks. And despite the controversies that have arisen, the progress realized thus far demonstrates that coordination of incentives can be achieved in an evolutionary way.

Preventing and managing financial crises

An international financial crisis can erupt unpredictably, triggered by the actions of a few individuals, a banking or other financial institution, or a

fiscally imprudent government. Such a crisis, starting from a single weak link, can spread worldwide through various mechanisms of contagion (Dornbusch, Park, and Claessens 2000). Since the Mexican financial crisis of 1994–95, the official financial community has pledged over \$280 billion in rescue packages across several distinct episodes to prevent financial distress in the country where the crisis arose and to reduce the probability of a global financial crisis (table 5.3).¹³

These rescue efforts have limited the spread of crises, but they raise two major concerns. First, the availability of large financial packages can create moral hazard: both lenders and borrowers may act imprudently, expecting that they will be bailed out if things go wrong. Second, crises may grow in size and number to the point where the resources of the official community prove insufficient to limit extensive damage. As Checki and Stern (2000) note, “The growth in the scale and complexity of capital flows could easily outpace the scale of feasible future support packages.”

After the financial crises of the second half of the 1990s, a consensus emerged on measures to prevent future crises, but these measures are taking time to implement. Controversy continues over how best to manage a crisis once it has occurred—and specifically over how to share the costs among the various creditors and debtors.

Crisis prevention. The principles of crisis prevention laid out in three reports of the Group of Twenty-Two (1998a, 1998b, 1998c) are relatively uncontroversial: more effective domestic regulation of financial institutions, less short-term bor-

rowing, and greater transparency in financial reporting. The key to achieving these goals is accepting and adhering to international standards on financial practices. Such standards define criteria for minimally acceptable practice for all countries, but they permit countries to meet those criteria in different ways (Eichengreen 2000a). They are a way of reconciling widespread participation in global financial markets with the diversity of national economic systems and structures. Spearheaded by the International Monetary Fund (IMF), but also involving the World Bank, the Financial Stability Forum in Basle, the United Nations, and a large group of nongovernmental organizations and private actors, efforts focus on establishing a variety of financial standards (Goldstein 2000). The IMF reports on its website on countries’ adherence to the data dissemination standard. The IMF’s *Reports on the Observance on Standards and Codes* are summary assessments of a country’s progress in implementing standards and codes across a range of areas, including data dissemination; transparency of fiscal, monetary, and financial policies; financial sector standards; and market and institutional infrastructure. And to assist governments, supervisory authorities, and central banks in assessing their financial sector’s strengths and vulnerabilities (and its contribution to growth and development), the IMF and the World Bank prepare Financial Sector Assessment Programs.

Standards are seldom uncontroversial. A key problem with setting standards is that it assumes knowledge and consensus on a variety of unresolved matters. Economists disagree among them-

Table 5.3 Sources of funding for recent financial rescue packages

(billions of dollars)

Crisis country	Period	Source				Total
		IMF	World Bank	Other multilateral institutions	Bilateral sources ^a	
Mexico	February 1995	17.8	..	..	30.0	47.8
Thailand	August 1997	3.9	1.5	1.2	10.5	17.1
Indonesia	September 1997–March 1999	12.0	5.5	4.5	26.1	48.1
Korea, Rep. of	November 1997	21.0	10.0	4.0	23.3	58.3
Russian Federation	June 1998–June 1999	11.2	2.3	..	10.0	23.5
Brazil	December 1998	18.1	4.5	4.5	14.5	41.6
Turkey	December 2000	10.4	..	..	..	10.4
Argentina	December 2000	11.7	2.4	2.4	21.0	37.5
Total		106.1	26.2	16.6	135.4	284.3

.. Negligible or not applicable.

a. Includes financing from private sector market participants.

Sources: IMF and World Bank data.

selves about the design of an efficient bankruptcy law, whether fixed or flexible exchange rates are superior, and much else. Even the new guidelines for capital adequacy, which have key regulatory implications, invite controversy (box 5.9).

Crisis management. Crisis management requires both resources to prevent a panic and transparent mechanisms to allow equitable sharing of the burden of losses. The leading industrial countries have been important in crisis management, particularly when their own financial institutions have been involved: for example, the United States took the lead in dealing with the collapse of the hedge fund Long Term Capital Management in 1998. The IMF has played a central role in providing new resources. The pricing of the IMF's rescue packages, their ma-

turity, and their size have all been the subject of recent debate (Goldstein 2000). The trend, within the limits of permissible practices, has been to allow for the possibility of penalty rates for rescue loan packages, and to shorten the maturity of these loans while ensuring that the package is large enough to command credibility and prevent contagion.

