Public goods *for* economic development

Public goods

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PREFACE

Since the United Nations Development Programme (UNDP) published its first book on global public goods in 1999, the global public goods approach has been on the agenda of multilateral agencies such as the International Monetary Fund, World Bank, Food and Agriculture Organization, World Trade Organization and United Nations Industrial Development Organization; non-governmental organizations; and donor countries. Donor countries have also begun examining the role of public goods in the development process. France and Sweden created the International Task Force on Global Public Goods in December 2003 to "assess and prioritize international public goods, global and regional, and make recommendations to policy makers and other stakeholders on how to improve and expand their provision." There has also been growing interest in the academic community in the transnational public goods approach.

Because global public goods tend to be underfunded and undersupplied, particularly those that would benefit the economic development of developing countries, this UNIDO publication aims to enrich and complement the international public debate by examining in more detail the relationship between such market failures as public goods and externalities and the economic development in developing countries. The focus is on four core areas:

1. Addressing the financial instability that threatens development and may lead to distortions in the allocation of resources, curbing productivity and income growth. Addressing financial instability is an integral part of effective development and institutional capacity building and requires national and international action.
2. Enhancing market integration, because trade is vital for poverty elimination.
3. Creating developmentally relevant knowledge. Diffusion of technology is the key to productivity convergence, but severe structural barriers impede the process. It is thus essential to ensure the provision of the public goods required to foster the international diffusion of technical knowledge and to enable developing countries to overcome market failures.
4. Protecting the global economic environment by making environmental management an integral component of poverty reduction, with major long-term impacts on health and other key aspects of human development.

Institutional innovations are needed within the United Nations system to take full advantage of the potential of the wealth of knowledge, skills, experience and resources of institutions that have been working on these matters for the last 40 years. This has implications for organizations concerned with economic development, like UNIDO. Through internal restructuring, reorganization of its operations and substantive improvements in its approach to research and technical cooperation UNIDO has

already greatly enhanced its performance. But its ability to achieve further progress depends on overall system potentials. Many other United Nations institutions, funds and programmes are active in the areas of UNIDO's mandate, and a more focused exchange of experience and information would reciprocally enhance the value of each institution's contribution to economic and social development while adding to their joint impact.

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INTRODUCTION
OVERCOMING MARKET FAILURES FOR ECONOMIC DEVELOPMENT

Strong links between public goods provision and economic development make the case for the provision of public goods at national, regional and international levels. The provision of public goods is a key element of the quality of life and environmental sustainability. Their undersupply may affect prospects for economic development, threatening global economic stability, peace and prosperity.

Mechanisms for the effective delivery of public goods and services should therefore be central to any poverty eradication strategy. However, the role of public goods in economic development has been neglected in the mainstream literature. Current views of economic development (macroeconomic stability, market-oriented reforms, good governance) need to be enriched and complemented by considerations of global public goods to achieve sustained high-quality economic growth and to ensure that growth translates effectively into poverty eradication. This is essential to achieve the Millennium Development Goals.

Several categories of public goods identified in the public goods literature are closely related to five of the Millennium Development Goals: the environment, health, knowledge, security and governance (Kanbur, Sandler and Morrison 1999; Morrissey, te Velde and Hewitt 2002). Three (environment, health and security) are associated largely with benefits derived from reducing risks. Two (knowledge and governance) are associated primarily with enhancing capacity. The environment, knowledge and governance public goods are most closely related to the work of the United Nations Industrial Development Organization (UNIDO) while the other two are more ancillary. The provision of health public goods improves the health of the workforce, but it is the quality of life, rather than of the workforce, that motivates the provision of health public goods. Similarly, while security may benefit the economy and industry, that benefit does not motivate the provision of security public goods. The provision of security public goods is motivated by a fear that instability will either spread to other countries or create negative spillovers (refugees, blocked supply lines, reduced growth) for neighbouring and other countries.

Various market failures can constrain industrial development (table 1) (Rodrik 2004, 2006; Hausmann and Rodrik 2006). Some government responses to market failures are providing public goods and addressing positive and negative externalities through industrial policy. Capacity to efficiently deal with these market failures is related to governance institutions for coordination or support of technology development. The most extensive market failures relate to coordination failures, which tend to be most severe in poor countries. National economic and industrial strategies are required to identify complementarities and to identify and support the creation of linkages. This is particularly important for developing countries striving to diversify from traditional to non-traditional products and activities, for which markets are not yet formed. Institu-

tions, especially non-market institutions, are required to implement the strategy and ensure coordination. Intervention is also required to address positive and negative externalities. The various policy interventions devised to realize such policies need to be coherent, concerted and properly formulated.

Table 1. Industrial development, market failures and responses

Type (sources of failure)	Examples of market failures	Responses: policies and activities	Relevant public goods
Coordination	Externalities ignored Linkages not exploited No policy coherence on complementarities	Capacity building for industrial policy to identify linkages and externalities National strategy (industrial policy)	Governance Knowledge
Technology development, adapting and adopting	Incomplete and imperfect information Network externalities	Promotion of technology transfer and adoption Support for standardization and quality control Allowing more users the ability to join networks	Knowledge
Skills formation	Externalities (in training workers) Imperfect information	Coordination and/or subsidies for training	Knowledge
Capital markets, access to finance	Rationing or high interest rates	Microfinance schemes or formal sector subsidy	Knowledge
Environment protection, conservation, cleaner technologies	Negative externalities not accounted for	Product and process standards and regulations	Environment

Source: Adapted from te Velde and Morrissey (2005).

In the international effort to address the undersupply of public goods facing developing countries and economies in transition, the multilateral institutions are working largely in isolation. The international community is still learning how best to address these challenges and to deal with their interdependencies. The diversity of institutional arrangements needed to address the variety of global public goods underscores the importance of effective collaboration across the multilateral system. Better coordinated and more substantive and effective international programs are needed in this area, with collaboration focusing on areas of comparative advantage and value added (see box 1 on United Nations reform initiative). With the diversity of institutions working in eco-

nomic development within the United Nations system, areas of intervention ought to be selected within a transparent and clear intellectual framework. This Report aims to contribute to this debate through the intellectual framework of international public goods.

Box 1. UN reform and the provision of public goods

In February 2001 the High-level Committee on Programmes agreed to systematically pursue the issue of global public goods, particularly those set out in the Millennium Declaration. It decided to focus initially on global public goods related to the poverty agenda. In 2003 the Chief Executive Board initiated a new round of discussions on the future of multilateralism as a reflection of changing international attitudes towards the role and capacity of the United Nations system.

In a report to the Spring 2004 session of the Chief Executive Board the High-level Committee on Programmes concluded that a much greater degree of policy, programme and operational coherence is required within the United Nations system and in intergovernmental processes. Greater collaboration is needed among the secretariats focusing on priority issues of common concern, including the unification and coordination of programming frameworks at the field level.

On 16 February 2006 the UN Secretary-General announced the formation of a High-level Panel to explore how the UN system could work more coherently and effectively in the areas of development, humanitarian assistance and the environment. In development, the key challenges are:

- How to provide more efficient, coherent demand-driven support to national partners by building on the core normative, technical assistance and capacity-building strengths of the UN system.
- How to achieve adequate coordination at the field level, by establishing links between humanitarian, post-conflict recovery, development and environment activities.
- How to improve governance of the UN system, by strengthening interagency mechanisms and reducing fragmentation in intergovernmental decision-making.
- How to strengthen the financing of development activities, to overcome the lack of adequate and predictable funding and competition for donor resources, which results in overlap and distortion of core functions.
- How to establish a clear division of labour and effective partnerships based on comparative advantages within the UN system.

On 9 November 2006 the Panel released its recommendations for dealing with each of these five challenges.

CHAPTER 1
THE CONCEPT OF INTERNATIONAL PUBLIC GOODS

One of the most striking trends at the beginning of this century is the clear drive towards global integration. With the increasing importance of the international exchange of goods, services and factors, and the seemingly limitless possibilities offered by new communication technologies, the degree of interdependence of countries and the influences beyond national borders are reaching new levels. National problems have ramifications over ever larger areas, so that no place, however remote, is immune to the risk of contagion. At the same time, governments are seeing their freedom to manoeuvre reduced, so that they are forced to consider the conditions imposed on their decisions by the international framework. National spaces, previously fragmented, are being integrated on a global scale. There is an increased prevalence of interdependencies and cross-border spillovers in the international arena.

GLOBAL INTERDEPENDENCE AND INTERNATIONAL PUBLIC GOODS

The effects of this interdependence vary: positive in some cases (expansion of international trade), negative in others (the risks of contagion in cases of financial crisis), but often mixed. The greater the international mobility of people, the higher the risk of infection from diseases previously thought to be foreign, but also the faster the spread of new knowledge about medical treatments. The international integration of communication systems not only promotes the circulation of information around the world, but it also increases the harmful impacts of computer viruses. The integration of capital markets improves the efficiency of international savings allocation, but it also increases the risk of financial instability.

Globalization therefore involves very different types of externalities and international interdependencies. From them emerges the specific domain of international public goods, whose benefits spread beyond the providing country's borders. Public goods possess non-rival benefits and non-excludable benefits. Benefits are non-rival when consumption by one user does not diminish the benefits still available to others. Once the public good is provided, benefits are non-excludable if they are received by payers and non-payers alike. Public bads can be discussed in an equivalent, although inverse way: the corresponding public goods would be the promotion of activities that manage to prevent, avoid, or mitigate the harmful effects of public bads. Public goods are very diverse. Some—such as a justice system, multilateral organizations or an international regulatory framework—are essential for organizing coexistence. Others—such as safety in health matters or environmental protection—are minimum safety requirements for sustaining life. Finally, some—such as financial stability, commercial integration or knowledge promotion—improve the possibilities for progress throughout the world. Together, they form a collection of goods, services and regulatory frameworks that, along with the private goods that people can acquire, condition the level of well-being of the world's population.

NEED FOR COOPERATION AND COLLECTIVE ACTION

Because of the characteristics of public goods the market alone is often unable to ensure their efficient provision. Some form of collective action (planned effort by two or more agents to act together for a particular result thought desirable for all) becomes necessary to supply them, through coordination, cooperation or coercion. Within each country, that response is directed through the available institutional framework, with the nation state at the centre. At the supranational level, there is no institution similar to the state, so the response has to be initiated through various forms of voluntary coordination and cooperation, generally among countries.

The recourse to international cooperation is driven by different factors. Activities once the exclusive responsibility of states, such as security, financial stability, environmental management or public health, can no longer be efficiently tackled except through international cooperation. And such coordination is obligatory for new goods or activities that, because of their effects or their impact sphere, have had an international status from the start, such as management of geostationary orbits, control of climate change or development of the Internet.

As interdependencies grow among countries in fields where it is crucial to organize coexistence, promote security and stimulate progress, managing these interdependencies requires defining the framework of incentives in which agents operate and appropriate institutions engage in effective collective cooperation. The future level of world development and social well-being depends, to a large extent, on the ability to supply international public goods.