Private sector burden sharing of losses incurred is more controversial, because to date it has been somewhat ad hoc. The official creditors in the Paris Club have required private lenders (including bondholders) to offer "comparable treatment" in recent debt restructurings for Ecuador, Pakistan, the Russian Federation, and Ukraine (see box 2.7 and International Monetary Fund 2000). But progress has been "halting" (Eichengreen

Box 5.9 The new capital adequacy guidelines

The Bank for International Settlements' capital adequacy guidelines are intended to harmonize international bank supervisory practices and foster stability in the international financial system (Bank for International Settlements 1997). The Basle Accord, signed in July 1988 and since then adopted in more than 100 countries, sets a minimum target for bank equity capital of 8 percent of the bank's risk-weighted assets. Risk weights are zero for claims on central governments, 50 percent for loans secured by mortgages on residential property, and 100 percent on other claims on the private sector. Borrowers in non-Organisation for Economic Co-operation and Development (OECD) countries are treated as riskier than those in OECD countries, and long-term debt as riskier than short-term debt.

Yet as is now widely acknowledged, short-term debt played a critical role in the financial crises of the late 1990s. The guidelines' failure to recognize the risks underlying short-term capital flows is only one of their limitations. The framework does not fully take into consideration the erosion of the traditional distinctions between banks and nonbanks, the emergence of more sophisticated loan instruments on and off the balance sheets of financial institutions, or the advances made by banks in mitigating their risks through derivatives and securitization (Institute of International Finance 2000).

A proposed new framework envisions greater reliance on internal risk management practices by sophisticated financial institutions. The key objective is to achieve a closer link between capital charges and underlying risks, while providing adequate incentives for innovation and risk management. This is to be complemented by "dynamic,

risk-focused and process-oriented" official supervision and greater market discipline by improving public disclosure, especially of banks' risk exposures (McDonough 2000).

Since the majority of financial institutions lack sophisticated risk management systems, the new capital framework proposes to use credit ratings to assess the risk faced by these lending institutions. The ratings differ by the creditworthiness of the country in which the borrower resides and are further calibrated depending on whether the claims are on sovereigns, banks, or corporations. The greater differentiation of risk in the lender's portfolio marks an advance over the old system.

However, from the viewpoint of borrowers in developing countries, the use of external ratings raises some problems. Ratings do not exist for many developing countries. As of November 2000, for example, only 54 developing countries were rated by Standard & Poor's. The Basle Committee is looking into the possibility of using ratings by export credit agencies as well. But even these ratings are not available for all countries, especially for subsovereign and private sector borrowers.

Existing rating processes are also subjective and are known to have underestimated the risks of crises in recent years. Moreover, if ratings are downgraded during a crisis, their use for capital requirements may only exacerbate the procyclical nature of capital flows to developing countries (World Bank, *Global Development Finance 2000*; Ferencz and Laurin 2000; Chiuri, Ferri, and Majnoni 2000). It is also not clear whether the new capital charges will be higher or lower than in the earlier standardized framework. Hence the implications for the availability of credit to developing countries are uncertain.

2000b), although in the recent cases of Argentina and Turkey, private sector involvement was explicitly embedded in the program strategy. (An ongoing review of this fast evolving area can be obtained from reports on the IMF's website.) When the crisis is essentially due to investor panic, it can be contained by standstills or the freezing of repayments (Eichengreen 2000b). But when the crisis arises from a country's inability to pay, restructuring bonded debt is best achieved by prior provisions to allow flexibility (possible under the collective action clauses typical in bonds issued under U.K. law). International markets are unlikely to adopt these and other financial innovations without some regulatory requirements, which are difficult to impose because the authority to do so worldwide does not reside in any one entity.

Avoiding the disasters of global warming

Recent estimates suggest that, for the world as a whole, the costs of a 2.5-degree centigrade greenhouse warming may be modest, at about 1 to 2 percent of current world output. The costs to some developing countries could be much higher, however; for example, the expected cost to India is in the range of 5 percent of its gross domestic product. And there is a small but real probability that global warming may lead to global catastrophe (Nordhaus 1998).

Prudence requires steps to protect the globe, but it also requires that those steps be politically feasible and economically efficient. Currently the main approach to reducing global warming, embodied in the 1997 Kyoto Protocol, establishes quantitative limits by country on emission of the greenhouse gases responsible for warming: signatories to the protocol are required to reduce their greenhouse gas emissions at least 5 percent by 2008–12. Although many elements of the protocol are subject to criticism, it is a step—a necessary step—toward a global governance system for managing the risks from global warming.

A special feature of the Kyoto Protocol is its Clean Development Mechanism, which provides for the possibility of international trade in emission rights. Such trade would contribute to efficiency in the reduction of emissions; it could also transfer significant resources from industrial to developing countries. If trading rights function effectively, the marginal cost of eliminating a ton of carbon emissions could fall from \$200 to \$23 (Cooper 2000b).

Despite the provision for trading, however, Nordhaus and Boyer (1998) conclude that the approach is inefficient because the benchmark emission reductions set for different countries are arbitrary and will not lead to a globally optimal mix of reductions. Moreover, about two-thirds of the costs would fall on the United States, which because of the macroeconomic implications is unlikely to support the protocol. Others criticize the Kyoto Protocol for being difficult to monitor (Cooper 2000b) and for its weak treaty structure (Barrett 2000; box 5.10). However, despite its weaknesses, new ideas and practices are emerging from experience with the negotiation of the Kyoto Protocol, which could lead to a more acceptable and workable system, including refinements in the Clean Development Mechanism and some form of international carbon tax.

The promise of Clean Development Mechanism. The immediate prospects of international trade in pollution rights under the Clean Development Mechanism currently are not bright. But the idea's eventual promise makes this an important experiment. Under the mechanism, industrial countries that have committed to reducing their greenhouse gas emissions could purchase rights to emit greenhouse gases from activities in developing countries that hold emission rights. Emission rights trading is intended to ensure that emission reductions occur where they are cheapest to implement.

The Kyoto Protocol is unclear about exactly how such reductions would be measured and certified. This is a crucial impediment. But if the mechanism can be made to work, the resulting resource transfers to developing countries could be \$5 billion to \$10 billion a year (Black and others 2000). The major beneficiaries would be the Russian Federation, China, and India, but other countries would also benefit.¹⁴ For Colombia, sales of pollution permits could raise revenue equal to those from exports of bananas or cut flowers (Black and others 2000). Collateral benefits in the form of higher rural wages, higher employment, greater technology transfers, and reduced air and water pollution could add to the development impact (Austin and Faeth 2000; Black and others 2000).

The Prototype Carbon Fund, a private-public partnership sponsored by the World Bank, aims to facilitate emission rights transactions between private investors and host countries. Through monitoring of emission reduction, verification, and cer-

Box 5.10 The incentive structures of the Montreal and Kyoto Protocols

Well-functioning environmental treaties are rare (Barrett 2000). The relative success of the Montreal Protocol, which addresses the problem of depletion of the atmospheric ozone layer, is an exception that proves the rule. Its success stands in stark contrast to the relative failure of the Kyoto Protocol aimed at limiting global climate change.

Protection of the ozone layer under the 1987 Montreal Protocol has been successful for a number of reasons. Although the technical link between chlorofluorocarbon (CFC) emission and the destruction of ozone was ambiguous, the United States had already taken unilateral abatement measures in the 1970s, banning CFCs in nonessential aerosol products. This triggered research and development in the United States into CFC substitutes, which ultimately lowered the costs of such substitutes for producers in other countries.

The Montreal Protocol imposed uniform obligations upon signatories and established penalties on the import of products containing CFCs from nonsignatories. Once enough parties had joined the protocol, the trade sanction became credible. The protocol also unleashed further

efforts in the search for substitutes for CFCs. And it introduced a system of side payments to developing countries designed to cover the incremental cost of their compliance.

The Kyoto Protocol addresses a much more complex challenge. It stipulates national emission targets that, if adhered to, promise what some consider uncertain rewards in the distant future. The pervasiveness of the sources of greenhouse gas emissions also implies changing the behavior of hundreds of millions, if not billions, of people. The success of the Montreal Protocol, in contrast, required changing only the behavior of a relative few CFC producers and potential producers.