This becomes all the more important at a time when the international community seeks to accomplish the Millennium Development Goals, a set of shared goals for development (box 1.1). Although these goals are not necessarily public goods by nature, attaining them requires investments in international public goods. Finding a new vaccine against malaria or developing an accessible treatment for AIDS, preserving the peace or creating easier access to knowledge, promoting financial stability or establishing a more open and fair trading system could have a greater impact on poverty than could international aid.

Box 1.1. The Millennium Development Goals

Goal 1: Eradicate extreme poverty and hunger.
Goal 2: Achieve universal primary education.
Goal 3: Promote gender equality and empower women.
Goal 4: Reduce child mortality.
Goal 5: Improve maternal health.
Goal 6: Combat HIV/AIDS, malaria, and other diseases.
Goal 7: Ensure environmental sustainability.
Goal 8: Develop a global partnership for development.

Providing international public goods takes more than financial resources. It also takes the proper regulatory framework and institutional responses to ensure their supply. And that is where the greatest shortcomings remain. The world has made enormous strides in communications and interdependence between countries, yet we have not developed the policies or institutions needed to manage that process. This asymme-

try is the basis of the increased levels of risk and instability that characterize the international system. Insufficiencies in the provision of the international public goods that society demands reveal what limited investment countries have made in international cooperation. As a result of this failure, the world is more unstable, less safe, more unequal and less wealthy than it could be.

EXTERNALITIES AND PUBLIC GOODS: CONCEPTUAL CLARIFICATIONS

To understand how to provide international public goods, it is first necessary to understand the concept of international public goods and why markets fail to provide them.

The market is a powerful mechanism of coordination and social assignment. But there are some situations where it cannot operate well, causing socially inefficient results. Two such *market failures* are externalities and public goods.[1] In these circumstances producer or consumer actions have negative or positive consequences for others that are not taken into account in the decision that generates those effects and are uncompensated, and prices either do not exist or do not transmit the relevant information to allow agents to make optimal decisions. Resources are not efficiently allocated, which may affect prospects for economic development. Deliberate social action is necessary to modulate the incentives of individual agents and favour a collective response in line with socially desirable objectives. As Arrow realized (1971: 137), "when the market can't manage to establish an optimum situation, society will, at least to some extent, become aware of the shortages, and other social institutions, outside the market, will emerge to try to fix them."

To remedy market failure externalities, it is necessary to devise institutional mechanisms and policy instruments that include the implications of an agent's action in the decision process. These may take different forms, such as the establishment of a tax or fee equal to the external cost generated or the introduction of emission certificates with commercial value determined by the market, for example, for carbon dioxide. The theory of externalities provides the foundation for situations in which economic activities produce negative spillover effects that are often ignored by the initial generator.

Public goods have two features that make them different from private goods. They are *non-excludable* in their supply, which means there is no easy way of preventing someone from having access to their consumption, and they offer *non-rival* benefits, which means that consumption by one agent does not diminish the availability of the good's benefit for others. Non-exclusion implies that it is not possible (or easy) to limit the supply of public goods only to those who are willing to contribute to the costs of supplying them for society. This gives rise to free riding: potential users may wait for the good to be supplied and then consume the good for free. Non-rival benefits give rise to zero marginal costs of use, so that exclusion is inefficient since potential consumers with a positive marginal benefit are denied access to the good. This access costs society nothing while yielding positive benefits; thus welfare is not maximized by exclusion.

Because of the characteristics of public goods, leaving their provision to the market will result in undersupply with respect to the socially desirable level. Collective action is necessary to ensure efficient supply since the logic of individual interests results in a socially less than optimum response. To sum up, the provision of public goods faces two types of economic problems. First, non-rivalry introduces the challenge of de-

1 Other instances include asymmetric information and common property.

fining the optimum level of supply, given that an increase in the number of consumers increases aggregate well-being at null (or very low) cost. Second, the non-exclusive nature of a public good is the source of undersupply, since agents tend to hide their preferences. Efficient provision needs to take into account the costs of design and promotion of efficient collective action. Reaching optimum supply levels requires not only financial resources, but also the incentives to get agents involved and the institutional responses to ensure effective fulfilment.

The range of goods considered purely public is quite limited, whereas the number of goods that are partially non-rival or non-excludable—*impure public goods*—is more extensive (table 1.1). For example, *club goods* are excludable and partially rival. Partial rivalry is required to ensure that exclusion is not inefficient: the toll of a club internalizes the marginal congestion cost associated with another unit of utilization. Under certain circumstances the congestion-internalizing toll can self-finance an optimal provision level (Sandler 2004b). All users pay the same fee per use: those with a greater preference for the club good will pay more in *total tolls* by visiting or using the good more often. Thus, people's utilization behaviour reveals their preferences. Examples are management of a particular geostationary orbit, participation in a communications system or access to a specific net service, such as cable television.

Table 1.1. The characteristics and typology of public goods

Benefits	Rival	Partially rival	Non-rival
Excludable	**Pure private goods** Food Cars, fuel	**Club goods** Intelsat International Space Station Canals, waterways	Weather-monitoring stations
Non-excludable	**Common goods** Free access pasture Open pathways Hunting grounds Air corridors	**Impure public goods** Ocean fisheries Pest control	**Pure public goods** Pollution-control Disease-eradication programs Strategic weapons Sound financial practices Basic research
Partially excludable	**Impure public goods** Information dissemination Extension services		

Source: Adapted from Sandler 2002: 86; Kaul, Grunberg and Stern 1999: 5.

For other goods, even if access is non-excludable, consumption may include some level of rivalry. These are *goods subject to congestion*. A road, though available to everyone, is conditioned by the number of people that use it at any one time. For *open-access common goods* (or *commons)*, such as communal lands, forests or fishing areas in international waters, consumption is wholly or partially rival but non-excludable. The non-excludability of these goods can be culturally and physically determined or the result of international agreements and thus institutionally regulated (such as air corridors).

A common good (or resource) is one that can be exploited for private gain but that no one owns. Free access to these goods brings up a basic management problem, since the criteria derived from private benefits do not coincide with those that public or intergenerational interests demand. Private benefits call for the most intense exploitation, while public or intergenerational interests demand the establishment of control mechanisms to preserve the resource.

Thus, the characteristics of both non-rivalry and non-excludability can vary across classes of public goods. Finally, there are instances when an activity may simultaneously yield two or more outputs (*joint products*), some of them public or with different degrees of publicness (pure, impure or club goods) (Sandler 2004b: 53; 1977). The degree of publicness varies according to the dimension and characteristics of the public effects. These *joint products*, such as education or biodiversity, benefit both those who receive them and the entire society by fostering more responsible social behaviour.

Problems related to the efficient collective provision of public goods differ depending on their characteristics. Thus, for example, club goods can be provided relatively more efficiently since they allow for the possibility of differentiating among members and charging according to preferences for using the good. Those who use the goods most pay the highest charges. It is more difficult to instigate self-organized responses in the case of commons since there is rivalry for consumption but no possibility of exclusion. Yet, as Ostrom (1990) shows, it is possible to find answers through strategies of voluntary cooperation, without taking the extreme options of state intervention or a stricter definition of property rights.

The greatest difficulties are in the case of pure public goods, where non-rivalry and the lack of exclusion coexist. In this case, what is required is an efficient collective response. This can be analysed by using aggregation technology classification schemes of public goods (Sandler 2004b: 46).

EXPLAINING THE INCENTIVES OF PUBLIC GOODS' SUPPLY: AGGREGATION TECHNOLOGIES

The way the supply of public goods is created by the individual efforts of different community members is known as public goods *aggregation technologies* (Hirshleifer 1983; Cornes and Sandler 1984; 1996; Kanbur, Sandler and Morrison 1999; Kanbur 2001; Sandler 1997; 1998). An aggregation technology classification scheme of public goods gives an important perspective on contributors' incentives and so helps to explain how individual contributions determine the overall supply of a public good (Sandler 2005: 60–61; 81). Although a more complete aggregation technology taxonomy of public goods is possible, the following categories are commonly considered:

- *Simple summation goods*. In this, the most common option, the contributions of each agent determine by simple addition the aggregate levels of provision of the public good. For example, the level of damage to the atmosphere caused by a contaminating gas (such as carbon dioxide) is calculated by adding each country's individual emissions.

  In this case, the level of public good provision is indifferent to any change in income distribution among contributors (Bergstrom, Blume and Varian 1986; Cornes and Sandler 1984). So, when voluntary contributions are positive, the neutrality theorem applies: the amount supplied by one agent is a perfect substitute for the amount provided by another (Kanbur, Sandler and Morrison 1999: 65). When in-

dividual contributors' efforts are perfect substitutes and there is a lack of exclusion, free-rider incentives can present a problem for provision.

- *Best shot goods*. The aggregated level of provision of the public good is determined solely by the largest single contribution. For example, at the international level, development of a treatment for a particular disease is determined by the countries that make the greatest research effort or that have the highest technological levels. Prevention of terrorism, for example, would be handled by countries with the most solid and capable intelligence service. A strategic implication of best shot public goods for collective action is the need for coordination to avoid wasting resources because of duplication of effort.
- The existence of less extreme conditions for leadership permits differentiating a subgroup called *better shot goods* (Sandler 2003). In this case the largest contributor has the greatest impact on supply, followed by the second largest contributor, and so on. In developing a vaccine, the second-best vaccine may still have benefits for those who cannot tolerate the best vaccine.
- *Weakest link public goods*. The smallest effort or contribution fixes the effective provision level. Contributions beyond this smallest level use resources without increasing provision. As a consequence, contributors will match the smallest contribution level. With weakest link public goods, there are no incentives to free ride since then the effective provision level is zero. This is the case, for example, with the risk of contagious diseases, which is influenced by the situation of the country with the weakest health system. The country can easily become a focal point of infection from which the disease can spread to the rest of the world. The supply chain of this public good critically depends on its weakest point.
- Again, there is a subgroup of *weaker link goods* where demand is not as extreme. In this case the smallest contribution has the greatest impact on provision, followed by the second smallest contribution, and so on. The stability of financial markets, for example, can be seen as a weaker link public good, because the more unstable the market the more destabilizing is its overall effect. Additional gains can be achieved with the efforts exceeding the minimal provision level.
- *Weighted sum goods*. The aggregated level of provision is determined by the weighted sum of individual contributions. The weighting factor can differ by such characteristics as countries' geographical location (for example, desertification processes), dimension (such as forest preservation), or development level (for example, the poorest countries with the highest weights).

Each aggregation technology presents different provision problems (table 1.2). In the case of best shot technologies, aggregate supply is determined by the contribution of only one agent. The problem, therefore, is to establish whether that agent is able to provide efficient supply and how to ensure it. In the weakest-link case, everyone's contribution is important, and everyone has to match the smallest contribution. In the case of summation technology, the issue is how to ensure shared contribution, as everyone's participation counts toward the aggregate provision, but not everyone's contribution is needed—some can contribute zero. And, in the case of weighted sum technology, the key is to identify weights to be assigned to individual contributors to be able to deal with incentives for achieving aggregate level of supply.