The successful international trading of pollution rights under the Kyoto Protocol will depend on widespread participation in the agreement, which is highly uncertain. Moreover, the incentive to trade depends on every potential trading country believing that other countries will comply and not pollute more than their permit holdings allow. However, there is nothing in the Kyoto Protocol's present form to enforce compliance. The Kyoto signatories are only now tackling these problems of treaty design.

tification, the fund could help build trust between the parties from an early stage. Such trust is necessary for the sound development of the market. The fund also expects to attract additional public and private resources and promote the transfer of environmentally safe technologies.

Carbon taxation. Rather than quantitative limits on carbon emissions, an alternative favored by many economists is to agree on a common carbon tax (Cooper 2000b; Nordhaus 1998). Although perhaps infeasible at this point, a carbon tax is likely to play a role in limiting global warming as global understanding and consensus on these matters evolve. Under such a tax, the price of fossil fuels would increase in proportion to their carbon content. The tax would create incentives to reduce the use of fossil fuels, thus helping bring greenhouse gas emissions down to a more sustainable path. The tax would also be easier to monitor than the quantitative limits envisioned under the Kyoto Protocol (Cooper 2000b). Nevertheless, because the demand for fossil fuels may change in an uncertain manner, setting quantitative emission limits

and letting prices adjust to balance the market may still be preferable to using only prices to fine-tune the path of emission reduction. Moreover, because of their small current share in greenhouse gas emissions, developing countries might suffer a disproportionate burden from a uniform carbon tax to mitigate global emissions, and they would be deprived of the financial inflows that worldwide trade in emission permits could generate.

Looking ahead: the new challenges for international organizations

The provision of resources by international financial institutions, although clearly necessary, may well be less important than their role in convening relevant stakeholders and changing the incentives for political decisions. International policymakers face three key questions. Should more official funding be allocated to international public goods? If so, how should this be done? And what institutional mechanisms are needed to ensure that resources for these goods are spent wisely?

More resources for international public goods?

The undersupply of public goods underpins the call for greater provision. But the need for well-designed programs, with emphasis on efficient implementation, is as relevant for international public goods as it is for country-based finance (see chapter 4). In the near term, the resources from private and corporate philanthropy will likely grow. But if total official resources remain relatively unchanged (as suggested by recent trends reported in chapter 4), then increases in expenditure on international public goods can only come at the expense of other priorities. Several avenues exist for meeting the increased resource requirements:

- International financial institutions can help create the consensus to reverse recent trends in aid budgets and achieve substantial increases.
- They can foster improved incentives for managing global public goods.
- At the same time, new channels for financing development assistance must be sought.

Larger aid budgets could provide a significant boost in priority areas such as vaccines and drugs for diseases that disproportionately affect the poor. More funds, however, also imply improved mechanisms for aid coordination (chapter 4). The international public goods agenda opens up new and heretofore little explored dimensions of aid coordination that relate to the issues of timing, balance, and synergy between core and complementary activities.

Improved incentive structures, as discussed in this chapter, could help rein in financial resource requirements. Schelling (1997) argues that the benefits of investments in containing global warming will mainly accrue to future generations, who will also be richer, on average, than those making the investments. Therefore it may be best to leave some of the tasks related to this and other global public goods provision to a time when their financing is more affordable. On the other hand, action may be badly needed today to prevent irreversible damage. For this reason, this chapter has made a case for establishing mechanisms and approaches for aligning the incentives of different actors with the global interest.

The problem of added resources may ultimately be solved in unconventional ways. Lancaster (2000) argues that political support does

exist in the United States for devoting more resources to global problems. But these resources are being channeled in new ways, reflecting the objectives of either directly dealing with the poor or mediating aid through the private sector. The U.S. tax credit for development of an AIDS vaccine is an example of funds made available but not transferred through traditional channels. Tax incentives for charitable giving similarly enlarge the resource envelope. These and other shifts imply that, in the aid business, it will not be “business as usual.”

Financing instruments

Although trust funds have proved effective in financing a broad range of international public goods, they compete with traditional concessional lending. Both come out of the same pool of resources. So the continued growth of trust funds risks compromising the country infrastructure essential for effective use and absorption of international public goods.