Problems may differ not only by the type of public good and its aggregation technology but also by the management problem—undersupply or overuse—that affects

it. For pure public goods, supply generally improves in moving down the aggregation technology scale. For impure public goods, non-exclusion causes mainly an undersupply problem: consumers tend to hide their preferences in a situation where consumption is non-rival. Overuse is common as partial rivalry assumes greater costs, while partial excludability assumes that fees do not account for possible negative effects on others. Partial excludability also leads to some undersupply for the weakest link, weaker link, best shot and better-shot public goods. This occurs because what is supplied is overused and because exclusion and tools in use have only partial remedy effect.

Club goods are goods with excellent supply possibilities because tools can be used to finance the club. Exceptions exist for weakest link and weaker link aggregation technologies, where externalities can appear and should be brought under club control.

In the case of commons the problem may derive from rivalry in an area where there is no exclusion, sometimes causing overuse problems in consumption.[2]

Table 1.2. Supply prognosis for international public goods and role of supranational institutions

Aggregation technology	Pure public good (non-rivalrous and non-excludable)	Impure public good (partial rivalry and partial excludability)	Club good (partial rivalry and excludable)
Simple summation	Undersupply Role for supranational institutions and treaties Curbing ozone shield depleters	Overuse/undersuppy Role for supranational institutions and treaties Deterring terrorism	Efficient supply Transnational parks Continental fishing
Weighted sum	Undersupply dependent on the relative weight of agent-specific benefits and actions; a large weight means that individual agent will tend to contribute more to the supply Role for supranational institutions and treaties Reducing sulphur deposits	Overuse/undersupply with agent-specific benefits important Role for supranational institutions and treaties Curbing the spread of AIDS	Efficient supply Intelsat

2 This is a matter of minor precision, since it is easy to understand overuse as a consequence of undersupply from inadequate measures of control.

Table 1.2. Supply prognosis for international public goods and role of supranational institutions (continued)

Aggregation technology	Pure public good (non-rivalrous and non-excludable)	Impure public good (partial rivalry and partial excludability)	Club good (partial rivalry and excludable)
Weakest link	For a homogeneous group, efficient supply is expected; for a less homogenous group, the better-endowed nations may have to bolster the capacity of those in the group that cannot meet the efficient supply level Containing disease	Overuse/some undersupply even for homogeneous groups owing to crowding Monitoring disease outbreaks	External force-based undersupply Additional externalities must be taken into account introducing tools Air traffic control
Weaker link	For a homogeneous group, efficient supply is expected. The smallest contribution has the greatest supply impact; less a capacity issue. Suppliers can make up for undersuppliers. A better endowed country may be less interested in the capacity of the less endowed. Need for coordination Maintaining financial stability	Overuse/some undersupply owing to crowding Maintaining sterilization	Some external force-based undersupply Additional externalities must be taken into account introducing tools Prudential norms and standards of finance
Best shot	Undersupply or efficient supply. Supply determined by the agent with the highest contribution. Leadership by a dominant nation or institution is needed Requires coordination and pooling of resources based on comparative advantages Discovering a vaccine against HIV/AIDS or Ebola	Overuse/some undersupply; coordination and pooling issues Gathering intelligence on terrorists	Efficient supply Rapid reaction force
Better shot	Undersupply or efficient supply. The largest contributor has the greatest marginal impact. Coordination and pooling issues are of a lesser concern, as there are more suppliers Sanitary and phytosanitary control of foods export	Overuse/some undersupply; coordination and pooling issues are less of a concern Database	Efficient supply Biosafety level 4 laboratory

Source: Based on Sandler (2004b: 60–68, 82).

GEOGRAPHIC SCOPE OF SPILLOVER EFFECTS: CROSS-BORDER, REGIONAL AND GLOBAL PUBLIC GOODS

The international range of a public good may differ depending on the geographic scope of its spillover effects (table 1.3). With *cross-border* public goods, effects spill over to surrounding countries (management of a shared hydrographic basin, upkeep of a

common natural resource such as a forest). *Regional* goods affect a group of countries that form a regional system (the regulatory framework of a regional integration process). *Global* public goods have worldwide effects (ozone layer preservation or climate change prevention). Together, these groups form the large domain of international public goods.

In addition to the two characteristics common to global public goods—strong qualities of publicness and quasi-universal benefits (benefit all countries and all people)—some people would add an intertemporal dimension, with effects going beyond the current generation or "at least meeting the needs of current generations without foreclosing development options for future generations" (Sandler 1999).

Table 1.3. Geographic scope of the public goods

Kind of public good		Definition	Example
National		Spillover effects limited to national borders	National health care system Ground water purification
International	Cross-border/ Regional	Spillover effects reach a group of countries forming a region	Regional economic cooperation agreements Shared river pollution Regional corridors
	Global	Spillover effects have worldwide scope	Climate change prevention

Source: Adapted from Sandler (2004b: 136).

CLASSIFYING INTERNATIONAL PUBLIC GOODS

To sum up, in addition to their aggregation technology, public goods may be classified according to three complementary criteria: the good's public (pure or impure) nature, the geographic coverage area of its benefits (cross-border, regional and global) and the generational dimension of its effects (inter- and intra-generational). This classification is useful in considering the most suitable institutional framework for managing each good (table 1.4).

Because of the supranational nature of the externalities of all these types of goods, they need an international institutional and regulatory framework to manage them. But several factors encourage opportunistic behaviour in the international arena, including limited world regulation in the public domain, lack of executive supranational power and the weakening of collective controls caused by the large size of the affected community (Olson 1965).

INSTITUTIONAL RESPONSES TO THE PROVISION OF PUBLIC GOODS

Public goods and externalities are instances that call for a coordinated social response and collective action to provide a good. However, the presence of mutually beneficial goals is not enough to ensure the voluntary participation of agents involved, especially if there is no possibility of excluding access to collective benefits. In these cases, there

may be a "failure of collective action." Solutions call for the design of appropriate institutions to facilitate strategic interactions that are more conducive to cooperation among individual agents. Several key principles are usually considered.

THE SUBSIDIARITY PRINCIPLE AND ECONOMIES OF SCALE AND SCOPE

The subsidiarity principle assumes bringing institutional responses as close as possible to the area affected by the goods spillover. In other words, lower jurisdictions should make the decisions unless convincing reasons exist for assigning them to higher jurisdictions (Bryant 1995). At the same time, those directly affected by the public good should be in charge of its supply.

Table 1.4. International public goods classification

Spillover range	Pure public	Impure public	Club	Joint products
Intragenerational				
Cross-border	Forest fire prevention Groundwater pollution cleanup	Waterways Rivers Highways Local parks	Electric grid Information networks Peacekeeping	Medical aid Technical assistance Internet connectivity
Regional	Animal disease control Flood control Weather forecasts	Regional parks Treatment of endemic disease	Free-trade zone Common market Monetary area	Regional peacekeeping Military forces
Global	Ocean pollution cleanup Monitoring station World Court	Electromagnetic spectrum allocation Satellite transmissions Postal service Disease control	Air corridors Internet Shipping lanes Financial stability	Foreign aid Disaster relief Drug interdiction
Intergenerational				
Cross-border	Wetland preservation Lake cleanup Toxic waste cleanup	Acid rain reduction Fisheries protection	National parks Irrigation system Lakes	Natural disaster prevention
Regional	Lead emissions reduction Forest conservation	Reduction in emissions of volatile organic compounds Agricultural research	Transnational parks Barrier reefs	Cultural norms Bioprospecting
Global	Ozone shield protection Global warming prevention Disease eradication Knowledge generation	Overuse of antibiotics Ocean fisheries Antarctica protection Revolution making	Geostationary orbits Polar orbits	Tropical forest preservation Space colonies United Nations Poverty alleviation

Source: Sandler (1999: 24–25).

This assumes respect for the principle of fiscal equivalence, defended by Breton (1965) and Olson (1969), which establishes the relationship between the decision-making processes affecting the supply of a specific public good and allocative efficiency. The principle states that political jurisdiction should be decided by the spillover effect of a public good: those affected by the public good should have the greatest stake in deciding on the level of supply. According to this principle, the sum of marginal benefits from the provision of a good is equal to the marginal costs of provision, thus ensuring the social optimum. Any disruption in applying this principle may lead to suboptimum results, either because those who do not receive benefits are asked to contribute to provision (generating oversupply) or because some who receive benefits are kept out of the group of contributors (leading to undersupply) (Kanbur, Sandler and Morrison 1999).

Applying the subsidiarity principle decreases transaction costs in the negotiation and supervision of the agreement. It reduces the number of participants to those directly affected and allows for greater homogeneity in the interests of those involved. Application of the subsidiarity principle would, however, also lead to the creation of a variety of overlapping institutions at the international level, because of the diverse scope of international public goods. This would create a problem of inadequate specialization and coordination between the institutions involved, as discussed further on.

Strict application of the subsidiarity principle may be counterproductive when goods have important economies of scale in their production or distribution. It may then prove more efficient to search for institutional solutions with a larger jurisdictional remit, aiming to explore the advantages derived from increasing returns from scale. The presence of economies of scope, where unit costs fall as more public goods are provided by the same institution, may also limit the advisability of subsidiarity. These scope economies arise from shared fixed inputs underlying the transaction. With such economies it may be worthwhile to supply public goods with diverse spillover ranges within the sane jurisdiction if cost savings more than offset any losses in efficiency from not matching benefit recipients with decision-makers. Thus, for example, the strict application of the subsidiarity principle might suggest that the institution in charge of malaria prevention include only countries where this disease is endemic. However, as long as dynamic advantages and economies of scope arise from this health-related research, it might be advisable for the institutional response to have a wider jurisdictional coverage (such as that of the World Health Organization).

Another factor to be considered in the design of the institution is the sectoral scope of the response. Specialization (a narrow scope) would be a desirable criterion for a public good with limited relationships and oriented towards a specific demand, such as the North Atlantic Treaty Organization (NATO). Specialization would be counterproductive for goods with important externalities related to other kinds of goods, presenting high economies of scope. For them, it might be desirable to appeal to an institution capable of supplying different goods at the same time (a wide scope), such as the World Bank.

The combination of efficiency criteria (economies of scale and scope) and jurisdiction level gives rise to a matrix of institutional possibilities (table 1.5). It is hard to find a response at the international level that integrates economies of scale and economies of scope to this extreme (wide scope and global jurisdiction), since that would imply a structure similar to that of a world government. In more modest proportions, institutions such as the World Bank or the United Nations Development Programme (UNDP) possess many of the dimensions of these two characteristics. More narrowly, it

might be possible to select integrated structures, although they are notably more specialized (such as the World Health Organization, the United Nations Conference on Trade and Development, the International Labour Organization and the United Nations Industrial Development Organization). For public goods with more limited geographic coverage and high economies of scale and scope, the institutional response should combine wide specialization and regional jurisdiction (as in the case of regional development banks). And finally, for public goods with limited geographic coverage and low externalities, regional jurisdiction and narrow scope can be combined (for example, the Co-operative Program for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe, or the Amazon Co-operation Treaty).

Table 1.5. Some examples of institutional responses for the provision of international public goods

Activity coverage	Jurisdictional coverage	
	Regional	Global
Narrow (specialized)	Co-operative Program for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe Amazon Co-operation Treaty	World Health Organization United Nations Industrial Development Organization North Atlantic Treaty Organization
Wide (diversified)	Regional Development Banks	World Bank United Nations Development Programme

While this classification gives some notion of the diversity of institutional responses according to the sectoral scope required for supplying a public good and on the jurisdictional level, it would be a mistake to have just one institution responsible for the provision of each international public good. Managing international public goods is complex enough to involve multiple institutions at different levels. Some may supply core activities aimed at the production of public goods and others may focus on complementary activities that help to generate conditions for the good's provision and consumption (see viewpoint 1.1 on aid financing of international public goods); some may supply final public goods, and others intermediate public goods, needed in order to supply final public goods. Therefore, clusters of institutions should be considered for each international public good, institutions with different missions and tasks that together provide the institutional infrastructure necessary for supplying the good. To avoid overlap it would be crucial to define the specific task specialization in the cluster core, assigning coordination and leadership functions to institutions according to the tasks that the supply of the good requires.

Viewpoint 1.1
Recent developments in aid financing of international public goods

Should aid finance international public goods? The current consensus is that aid should go to financing activities to achieve the Millennium Development Goals, so any aid to international public goods would need to be justified by addressing the Millennium Development Goals. However, there are other resources for financing international public goods (taxes, private resources, non-aid public resources and combinations of these), so an argument needs to be made for the role of aid, not only that the provision of public goods helps countries achieve the Millennium Development Goals.

Providing public goods to achieve the Millennium Development Goals

The categories or sectors identified in the public goods literature relate quite well to the types of Millennium Development Goals, at least in name. Typically, five public goods sectors are considered—the environment, health, knowledge, security and governance. Three of these sectors—environment, health and security—are largely associated with benefits derived from reducing risks. The other two—knowledge and governance—are associated primarily with enhancing capacity.

There are at least three related ways to think about aid financing for the international public goods needed to achieve the Millennium Development Goals:

- Providing public goods to address market and coordination failures that prevent industrial development, growth and the achievement of the Millennium Development Goals.
- Assessing the aid financing needs to meet the Millennium Development Goals, many of which correspond to some degree with the provision of international public goods.
- Analyzing the costs and benefits of overcoming major challenges in development, some of which might be overcome though the provision of international public goods.

Who should provide international public goods?

Three arguments make the case for aid financing of international public goods. First, the private sector will not provide a sufficient amount of public goods, because it will consider private rather than social benefits. This calls for some public sector engagement. Second, individual countries have insufficient incentives to make an optimal contribution to international public goods, given that not all benefits accrue nationally. This calls for some form of cooperation among countries. Third, poor countries lack the resources to make a full contribution to the provision of international public goods. This justifies aid finance of international public goods in poor countries.

However, the argument is more complex in practice. Aid financing does not necessarily imply actual provision by donor agencies. Provision of international public goods can involve coordination with other actors, such as the private sector. And even if a pure public good could be identified, it is almost impossible to verify exactly how much current financing contributes to the provision of the good and by how much the good is underprovided. Certain financing mechanisms (Global Environmental Facility) try to finance provision up to the point at which the private sector would stop. But in practice this point is difficult to identify, more so for the more common impure public goods, and provision may depend on the strongest pressures.

How much aid financing of international public goods?

The share of aid allocated to international public goods has risen since the early 1980s (Raffer 1998; World Bank 2001a; te Velde, Morrisey and Hewitt 2002). Te Velde, Morrisey and Hewitt (2002) estimate the share of aid allocated to international and national public goods since the 1980s, in total and by individual donors, and show that by the late 1990s donors allocated at least 10% of aid to international public goods and at least 30% to national public goods. They also show that using the Organisation for Economic Co-operation and Development's Creditor Report-

ing System data may underestimate the share of aid allocated to international public goods by some 50%. Te Velde, Morrisey and Hewitt (2002) also show that the share of aid allocated to financing public goods doubled in the 1980s and 1990s. Aid allocated to environmental public goods accounted for more than half the total. In the 1990s in particular, greater shares of aid were allocated to health, knowledge and conflict prevention. Recently, there has been discussion on supporting international public goods related to governance.

Furthermore, te Velde, Morrisey and Hewitt (2002) show that in the 1980s and 1990s, aid spending on public goods increased at the expense of other types of aid spending. Some of these other types of spending may be desirable in their own right (for poverty reduction) or may generate externalities and benefits that contribute to growth and development (capital infrastructure projects that are excluded from the definition of public goods). The implication is that future increases in spending on international public goods in developing countries should not come from further increasing the share of aid allocated to this purpose. So, either the value of aid should be increased or sources of non-aid funding will be required to increase support for international public goods. In encouraging donors to increase the amount of aid allocated to public goods, especially international public goods, attention should be given to the form of aid (grants or loans) and cooperation between donors.

Mascarenhas and Sandler (2005) provide an empirical analysis of the use of aid to support the provision of public goods, although their focus is on the balance between grants and loans. They argue that grants are the most appropriate form of aid for financing spillovers associated with international or regional public goods and that therefore multilateral agencies and regional development banks should give a higher proportion of aid in the form of grants.

Mascarenhas and Sandler (2005) considered the broader question of whether the total amount of aid spent by a donor reflects what other donors are doing. In general the results suggest that a donor's decisions on how much aid to allocate, overall or to particular regions, are independent of the actions of other donors. They suggest that donors are not making cooperative decisions on aid allocation or at least that they have not done so in the past. Because financing of international public goods requires donor coordination, the analysis suggests that cooperative behaviour cannot be assumed and, indeed, that considerable effort will have to be made to engineer greater cooperation in donor financing of international public goods.

Provision of international public goods and aid architecture

Aid architecture is changing and will have to deal with large increases in aid in coming years and with issues of aid effectiveness, including harmonisation, alignment and ownership. It will also have to deal with an increasing number of new initiatives and institutions providing international public goods.

Lead donors have managed to alter the donor focus to one of systematic support for recipient-owned plans and schedules for the attainment of development outcomes, greater use of national administrative systems in aid transmission and greater coordination between donors and recipients (Rogerson, Hewitt and Waldenburg 2004). Measurable and monitorable targets have been agreed. Once set in motion, the aim is to secure these changes in donor behaviour towards a more balanced international aid delivery system. Much international reform may still be needed. Many issues of international accountability remain, and donors still have to loosen the bonds of aid policy conditionality (Rogerson 2005), but the donor-recipient relationship system does seem to be on track for qualifying as an international public good.

However, the proliferation of special funds (as for HIV/AIDS), unless genuinely additional, may divert resources from other genuine development priorities, hampering the delivery of real international public goods. There is also the issue of substitution, with donors sometimes claiming international public good status in their development spending for activities that do not qualify.

Policy issues

There are some interesting policy implications for international organizations such as the United Nations Industrial Organization (UNIDO).

- What is the rationale for providing the good (that is, what is the market failure, what is

the cost-benefit ratio of intervening and what are the best initiatives)?

For UNIDO, it seems clear that knowledge (industrialization strategies) and governance of international economic relationships affecting industrial development and environment (effects of industrialization) are key international public goods. The rationale for UNIDO in providing such goods seems clear. Few institutions focus on industrialization strategies, and UNIDO can aspire to be the world's main body of knowledge on industrialization.

Another opportunity lies in recent aid for trade initiatives, which can be used to implement international trade rules and standards for production processes, contributing to international public goods related to governance. The provision of trade-related public goods tends to have a favourable cost-benefit ratio.

Addressing climate change may require a different approach towards supporting the development and diffusion of new energy- and carbon dioxide-saving technologies. UNIDO is already doing similar things under the implementation of the Montreal Protocol, so it could extend these efforts to try to underpin the implementation of the Kyoto Protocol in a way that is more cost-effective.

- What type of international organization should provide the international public good? If the good is aid, should it be bilateral or multilateral donor agencies?

  Knowledge of industrialization or implementation of international rules and energy-efficient technologies is necessary for economic development and is associated with aspects of international public goods. Such knowledge needs to be built up and maintained internationally but transferred to countries in alignment with their priorities. Knowledge should not be too dispersed among donors or organizations but concentrated to reach critical mass and economies of scale and scope. For instance, UNIDO will have an advantage in building knowledge on industrialization.

- How does provision of an international public good sit with the Paris declaration aims of harmonisation, alignment and ownership?

  To take the aid for trade example, financing trade rules will depend on how aid for trade fits with the strategies of receiving countries. Financing trade rules must be coordinated with other players, because coordination relates to the debate on aid effectiveness.

Alignment with developing countries' priorities needs to be safeguarded. To support economic development, technical assistance activities in a country should build on international knowledge and be aligned with other activities. This means linking with national working groups on trade or private sector development. Funding for knowledge-related public goods may occur at the national level, though executing agencies could be international players building knowledge internationally and helping coordinate. The existence of demand for knowledge-related public goods at the country level and continued interaction between global institutions and beneficiaries of knowledge transfer both seem key to reducing the gap between global initiatives on knowledge activities and the harmonization, alignment and ownership agenda.

Source: Drawn from a background paper by te Velde, Hewitt and Morrissey (2006).

SELF-ENFORCEMENT MECHANISMS

The second important aspect in institutional responses is to ensure self-enforcement, which depends on the type of public good and the aggregation technology considered (table 1.6). For *club goods* there seems to be no serious problem in reaching an efficient result by demanding mandatory contribution from participants who want to access the good's benefits. The possibility of exclusion and monitoring permits this toll-based club arrangement. In addition to the contribution assessed to meet the fixed costs of production, supplemental contributions can be assessed according to each participant's use of the good to meet the difference between the marginal costs of the good's production and the aggregated marginal benefits gained by the consumers.

Table 1.6. Some self-enforcement mechanisms for international public goods provision

Aggregation technology	Pure public goods	Impure public goods	Club goods
Simple summation	Undersupply *Cost sharing* *Threshold* *Property rights*	Undersupply (overuse) *Cost sharing* *Threshold* *Property rights*	Efficient supply *Tolls*
Weighted sum	Undersupply *Cost sharing* *Threshold* *Property rights*	Undersupply (overuse) *Cost sharing* *Threshold* *Property rights*	Efficient supply *Tolls*
Weakest link	Undersupply *Transfer* *(or homogeneous group)*	Undersupply (overuse) *Transfer* *(or homogeneous group)*	Undersupply *Tolls and transfer*
Best shot	Efficient or undersupply *Leadership and coordination*	Undersupply (overuse) *Leadership and coordination*	Efficient supply *Tolls*

Source: Adapted from Sandler (2004b: 82).