Trust funds also raise other challenges. In effect, they earmark resources to designated uses. Some economists consider such earmarking undesirable because it limits flexibility in the use of these resources. But others view it as a pragmatic way to accomplish high-priority tasks. The World Bank’s DGF has developed transparent and flexible methods to finance a broad range of activities. The Global Environment Facility (GEF), too, has evolved in its ability to finance new activities in response to new demands.

The growth of trust funds also creates new responsibilities for monitoring expenditures and impacts. But no central source yet exists for tracking trust fund expenditure or sorting out the overlap in different reporting systems. Evaluating the use of trust funds is thus important to determine whether more official resources should be diverted from country expenditures. The evaluation of programs that generate benefits for many countries is not inherently different from the evaluation of country-based activities. The successful provision of international public goods abides by the same principles of aid effectiveness as does country-focused external assistance.

Nonconcessional multilateral lending appears more suitable than grants for financing complementary expenditures, since the latter give rise to substantial domestic benefits. But borrowers may be unwilling to borrow for such purposes. Can

multilateral lenders do more? The World Bank's Operations Evaluation Department, in a recent review of the Bank's forestry policy and projects, called for a reexamination of the pricing of loans from multilateral agencies for activities that have global spillovers (World Bank 2000f).

Differential pricing—that is, lower interest charges for some investment loans—could be applied to the financing of activities that convey international benefits, but it needs to be judged on efficiency considerations, since it does not expand the envelope of resources. Currently, differential pricing exists in a rough and ready form. Countries obtain resources either as grants through trust funds and bilateral programs or as concessional loans or as loans at near-market rates. Differential pricing would permit a more nuanced subsidy to different international public goods in different settings. But it could also enormously increase the administrative burden of determining how alternative prices should apply under differing conditions. The same effect could be achieved by combining, in varying measure, grant funds (for example through the GEF and trust funds) and concessional and nonconcessional lending.

Institutional arrangements

The international community requires an institutional and organizational framework for transnational problem solving on an ongoing basis. International organizations, traditionally active in this area, have an enhanced role to play. In the past such organizations have been central to the provision of public goods, through their resources, their knowledge transfers, and their global negotiations and rulemaking (Kapur 2000). They also generate information, lower the cost of transactions, encourage members to think about a common future, create linkages across issues, and create and diffuse ideas, norms, and expectations (Ruggie 1992; Martin and Simmons 1998). And they negotiate and manage rules for conditionality, sanctions, and even the use of direct force (as in the case of the North Atlantic Treaty Organization). In a sense, international organizations are themselves international public goods.

But to be effective, and reflecting the role of different types of resource flows described above, institutional priorities and methods of operation will also need to evolve. International organizations must be willing to observe the principle of

subsidiarity: to allow the most knowledgeable organization in any given initiative to take the lead. They must partner with others to establish priorities, set standards, and use demonstration projects to create knowledge for action. The discussion of such coalition-based governance and the meaning of subsidiarity in this context is still at an early stage. It will need to evolve in the context of an appropriate yet still to be identified framework for achieving effective policymaking in a decentralized stakeholder setting. It is by operating in a distributed, network-based system of governance that international organizations will influence political decisionmaking to advance the global interest.

Thus, in conclusion, international organizations are critical to the three-pronged approach to international public goods advocated in this chapter. They are important as conduits for grant funding and (in the case of the international financial institutions) as sources of finance for complementary investments undertaken by their clients. They provide valuable support for the creation of the frameworks and incentives needed to leverage public resources with private funds. And they play an indispensable catalytic role in convening stakeholders and providing platforms for international joint action.

Annex 5.1

A primer on international public goods

Pure public goods generate shared benefits—and public “bads” create shared costs. One person's consumption of a public good does not reduce the amount available to others (that is, public goods are *nonrival*). And it is impossible, or prohibitively costly, to exclude those unwilling to pay for a public good from enjoying its benefits (that is, public goods are *nonexcludable*). Actual goods fall along a continuum between pure public goods and pure private goods, to the extent that their benefits are neither wholly nonrival nor wholly nonexcludable. Private goods are rival and excludable but can generate spillover benefits (externalities), too. Because the “publicness” of public goods favors free-riding behavior, they tend to be undersupplied, whereas—in the absence of rules—common pool goods (goods that are rival but nonexcludable) tend to be overused. Adequate provision of pure public goods and sustainable use of common property are a matter of collective choice.