The efficiency associated with a club mechanism can be obtained for most aggregation technologies, with the exception of weakest link. For that, there are potential externalities that may not be fully addressed by the individual suppliers. In the case of air traffic control, one country's less reliable control infrastructure can disrupt the flow of the entire network when the component system malfunctions. Uniform tolls to air carriers for using the network are unlikely to adjust for differential reliabilities. Moreover, the suppliers may have little incentive to bring their component system up to the standard of the rest of the network unless pressured to do so or subsidized by other club good providers. The Quality of Service Fund of the Universal Postal Union is a mechanism of this kind; it aims to improve the quality of postal services in developing countries through the financial support of developed countries.

For *impure public goods* the market leads to the good's undersupply (or overuse). Correcting this situation depends on the type of aggregation technology consid-

ered. With a best-shot technology, some leadership and coordination capabilities may be necessary to avoid redundant initiatives. If that capability exists, provision may reach the social optimum.

If the technology is a weakest link type, there will be a less than optimum supply unless a transferral procedure is established from countries with greater resources to less privileged ones either directly or through an international institution.

A more complex option is when the good has a summation technology. Optimum supply requires a cost-sharing system among participants or better definition of participants' property rights. Both cases depend on some sort of agreement to ensure those institutional adjustments. Such agreement may be unnecessary if the good's supply requires a minimum contribution threshold, in which case some leadership ability may be enough, or if inaction entails costs, in which case at least one agent may be motivated to contribute. These same options could also be suitable responses for a weighted sum technology; however, this case would crucially depend on the weights being considered.

Generally, efficient provision is a concern for the pure public good case. For most aggregation technologies, the market is not able to supply a socially optimum level. An exception is weakest link when all countries have identical tastes and income, since each country has the desire and ability to match the efficient provision level. Also, in the case of a discrete best shot public good (where the good is provided or not), the richest country is apt to efficiently supply the good for everyone. In best shot scenarios where alternative levels of the good are possible, efficient supply requires leadership and coordination. And for summation (and weighted sum) technologies, as for impure public goods, some institutional response or the establishment of property rights will be necessary to ensure a cost-sharing structure in the good's production (penalizing those who do not contribute).

INTERNATIONAL PUBLIC GOODS GOVERNANCE AND GLOBAL CITIZENSHIP

Globalization has increased the sphere of international public goods. This process entails a double challenge: one political and one economic. The political challenge refers to the fact that globalization is displacing basic principles on which democracy is founded, such as symmetry and coherence among decision-makers and the people affected by those decisions (Held 1997). Both citizens' control over their representatives, through electoral processes, and public and institutional accountability rest on these principles. These basic principles have been undermined through a set of decisions affecting citizenship that were taken in contexts or by institutions beyond the scrutiny or control of those who are finally affected by them.

Today, national communities are no longer the only source of decisions that influence their members' lives, nor are the effects of government decisions limited to the strict domain of the citizens themselves (Offe 1985). Some international institutions—such as the World Bank and the International Monetary Fund (IMF)—make decisions with limited effective participation from the citizens affected, and national decisions increasingly have impacts beyond their borders. There is a growing mismatch between the scope of the problems, which is increasingly supranational, and the scope of political processes, which is still largely national. The greater that mismatch, the greater the difficulties that states will encounter in erecting a predictable environment for their citizens

and the less citizens will be able to control the decision-making processes that affect them.

Restoring the democratic principles of symmetry and coherence would effectively lead to the configuration of a more democratic and responsible international framework. It would also lead to a multilateralism committed to the government of the new interdependencies that globalization entails in a more representative and accountable way. For that institutional order to be legitimate it should be based on the effective recognition of a certain concept of global citizenship (Archibuggi 2004). There is no doubt that the Human Rights Charter constitutes, in moral and judicial terms, an incipient core from which this concept of global citizenship can be formed (Alonso 2000).

The economic challenge has to do with the effects on allocation caused by cross-border externalities. When the indirect effects of a decision are not taken into account by those who make the decision, a social allocation problem is created: the national benefit (or cost) of a particular activity, which is the element considered by decision-makers, does not match the aggregated benefit (or cost) on a global (or intergenerational) level of the activity. Correcting this inefficiency requires strengthening the international coordination framework, either for taking advantage of the interdependencies (the positive externalities) or for preventing the allocation problem (the negative externalities). This problem is exacerbated in the case of international public goods.

Both problems point to the need for a sounder normative and institutional framework that allows greater means of governing international interdependencies. The problem, however, is that the international community faces the difficulty, as Kindleberger (1986) stated, of finding a way to provide "international public goods without international government", a challenge that increases the importance of international cooperation.

Integration has advanced among countries, but the coordination institutions necessary to manage the new interdependencies have not yet emerged. This asymmetry is at the basis of the increased risk and instability of the international system, and it poses an obstacle to the fullest shared use of the possibilities for progress that international integration offers. Correcting that asymmetry requires strengthening the normative and institutional bases of more democratic and effective collective action on an international level.

Several problems lie in the way, however. One is to find a suitable definition of an incentive framework in order to encourage the involvement of agents and to deter opportunistic behaviour. Another concerns the efficiency and coherence of the international system in charge of the supply of international public goods.

MULTILATERAL FRAMEWORK FOR THE PROVISION OF INTERNATIONAL PUBLIC GOODS

The range of problems facing the world's governing powers urges the increasing prominence of multilateral responses, such as consultative and international action forums. The current system is inadequate to the task. As Sutherland (1998a) put it in his Per Jacobsson Lecture at the annual meetings of the IMF and the World Bank, "globalisation is imposing new pressures on key international institutions. It is also exposing weaknesses in the current system of global leadership."

This judgement seems validated by repeated efforts over the years to renew the United Nations system, with numerous proposals for reform. Yet, as Smouts (1999: 29)

states: "These occasionally result in marginal adjustments that create an illusion of progress without fundamentally altering the state of affairs."

The number of proposals seems to have increased in the last three decades, shortly after the initial reports of Jackson (1969) and the Gardner Commission (United Nations 1975). A far from exhaustive list would include the Heritage Foundation proposal (1984), the Bertrand proposal (1985), The Group of 18 report (1986), the UN Association of the United States study (Fromuth 1988), the Childers and Urquhart report (1994), the ambitious work of the so-called "Nordic Project" (1991, renewed in 1997), the South Centre proposal (1996) and the report derived from the Commission on Global Governance (1995). To these proposals should be added the reform initiatives promoted by the Secretary-General, such as *An Agenda for Peace* and *A Development Programme*, both proposed by Boutros-Ghali, or those promoted by Kofi Annan, *Renewing the United Nations: A Programme for Reform* proposed in 1997 or *A More Secure World: Our Shared Responsibility* in 2004, and the ongoing debate and donor initiatives on UN reform.

In contemplating this series of initiatives, the real question is not whether change is necessary, but what magnitude of change and what the implications would be. While the structures and functions of the United Nations institutions have changed noticeably over the last few years, the world has changed far more (Zoninsein 1999).

The system of international relations is quite different from the one on which the current multilateral system is based. Important changes challenge the post-war inherited international order. The post-war bipolar world has been replaced by a multipolar configuration of international economic gravitation centres. The world economy has become regionalized, with the formation of integrated areas of diverse scope and coverage. The developing world is increasingly heterogeneous, with countries of very unequal conditions. Globalization has brought new interdependencies between countries and new possibilities and new risks beyond national borders. And there has been growing awareness of human rights and the necessary commitments required for their effective application. The international system modifies its procedures to adapt to such new conditions. But limitations remain that must be corrected if the multilateral system is to efficiently confront the challenges of the new international order.

In the provision of international public goods, Kaul, Grunberg and Stern (1999: xxvi-xxix) identify three large gaps that need to be corrected. The jurisdictional gap reflects differences between the international (or global) dimension of an important part of public goods-related aspects and the national limits for representatives' decision-making capabilities. The participation gap occurs because the mainly intergovernmental nature of international cooperation involves largely intergovernmental agents whereas many stakeholders contribute to the supply of international public goods. And the incentives gap occurs because moral arguments are not enough for countries to integrate the external effects they generate into their decisions or to respond cooperatively to supply international public goods. For this reason, Kaul, Grunberg and Stern (1999, 466-93) proposed redefining international cooperation to close these gaps, creating a new jurisdictional framework through a dynamic of greater participation (integrating all the stakeholders involved) and a new incentives framework (facilitating cooperative responses).

Dealing with the jurisdictional gap requires a more appropriate institutional definition for the management of the new interdependencies that globalization entails. The roles, missions and coordination among multilateral institutions may all need to be revised.

Doing so exposes one of the main problems of the multilateral system: its limited internal coherence. The largely disordered process by which the United Nations institutions were created did not favour an ordered system. There is considerable overlap in the activities of institutions, without any clear specialization. For example, the fields of rights and reproductive health are treated by the United Nations Children's Fund (UNICEF), United Nations Development Programme (UNDP), United Nations Population Fund (UNFPA) and the World Health Organization (WHO). UNICEF, the UNDP, the International Labour Organization (ILO) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) are all involved in education and human resources training. The Food and Agriculture Organization (FAO), ILO, World Food Programme (WFP), United Nations Industrial Development Organization (UNIDO), and the World Bank all focus on promoting employment and supporting small enterprises. The UNDP, World Bank and UNIDO all promote private sector development. The FAO, United Nations Refugee Agency (UNHCR), United Nations Relief and Works Agency (UNRWA) and WFP, among others, carry out emergency and humanitarian aid tasks. Overlapping also occurs among financial and non-financial institutions, such as the UNDP and the World Bank, in technical assistance tasks. How can the system be better structured to achieve synergies and avoid overlaps?

While such competition among institutions might be thought to encourage mutually positive stimulation, in most cases this overlap of activities is due to a lack of coordination. This situation not only impedes the institutions' effectiveness, but also seriously damages their international image.

Establishing order is not a simple matter of assigning the tasks of the supply of each international public good to just one multilateral institution, however. That would be both naive, considering the degree of institutional overlap, and clearly inefficient, because of the diverse nature and different functional level at which international public goods must be supplied. Promoting an international public good requires both establishing an incentives framework at an international level (core activities) and implementing policies aimed at strengthening countries' ability to produce complementary national public goods and to benefit from international public goods (complementary activities). Each of these tasks could be the responsibility of a different institution, operating at a different level, with a different scope. With this interpretation, the problem is not to find the responsible institution ("anchor institution", to use the term of the International Task Force on Global Public Goods), but to define each institution's specialization inside a cluster of institutions within the system of international public goods supply.

Proposals for an *issue-driven* and network approach are based on this understanding. It is based on clustering various institutions to work jointly on adding value in providing a public good according to their respective comparative advantages and fields of excellence (UNIDO 2005; Magariños 2005: 36; Rischard 2002). Coordination functions would be given according to each specific task, taking into account each institution's specialization, rather than through one bureaucratic command centre. An exam-

ple of the division of tasks among institutions that could take place for economic integration is shown in figure 1.1.

Regional institutions can also contribute to the creation of an institutional framework for the provision of international public goods and help to reduce the jurisdictional gap (Estevadeordal, Frantz and Nguyen 2004). Many international public goods have a regional scope, and many tasks involved in the provision of international public goods could be deployed in that context. Consider, for instance, the positive role that a regional agreement such as the Amazon Cooperation Treaty could play in the provision of such global public goods as biodiversity preservation and climate change prevention or the effects that the New Partnership for Africa's Development may have in promoting a more open economic order in Sub-Saharan Africa.

There are also intermediate institutions, between national and global levels, that are more accessible to national efforts and closer to state control and so may be more conducive environments for encouraging international cooperative action, like regional development banks (Sandler 2005; Kanbur 2004; Martínez Nogueira 2004). These intermediate institutions have an important role to play but are less developed and have a limited capacity to provide regional public goods because of the greater focus on funding the provision of global or national public goods. The publicness of regional public goods should be taken into account when tailoring financial and institutional support for the provision of regional public goods (Sandler 2005: 15–17; 32).

The supply of international public goods needs to start at the national level (Kaul, Grunberg and Stern 1999), with each country accepting its national responsibility in the provision of international public goods. International institutions acquire authority mainly through the delegation by member states. Thus it is very difficult for an international institution alone to design agreements and enforcement mechanisms to guarantee the adequate provision of international public goods. When international public goods involve spillovers that spread globally, international networks and partnerships from different regions are important to their provision. In these cases the role of multilateral institutions is important in avoiding duplication of efforts and to providing for adequate financing (Kaul, Grunberg and Stern 1999: 33).

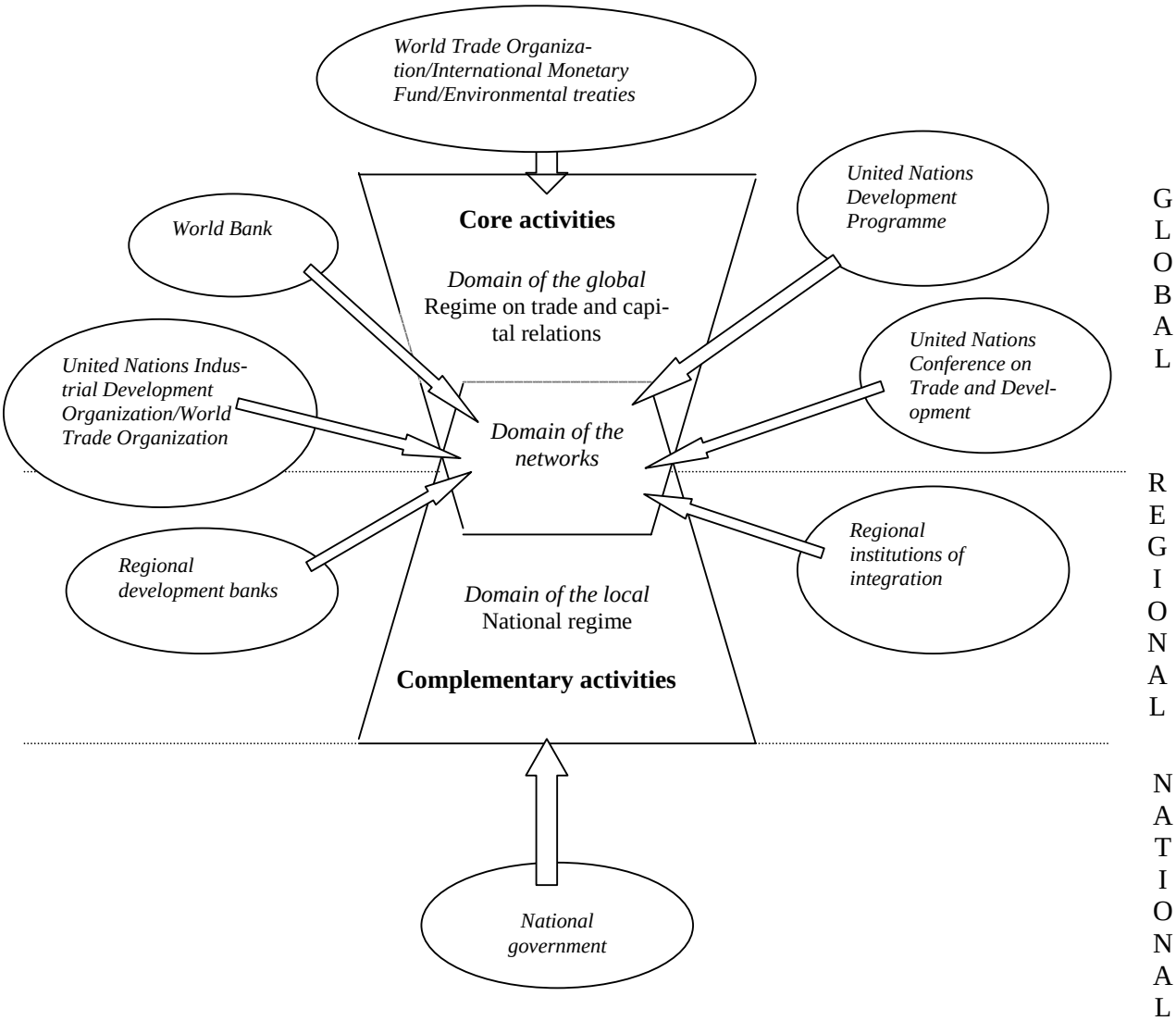
PARTICIPATION AND ACCOUNTABILITY

The formation of networks and partnerships has increased participation in deliberations and decision-making processes at the international level. Civil society parties have become active agents in the international system, responding to globalization. They have created platforms for international action, working networks and shared systems of international organization separate from national government and with the aim of establishing foundations of control, advocacy and pressure in the face of transnational powers. Beyond the possible weaknesses of this process (Edwards 1999), international civil society organizations are a political response to globalization.

More and more non-governmental agents actively participate in the supply of and demand for international public goods. For example, in the provision of a legal framework for human rights, contributions came not only from the United Nations and the nation states that signed the letter, but also from civil society organizations, such as Amnesty International, Transparency International and Human Rights Watch, which promote human rights. In the prevention and treatment of HIV/AIDS the UN and national specialized bodies are now joined by private groups such as the Rockefeller, Ford

and Bill & Melinda Gates Foundations and non-governmental organizations. Biodiversity preservation is ensured thanks to the efforts of states, multilateral institutions and large numbers of private players, such as Greenpeace and the Worldwatch Institute. Thus, it is no longer possible to understand the international regime of international public goods supply without considering all the stakeholders involved.

Figure 1.1. Institutional cluster in economic integration



Source: Adapted from Sagasti and Bezanson (2001)

Another concern is the democratic limitations of some of the management structures of multilateral institutions and the implications for accountability. The severest criticisms are directed at financial institutions (such as the IMF and the World Bank), whose decision-making processes are determined largely by the quotas that countries contribute to the institution's social capital. The weight assigned to countries may be far from their actual influence in the current international economy. For exam-

ple, China, the second largest economy in the world in purchasing-power terms, has a membership quota in the IMF similar to that of Belgium (Buira 2003).

Additionally, this decision-making structure ensures that industrial countries have the majority of the votes on the governing bodies: 24 industrial countries enjoy a 61.4% voting share, while developing countries (and non-oil producers) have scarcely 29% of the vote. And this structure is replicated in the IMF's government system: the same 24 industrial countries, none of them beneficiaries of IMF-supported programmes, have 10–11 executive directors, while 42 African countries, for which IMF decisions are crucial, have just 2 executive directors. Obviously, many countries feel that they are not well represented in the decision-making processes.

Even in institutions such as the World Trade Organization, where all countries have equal voting capability, there are complaints about the degree of democracy and transparency in decision-making and about the representativeness of governing bodies (see viewpoint 1.2 on global public goods and global governance). Developed countries reach agreements among themselves that they later try to impose on the other member states using their greater economic weight.

It is difficult for international institutions to promote effective processes of negotiation and agreement based on voluntary cooperation formulas between countries if they are not capable of appropriately integrating and representing all countries involved. This requires intense efforts at transparency, accountability and legitimacy.

FINANCING MECHANISMS FOR THE PROVISION OF INTERNATIONAL PUBLIC GOODS

There are four basic mechanisms for supporting public goods supply: correcting the effect of externalities by creating a quasi-market or applying taxes or fees; turning to voluntary private resources from individuals, businesses or foundations; claiming public resources from national contributions or international funds and combining any of these three mechanisms (table 1.7). The relevance of each mechanism depends on incentives and government structures that are internationally established for the provision of these goods (Sagasti and Bezanson 2001).

Table 1.7. Financing mechanisms for global public goods

Financing means	Mechanism
Internalizing externalities	Market creation or strengthening
	Taxes, fees and levies
Drawing on private sources	Corporations (for profit)
	Corporations (not for profit)
	Individuals
Relying on public sources	National sources
	International sources
Forming partnerships	Combination of various different sources

Source: Sagasti and Bezanson 2001.

Viewpoint 1.2
Global public goods and global governance

Why does sound economic theory with important policy implications such as that advanced in international discussions on global public goods so often prove difficult to implement in practice? Frequently, such economic theory demonstrates little or no appreciation of the political constraints likely to work against policy implementation. While economic assumptions about what constitutes good governance in the twenty-first century are becoming increasingly sophisticated technically, especially for the provision of public goods, they often remain oblivious to the nature of the politics that can derail them, no matter how theoretically sound and policy relevant.

In short: economics, even the emerging subdiscipline of political economy, is not comfortable with politics. Political economy, as what might be called a theory of choice under constraint using game theoretic models, may offer important insights into issues such as scarcity and the role of institutions in the policy process. It is less comfortable with questions of ideological contest, power, political struggle, representation, legitimacy and accountability, all of which can make or break the implementation and acceptance of a given policy.

That discomfort sets the stage for discussing global governance, an overused and underspecified concept. The demand for research on global governance has followed the recognition that sovereignty is more a relational and relative question of responsibility. The result is a dramatic change in the role of international law.

More than a technical and managerial problem

The demand for global and regional governance has become increasingly complex. And the role of multilevel governance structures in key policy areas has grown dramatically.

Yet in some key areas of the global cooperative agenda, in both the economic and the security domain, collective governance capacity appears to be deteriorating and resistance to its enhancement to be growing. For an increasing number of actors global governance questions resist the technocratic fix and pose major political and ethical questions about the appropriate manner in which policy is made, decisions are taken and implemented and resources are distributed. This is an issue for the theorist as much as the practitioner. Indeed, a problem with the much of the contemporary analysis of the demand for governance, beyond the confines of the state, is that it is often posed as a technical and managerial problem. This approach removes any notion of politics or ethics from problem solving.

But actors in this process are not ethically neutral and dispassionate. They are players with political agendas. This is so whether the relevant international institutions are included (United Nations and alliances in the security domain, the International Monetary Fund in the international financial arena; the World Trade Organization and regional and bilateral institutional arrangements in the trade arena; the World Bank in the context of development) or those ever more visible non-state actors (such as multinational corporations and non-governmental organizations) and various advocacy coalitions and global public policy networks such as the Davos Forum or the emerging counter-voices at the Global and European Social Forums or what is generically thought of as the alternative globalization movement.