Spatial reach. Public goods and the public aspects (externalities) of private goods differ according to the spatial reach of the benefits conveyed. Some such goods are local public goods (or create local externalities), whereas others are national or transnational. The term *international public good* applies to the last of these. Such goods can further be classified into *global* and *regional* public goods, according to the reach of their benefits. In addition, some international public goods are goals in themselves, whereas others are means. Examples of goals include world peace, poverty reduction, financial stability, and prevention of global warming. The institutions, policies, and processes of international cooperation are the means needed to reach these goals, as are other intermediate products such as data, knowledge, harmonization of standards, and consensus on good practice. All these means have the character of international public goods in their own right: they are transnationally relevant and both nonrival and nonexcludable in appropriate settings.

Production of public goods. International public goods can also be differentiated by the manner in which they are produced. Some are referred to as *best-shot* goods, since they depend critically on the largest individual contribution toward their creation. Examples are some kinds of information technology and of medical and biotechnological research.¹⁵ Industrial countries have comparative advantage in the technology needed to produce best-shot goods. Production of other public goods is determined by the smallest contribution; for example, the control of infectious diseases requires eradication even in the smallest countries. These are called *weakest-link* goods. Developing countries are typically producers of “weakest-link” public goods such as disease control, biodiversity preservation, and financial stability. Finally, efforts by all

partners contribute more or less proportionately to produce *summation* goods, such as reduced greenhouse gas emissions to control climate change.

Data on trust funds

Table 5A.1 reports the contributions of donors to trust funds administered by a variety of international organizations, including the World Bank. Table 5A.2 breaks down contributions to World Bank-administered trust funds by the types of programs for which the funds are used.

Official aid

The Organisation for Economic Co-operation and Development’s Creditor Reporting System (CRS) is the source of the data used in this chapter to estimate the share of aid (concessional resources), other than through trust funds, allocated to financing the provision of international public goods. The CRS is the main source of statistics on the sectoral and geographical distribution of aid. The CRS data on aid commitments list official development assistance projects according to a five-digit classification scheme.

Expenditure on goods that predominantly convey cross-border benefits is categorized as core expenditure on international public goods. Aid allocated to activities that have a predominantly national reach, yet are critical for the delivery of international public goods or for the absorption of their benefits, is categorized as complementary expenditure. Nevertheless, the five-digit CRS classification is often not sufficiently detailed to allow an accurate expenditure breakdown. Therefore, judgments must be made in distinguishing between those activities that contribute to the provision of international public goods and those with mostly national benefits. Some of these judgments are highlighted below, and the five-digit CRS cate-

Table 5A.1 Donor contributions to trust funds administered by selected international organizations

Organization	Most recent reporting year	Amount (millions of dollars)	Share of regional or global programs (percent) ^a
United Nations Development Programme	1999	329.0	20
World Health Organization	1998–99	93.0	70
UNICEF	1999	601.7	4
Asian Development Bank	1999	135.3	25
Inter-American Development Bank	1999	25.4	80
World Bank	2000	1,301.0	55

a. Estimated.

Source: Agency data.

Table 5A.2 Contributions to World Bank–administered trust funds*(millions of dollars)*

Program	1997	1998	1999	2000
<i>Global and regional programs</i>				
Principal environmental programs				
Global Environment Facility ^a	234.6	261.1	250.6	247.1
Montreal Protocol and Ozone Trust Fund	68.2	57.6	77.4	80.4
Brazilian Rain Forest program	8.1	6.2	12.8	3.6
Prototype Carbon Fund	0.0	0.0	0.0	27.0
Persistent Organic Pollutants program	0.0	0.0	0.0	13.7
Principal knowledge programs				
Consultative Group on International Agricultural Research	54.9	50.8	24.5	38.3
InfoDev	2.3	10.3	22.1	5.3
World Bank Institute programs	9.6	8.4	10.4	6.7
Principal health programs				
African Program for Onchocerciasis Control	18.0	20.0	20.3	16.4
Tropical Disease Research program	2.5	3.0	0.0	0.0
Principal finance programs				
Consultative Group to Assist the Poorest	16.5	0.8	8.6	11.6
ASEM-EU Asian Financial Crisis Response program	0.0	0.0	12.7	16.9
Other global and regional programs (all sectors)	109.7	136.6	275.7	249.3
Total	524.5	554.8	715.2	716.3
<i>Other</i>				
Country-specific trust funds	890.6	648.1	553.1	585.5
Total, all programs	1,415.1	1,202.9	1,268.3	1,301.8

a. Including cofinancing.

Note: Figures exclude contributions to the HIPC trust fund.

Source: World Bank data.

gories that compose each expenditure group are summarized in table 5A.3. These categories fall under the following broader headings:

- Health.* Provision of health care generally is a national public good, although certain expenditures, such as those for vaccines used in the eradication of communicable diseases, contribute toward international public goods. At the same time, securing an adequate level of vaccine delivery involves domestic efforts to improve immunization capacity, by upgrading basic health care infrastructure and training personnel. Investments to improve sanitation and safe water supply also contribute to infectious disease control, since the burden of diarrheal diseases (such as cholera and dysentery) is highest in areas with poor sanitation, inadequate hygiene, and unsafe drinking water. Similarly, expenditures on family planning and reproductive health reduce the risk of spread of HIV/AIDS. In any case, much of the most important expenditure for infectious disease control is on R&D in industrial countries (such as on vaccine development for malaria, tuberculosis, and AIDS) and is therefore not captured in the CRS data.
- Environmental protection.* Local environmental projects create national public goods, but because they often relate to issues of global concern, they can contribute to international public goods as well. Examples include protection of biodiversity or rainforests and reduction of some forms of pollution (especially of greenhouse gas emissions). Development of alternative sources of energy also contributes toward lower atmospheric carbon dioxide concentrations. Improving environmental administration capacity, training, and education plays a supporting role in improving environmental safety.
- Knowledge.* Many developing countries, especially in the middle-income group, have the capacity to contribute to the creation of global knowledge—for example, in agriculture and livestock research and in fisheries, but also in technological applications. Aid flows to support national programs in these areas are categorized as core expenditures on international public goods. Complementary expenditures are those directed toward the provision of higher education and advanced technical training, the improvement of education administration and management, and the free flow of

Table 5A.3 Allocation of DAC development assistance to international public goods by five-digit CRS category

<p>Health</p> <p>Core aid expenditure</p> <ul style="list-style-type: none"> • Infectious disease control (12250) • Medical research (12182) • Control of sexually transmitted diseases, including HIV/AIDS (13040) <p>Complementary aid expenditure</p> <ul style="list-style-type: none"> • Health policy and administrative management (12110, 13010) • Medical education and training, health education, and health personnel development (12181, 12281, 12282, 13081) • Medical services (12191) • Basic health care and health infrastructure (12220, 12230) • Water and sanitation, including waste management and disposal (14081, 14020, 14030, 14050) • Basic nutrition (12240) • Family planning and reproductive health (13020, 13030) <p>Environment</p> <p>Core aid expenditure</p> <ul style="list-style-type: none"> • Forestry (includes forestry development, forestry services, and forestry research; 31220, 31282, 31291) • Biosphere protection and biodiversity (41020, 41030) • Environmental research (41082) • Solar energy, biomass, wind energy and ocean power, and geothermal energy (23070, 23066, 23067, 23068) <p>Complementary aid expenditure</p> <ul style="list-style-type: none"> • Environment education and training (41081) • Environmental policy and administrative management (41010) • Energy research and education (23081, 23082) 	<p>Knowledge</p> <p>Core aid expenditure</p> <ul style="list-style-type: none"> • Educational research (11181) • Agriculture and livestock research (31183, 31184) • Fisheries research (31382) • Technological research and development (32181) • Research and scientific institutions (16381, 16382) <p>Complementary aid expenditure</p> <ul style="list-style-type: none"> • Education policy and administrative management (11110) • Educational facilities and training (11120) • Higher education (11420) • Advanced technical training (11430) • Free flow of information (includes radio, television, and print media; 15065, 12030) <p>Peace and security</p> <p>Core aid expenditure</p> <ul style="list-style-type: none"> • Postconflict peacebuilding and settlement and reconstruction relief (15061, 16340, 16330) • Landmine clearance and demobilization (15064, 15066) • Emergency assistance (72010) <p>Complementary aid expenditure</p> <ul style="list-style-type: none"> • Government and civil society (strengthening civil society; 15050) • Human rights (15063) • Legal and judicial development and government administration (15030, 15040)
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Source: World Bank staff, based on OECD DAC classification.

information—all of which facilitate the dissemination of advances in global knowledge at the local level.