The financial crises of the late 1990s generated precisely the sorts of distrust and animosity that detract from the possibilities for mutually beneficial cooperation at the international level. The rhetoric in industrialized countries about burden sharing—the implication being that developing countries did not share the burdens of global public goods—was more than countered by perceptions in developing countries that the burdens of moral hazard, social dislocation and the impact of unfettered competition had been unloaded on precisely the economies and societies that were least equipped to deal with them. In an era of deregulated capital movement and the processes of financial change that brought hedge funds, pegged exchange rates and precipitous currency collapses, the notion of global burden sharing adopted by the developed world was thought by

many in the developing world to be putting the cart before the horse.

Broadening the discourse

Knowledge of global public goods is embedded in socio-political and methodological-philosophical contexts that can impede or derail the translation of good economic theory into successful policy practice. What is required is a broadening of the discourse to acknowledge the importance of justice and fairness in the successful development of global public goods and the need for the literature to engage more strongly with the insights from theorizing in positive political philosophy that advance concrete ideas of justice and fairness arguments within this important sector of the global development debate.

If the economic theory and practice of global public goods is not embedded within this wider normative context, especially the intermediate institutional global public goods meant to facilitate the liberalization of trade, then discussion of the relationship between trade and development as more than simply a rationalist enterprise will continue to take place in parallel universes. Theorizing must be embedded in a wider context that also appreciates the salience of linking human actions and social relations with values and meanings (such as altruism) and social and political power relations.

Broadening the conception of governance

Much, although not all, global public goods theory has a limited conception of governance. Global governance is no administrative science to accompany economic science. It is a contested political process that can be seen in a number of ways. Global *governance* (economic governance) encompasses the arrangements—across a spectrum from weak to strong in influence—that various actors attempt to put in place to advance, manage, retard, control, regulate or mitigate economic globalization. It has two types:

- *Global governance 1–efficient negotiation processes,* which is the enhancement of effectiveness and efficiency in the delivery of global public goods through collective problem solving and underwritten by a technocratic managerial elite, with international institutions increasingly important as instruments for reducing transaction costs, coordinating policy and ensuring compliance to mitigate risk in an open and deregulated global economy.
- *Global governance 2–open and fair negotiation processes,* which is the emergence of systems of representation and accountability for enhanced legitimization and democratization of policy-making in global, as opposed to national, contexts. As the role of the nation state as a vehicle for democratic engagement becomes more problematic, the clamour for democratic engagement at the global level has become stronger.

This twofold definition is central to understanding the prospects for developing a working system of global governance for the efficient and effective provision of public goods in the twenty-first century. This question concerns the degree to which private or non-state actors are meaningfully involved. Without meaningful involvement by the private sector, global governance as a transparent, accountable and representative process of decision-making will always lack legitimacy and, as a consequence, long-term sustainability.

In sum, current understandings of governance exhibited in the work on public goods have little or no awareness of politics as ethics and politics as struggle for accountability, representation and legitimacy.

Scaling up the public domain to the global level

We now understand, at least better than we did before the financial crises of the late twentieth century, that separating markets from politics and institutions—or of the private from the public—is unsustainable. The spotlight in policy and academic debates has thus fallen on the role of public authorities in minimizing a raft of public bads associated with market failure, social exclusion and financial volatility, and on the public domain as an arena in which market and non-market social relationships can be effectively mediated. As yet, however, we have no way of scaling up the public domain to the global level. The overdeveloped global economy is unfortunately matched by an underdeveloped global polity.

The development of a better understanding of global governance 2 is central to the global governance agenda, especially the ability to deliver global public goods. Much of the literature has so far represented an extension of the domestic analogy to the global context, extending the model of democratic accountability to the global context. However, all but the most minimal of democratic constraints present within a domestic polity are absent at the global level. There is no serious institutionalized system of checks and balances at the global level. And the institutional constraints that do exist have little purchase on the behaviour of major powers, should they choose to ignore them. Nor is there a meaningful global public sphere in either a legal or a sociological sense.

Thus for global governance 2 to be meaningful—acceptable to a large group of principal actors in global politics—and at the same time remain supportive of global governance 1 there has to be an understanding of the fundamental differences between unrealizable concepts of cosmopolitan global democratic governance and systems of accountability that can have real political purchase in global public policy. Claims to legitimacy, or rather the absence of it in global public policy, are frequently a euphemism for the rejection by weaker actors of the asymmetrical structure of power in the contemporary global order. This is an unfortunate political reality. Exercises to enhance the accountability of global governmental actors that do not take seriously notions of procedural fairness will do nothing to fundamentally alter the structural nature of global power.

This has several implications. First, the nature of what constitutes global public goods will continue to be strongly contested. Second, to be blunt, both the ability and political will of the United States to offer self-binding hegemonic leadership, underwriting multilateralism as a principal institutional form of global governance, will continue to be problematic. Third, without reform, resistance among global rule takers to hegemonic order will grow.

The next step in the enhancement of global governance 2 needs to be modest. It will certainly not appeal to radical transformationalists. It will not deliver an ideal type of global democracy (with universalist participation) predicated on the globalizing of the domestic analogy. But it does recognize the ability to enhance, and in some instances to consolidate, existing patterns of legitimacy and accountability. Legitimacy must be embedded in shared norms (usually of elites, but wherever possible of national publics, of the major state actors) and be underwritten by judicial instruments (such as the International Criminal Court and increasingly the dispute-settlement mechanism of the World Trade Organization). It should also be enshrined in negotiation practices that are not only efficient (global governance 1) but also open and inclusive (global governance 2). This is not abstract political theorizing. Successful, albeit gradually enhanced, such activities will eventually cast massive and beneficial policy shadows.

Source: Drawn from a background paper by Higgott (2005).

Since the private benefits of public goods are lower than the social benefits, markets lead to underproduction compared with the socially desirable level. This difficulty can be overcome by defining property rights more precisely, to strengthen the market mechanism, or by levying a tax or fee, to internalize social costs. Both methods internalize externalities by making marginal social benefits coincide with marginal social costs. Informational difficulties have to be overcome, however, since those who bear the external costs tend to exaggerate the harm while those who gain the external benefits tend to underplay them.

Markets for public goods do not arise spontaneously—the conditions for appropriating the good are absent, and agents fail to express preferences that would lead to the setting of prices. For a market to exist, those factors need to be created through institutional change. Property rights have to be defined (through setting quotas, for example), an information system has to be created and a transparent regulatory framework has to be established to ensure exchange operations. With an association established between preferences and costs, agents can exchange the good's access rights for payment. However, there are costs involved in creating a market, associated with establishing the legal framework and the enforcement mechanisms, and these costs are often borne by public institutions (Sagasti and Bezanson 2001: 41).

Under the Kyoto Protocol, for example, this part of the market is being created to control greenhouse gas emissions. Once the maximum quantity of emissions considered internationally acceptable is set, that total will be allocated to countries through quotas. Later, countries could exchange quotas with each other, so that the most environmentally efficient countries could sell a part of their emissions rights to countries that need to exceed their emissions quotas. Internationally established emissions limits can be met, while countries that make an extra effort to reduce emissions will be rewarded by countries that are unable or unwilling to reduce their emissions to the agreed level. Such mechanisms could be used to manage scarce basic resources (common goods) such as water or fishing, where it is necessary to fix a maximum consumption level in order to share the good among different agents.

The main drawback is the difficulty of achieving agreement on overall limits and quotas among participants. Reaching agreement is easier at the national level, where the state's legal authority can be brought to bear.

Another way to internalize externalities is to establish a tax, fee or contribution related to the consumption of the public good. A common procedure for national public goods, it too presents greater difficulties at the international level since there is no equivalent fiscal authority. This procedure seems especially suitable for club goods, such as irrigation systems, access to communication networks or the use of certain shared resources (satellites, for example), or for common goods, with their discrepancy between the immediate interest of each agent (to pursue the highest exploitation) and the collective or intergenerational interest (to maintain the resource's sustainability). Payment of a tax or fee is expected to bring private behaviour closer to the conduct demanded by collective interests, avoiding congestion, instability or overexploitation of the resource.

Proposals to use taxes to manage specific international problems have a long history in development thinking. The Brandt Commission (1980) suggested drawing aid

resources from an international tax on a socially non-beneficial activity such as trade in weapons, luxury goods, international common goods or oil. The 1987 Brundtland Commission report on sustainable development made a similar recommendation.

Although none of these proposals has been implemented, the suggestion has emerged again in Nobel Prize winner James Tobin's proposal to apply a tax on international financial transactions in part to correct the high volatility of international capital flows. While the proposal has become part of several social movements for alternative globalization, there has been no consensus on its viability or technical feasibility.

DRAWING ON PRIVATE RESOURCES

International public goods can also be supplied through voluntary contributions from individuals, independent foundations, non-profit institutions, businesses and individuals.

The Rockefeller and Ford Foundations have promoted research and technologies related to the green revolution that were later taken up by international institutions and the governments of developing countries. The Rockefeller Foundation has also supported vaccine development for "forgotten diseases" through the Great Neglected Diseases of Mankind Programme and more recently, along with the Ford Foundation, has supported AIDS research. The MacArthur Foundation supports biodiversity programmes, while the Bill & Melinda Gates Foundation promotes childhood health programmes and AIDS research.

Non-profit institutions also make a substantial contribution to international public goods. Non-governmental networks, such as Oxfam, CARE, Save the Children, Greenpeace, Human Rights Watch and Amnesty International contribute to international public goods supply partly through direct interventions and through their pressure on governments to make a more effective commitment to social needs. Even with limited resources NGOs contribute by mobilizing public opinion, demanding that governments become more aware of international public goods management, and by agenda setting. Academic and research institutions also contribute to the supply of some international public goods, especially in research, the spread of information and statistical data and the consolidation of cognitive communities.

Businesses have also contributed to the supply of international public goods by sponsoring funds and programmes related to public goods or by making decisions and assuming costs. Examples are Astra-Zeneca's efforts in developing a drug to cure tuberculosis and Novartis's work developing products against Dengue fever. Shell and British Petroleum have adopted agreements to reduce greenhouse gas emissions. That these actions are motivated by profits or the desire to improve corporate image does not deter from the beneficial results they have for the international community.

Individual contributions also play a part, whether channelled through NGOs or the United Nations system or contributed directly to specific causes. Examples are Ted Turner's donation to the United Nations, Live Aid concerts to collect funds for AIDS in Africa and Elton John's donation of royalties on his CD tribute to Princess Diana to finance the campaign against anti-personnel mines.

These are donations arising from personal initiative. There are also proposals to institutionalize the collection of private contributions for certain international public goods. An initiative with the longest tradition may be the creation of a United Nations lottery, initially proposed in the UN General Assembly in 1970 and recently revived by

different NGOs, to create the People's Earth Fund for environmental programmes. The financial possibilities of this kind of system are broad.