- *Peace.* Expenditures on preventing a relapse into conflict or alleviating its effects (such as helping refugees) are considered core expenditures on international public goods in the sense that they convey cross-border benefits in the form of greater security. Postconflict reconstruction and mine clearing contribute to improving the sustainability of peace, because the risks of a relapse into conflict are higher immediately after the end of hostilities. On the other hand, improving governance, accountability, and human rights and strengthening legal and judicial systems contribute to reduce the risks of the government failures that are often at the origin of civil wars. Expenditures in these areas have a complementary role in safeguarding peace.

Notes

1. The terminology used in the description and analysis of public goods is complex. Throughout this chapter, the key focus is on externalities: costs and benefits that the actions of one individual or group impose or bestow on others

without payment of compensation. Some formal definitions related to public goods are presented in annex 5.1.

2. For comparison, the annual spending authority of the U.S. Environmental Protection Agency is about \$10 billion.

3. Sachs (2000a), for example, estimates that vaccine development for malaria, tuberculosis, and AIDS alone could usefully absorb \$10 billion a year, although other authors have advanced lower figures. Estimates by Kremer (2000) suggest that the present value of worthwhile expenditure (compounded over a 10-year period) for the development, purchase, and delivery of vaccines for these three diseases would be around \$18 billion. At a 5 percent discount rate, this amounts to an average annual expenditure of \$3 billion. Actual needs may lie somewhere in between the Sachs and Kremer estimates.

4. This is a small fraction of the total resources of foundations. Fueled by the boom in investment markets, the assets of all active U.S. foundations rose to \$385 billion in 1998. Giving by the nearly 47,000 grantmaking foundations in the United States amounted to \$22.8 billion in 1999, largely for domestic programs (The Foundation Center 2000). Foundation spending on domestic programs has been growing faster than international spending. Overall U.S. charitable giving has been growing at 8.5 percent annually over the past few decades (Schervish 2000).

5. Foundations' growth prospects are closely tied to the performance of the stock market, but their interest in responding to the challenges of globalization—a major factor underpinning the growth in international grantmaking—is not.

6. Contributions to the trust fund for the Heavily Indebted Poor Countries Initiative are excluded from this discussion.

7. The cost of the 50 programs funded through the Development Grant Facility stands currently at an annual \$1.3 billion; however, \$200 million of this overlaps with programs that also draw resources from single-donor and multipartner trust funds.

8. As a result of several large adjustment loans made by the International Bank for Reconstruction and Development in fiscal 1999, 63 percent of lending in that year consisted of such loans—up from 47 percent in fiscal 1998. In fiscal 2000 the share of adjustment loans decreased to 41 percent.

9. Total research and development (R&D) expenditure on HIV vaccines was only about \$300 million in 1999, compared with an estimated \$2 billion spent annually on research for AIDS treatment—and targeted to industrial-country markets (Ainsworth and others 2000).

10. Unlike conventional tax credits that match R&D dollars spent, this credit would be available only when sales are achieved. Qualifying vaccines would include those that cover diseases causing at least 1 million deaths every year and would require regulatory approval (see Kremer 2000).

11. About 30 percent of the International Development Association's (IDA's) operations on health, nutrition, and population (which, on average, accounted for 15 percent of IDA investment lending in 1998–99) were directed at family and reproductive health, especially increasing immunizations and providing information on good health practices. IDA is the largest financier of tuberculosis control efforts in developing countries, with major operations in China and India. IDA is also a cofounder of the Global Initiative to Roll Back Malaria, launched in 1998 with the aim of halving deaths from malaria by 2010.

12. Education and information creation (for example, on the prevention of AIDS) and information sharing and coordination (for example, through the Global Development Network, an association of policy researchers) complement the incentive structure.

13. These rescue packages have also included financial support from private sector market participants, most notably in the Russian, Brazilian, and Argentinean crises. Private sector support was most significant in the case of Argentina, amounting to about \$20 billion.

14. Other estimates predict much larger financial flows between countries—either as counterparts of permit transactions or as compensatory side payments (Organisation for Economic Co-operation and Development 1999). Moderate abatement strategies would generate annual flows of about \$50 billion (in 1995 dollars), whereas more ambitious abatement paths could generate as much as \$150 billion to \$200 billion annually.

15. This classification follows Sandler (1998).

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The word *processed* describes informally reproduced works that may not be commonly available through libraries.

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