RELYING ON PUBLIC RESOURCES

A third option for the provision of international public goods is to turn to public funds, either through direct contributions by developed countries or through the budgets of international organizations.

Development assistance. Development aid is the dominant source of international public resources from developed countries. Developed country contributions include bilateral programmes and contributions to international institutions, including those with a clear mission to tackle common problems on a global scale.

While a great part of official development assistance is already used to finance activities related to the supply of international public goods, international aid and global public goods supply are not identical. Kaul and Le Goulven (2003) identify several differences between the two. A key difference is that aid refers to international equity problems and its purpose is to eradicate poverty; therefore, its actions are directed at distribution. By contrast, public goods supply refers to the correction of market failure, seeking to arrive at better efficiency levels by focusing on economic allocation. Aid works mainly through unilateral transfers of resources (from donor to recipient countries). Public goods management appeals to a wider variety of political means (including changes in legal frameworks to promote cooperative action) and is directed mainly at goods rather than countries. And while aid is directed to developing countries, all countries potentially benefit from public goods supply.

New objectives are emerging for international cooperation related to common problems, but the traditional goals of aid—poverty eradication and meeting basic needs—still have not been achieved. For that reason, even with closely related policies for aid and public goods supply, it might be wise to maintain a certain autonomy of policies and equally diverse sources of finance (see viewpoint 1.1 on aid finance of international public goods).

Other international activity by government agencies. Developed countries also contribute to the provision of public goods through other kinds of activities that are not strictly valued as official development assistance, such as those generated by the international activity of various government departments. Examples are the financing of international cooperation in environmental management, international security, financial coordination, transport regulation, postal traffic and management matters. The scope given to activity that is part of international cooperation in fields of shared interest is quite wide.

Developing country financing. In developing countries, most resources for the provision of public goods come from the national budget, through allocations to core activities of a good's supply or to complementary activities to generate conditions for the good's provision and consumption (see viewpoint 1.3 on Sub-Saharan Africa). Public resources are extremely limited in developing countries, and financing for global public goods faces competition from demands for improving national public goods' provision—security, health, education and infrastructure. India has made progress in the development of a vaccine against hepatitis B, Viet Nam in the vaccine against meningitis B and Brazil and India in the production of generic drugs for AIDS treatment. There is no shortage of such innovative efforts as the Millennium Network for Tuberculoses R&D organized by the Brazilian government or the Coalition for R&D in TB Endemic

Countries, included in the Global Alliance for Tuberculoses Drug Development (www.tballiance.org).

Multilateral institutions. Finally, funds for managing shared global problems may also come from multilateral public institutions including the IMF, World Bank, regional development banks and special funds such as the International Fund for Agricultural Development. Some of these institutions' initial objectives—financial stability, international legal activity or research promotion—may be considered global public goods. Some of their investment programmes relate to sectors (health, education, environment, communications) that have some of the characteristics of a global or regional public good.

Non-financial multilateral institutions, many of them within the United Nations system, are also engaged in funding international public goods, such as peacekeeping and security tasks, humanitarian crisis help and human rights protection. That said, the United Nations' difficulties in increasing its financial capacity greatly limit its role as a supplier of international public goods.

The financial difficulties of this system prompt a search for alternative mechanisms for providing international public goods. A pragmatic approach is to create multilateral specific funds. The Global Environment Facility (GEF) finances international efforts in preventing biodiversity loss, climate change, the degradation of international waters and the depletion of the ozone layer. The GEF was established as a financing mechanism under the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change and has management participation from the World Bank, UNDP and United Nations Environment Programme. Despite the importance of the tasks assigned to it, the GEF's financial capacity is limited. In 2002, 32 donors countries pledged US$3 billion to fund operations between 2002 and 2006 (www.GEFWEB.org).

FORMING PARTNERSHIPS

These mechanisms are not mutually exclusive. They can be combined to enable diverse agents to work together. This occurs in programmes to develop drugs and vaccines for specific diseases, such as the International AIDS Vaccine Initiative, the International Microbicides Partnership in developing vaccines against Dengue fever, the Pediatric Dengue Vaccine Initiative, the Global Alliance for TB Drug Development, the Medicines for Malaria Venture and the Onchocerciasis Control Partnership.

The Global Fund to Fight AIDS, Tuberculosis and Malaria, created in 2002, includes international institutions (the World Bank, UNDP and WHO) and bilateral donors, and private contributions are possible as well. The fund was created as a financial instrument to collect, manage and finance actions to fight the three diseases worldwide.

Viewpoint 1.3
Sub-Saharan Africa—weakest link or de-linked from the global economy?

The many weaknesses of African economies and political systems shape Africa's access to international public goods and the capacity to participate in the provision of such goods, in several ways.

Implications of Sub-Saharan Africa's delinking from the global economy

First, an international public good may be available in the world economy without being available everywhere. This may be because complementary activities are needed to consume the public good in addition to the core activities required to produce it (World Bank 2001b). A classic example is scientific and technical knowledge (see chapter 5). Even though in most cases the complementary activities are private rather than public goods, an optimal scheme of provision of international public goods must provide for the measures necessary for the international public good to be consumed globally as well as produced.

This issue is particularly relevant for Sub-Saharan Africa, where countries often lack the capacity to take advantage of international public goods. An example is the international trade regime (see chapter 3). Even if the World Trade Organization (WTO) were able to fully enforce free trade rules, poor countries in Sub-Saharan Africa and elsewhere would not necessarily be able to increase their participation in the world trading system. Lack of capacity to consume international public goods is a major contributor to the "de-linking" of Africa from the rest of the world—and from its inability to participate fully in globalization (Collier 1995).

Second, for many international public goods Sub-Saharan Africa is the weakest link in the world economic system. In case of weakest link aggregation technologies, improving the capacity of African countries to participate effectively in the production of such international public goods is critical. Examples are global health and control of communicable diseases.

Economic theory calls for in-kind transfers to the weakest agents, to help them contribute to the production of international public goods, but there is still a wide shortfall in the provision of such transfers. One reason may be that the harm potentially inflicted on the world system by the weakest link nature of Sub-Saharan Africa is somewhat mitigated by its de-linking from the rest of the world.

This de-linking implies that Sub-Saharan Africa has little responsibility for the global crises associated with the underprovision of international public goods. This is true for best shot public goods and for public goods whose aggregation technology is linear, in that the contribution of each actor depends on its economic size. International public goods such as macroeconomic and financial stability and the protection of global environmental resources are of this sort. Since their production does not depend much on African countries' contributions, there is a risk that the specific needs of Sub-Saharan Africa will be ignored in the global deals struck to produce such international public goods.

Thus Africa faces problems based on an absence of complementary activities, public goods with weakest link aggregation technologies and the near exclusion of its needs from discussions of international public goods production. Lack of complementary activities affects three areas in particular: the international trade regime, global financial stability and knowledge diffusion and adaptation. The weakest link public goods aggregation technology is particularly relevant to health and peace and security, areas in which Africa has been dramatically absent from progresses achieved or attempted worldwide. The near exclusion of African needs in international public goods discussions concerns principally the conservation of global environmental resources.

Much of the recent international debate on the Millennium Development Goals has focused on the objective of worldwide poverty eradication as an international public good. While there have been some opposing arguments, there are at least two reasons to consider poverty eradication as an international public good: first, growing numbers of people around the world view the

extreme poverty in which so large a part of humanity lives as unacceptable on ethical grounds, and second, this extreme poverty, which is more and more geographically concentrated, may in the long run become a risk factor for rich countries as well.

Despite many years of preferential market access for Sub-Saharan African economies, few countries have been able to benefit. Certainly, there is a need for fairer trade rules, especially in agriculture, but the international trading system alone cannot be blamed for Africa's trade failures. There is now ample recognition that African countries need to invest in trade capacity building if they want to participate fully in international trade. Both African governments and donors have responsibilities in this area.

In the financial arena, the de-linking of Sub-Saharan Africa has tended to protect it from the turbulences of global financial markets. But Africa has not been immune to external shocks. The extreme volatility of terms of trade has inflicted heavy damage on African economies, and the international community could do more to cushion these shocks. Avoiding procyclical aid flows would be a small, painless step in the right direction for donors.

In the area of knowledge, the de-linking of Sub-Saharan Africa is harmful. The core issue here is not the Trade-Related Aspects of Intellectual Property Rights rules and the obstacles that they create against transfers of technology. The main problem is the incapacity to take advantage of existing knowledge because of a weak local knowledge base and infrastructure. Inadequate education policies implemented by many African governments are a major contributer. The problem is compounded by the flight of skilled labour from the continent. The international community is now working to improve the scientific and knowledge base for African development in some domains, particularly in agricultural research, but corresponding efforts are needed on the African side to make use of such research investments.

Concerning health, international efforts to develop vaccines and find cures for diseases that are concentrated in Sub-Saharan Africa, such as HIV/AIDS and malaria, have been insufficient, though work is intensifying. Again, international provision of international public goods must be complemented by investments in local capacities in the public health sector, with assistance from the international community. Health is the area in which the weakest link aggregation technologies have the greatest application in Sub-Saharan Africa.

Although the weakest link aggregation technology appears to apply as well to peace and security, its relevance there is less straightforward. African security crises have so far been limited to the continent. This does not mean that security crises in Sub-Saharan Africa are not serious. Conflicts in the region are responsible for half of all global battle deaths, and these conflicts have set back development efforts in many countries. Resolving conflicts is largely the responsibility of Africans, but the international community can assist, through rules and regulations that contribute to improved governance and, in some cases, through military intervention.

Finally, the de-linking of Sub-Saharan Africa from the world economy means that it has virtually no negotiating power in preventing global environmental damages that create special harm to the region, such as climate change and depletion of natural resources. Such damages are costly for the world system as a whole, but are particularly harmful for Sub-Saharan Africa.

Implications for poverty reduction and capacity building in Africa

Several proposals have been made in recent years to reduce poverty in Sub-Saharan Africa. This renewal of interest by the international community in the future of Sub-Saharan Africa reflects the view that eradication of poverty worldwide is an international public good.

Poverty alleviation is not merely a matter of doubling official development assistance, however. It also requires dealing with several other international public goods–related issues, such as vulnerability to shocks, food insecurity, illnesses, conflicts and environmental damages. Therefore, considerations of the more traditional international public goods are also considerations of the overarching objective of poverty reduction. The income dimension of poverty certainly plays an important role—and improving the ability of Sub-

Saharan Africa to participate in the world trading system would help to reduce poverty. But two difficult questions remain: is more financial assistance feasible, and is it desirable?

Feasibility is related to debates on the objectives of official development assistance. On bilateral aid, the empirical evidence suggests that the self-interest of donors is a major motive for their assistance. In particular, aid allocation is strongly influenced by trade linkages with aid recipients, so that there is a significant negative aid bias against Sub-Saharan Africa. A clear debate on the international aid architecture would be necessary if more aid is to be allocated on the basis of the global objective of poverty eradication rather than the particular objectives of donor countries.

The desirability of more assistance to Africa depends on the absorptive capacity of Sub-Saharan Africa and whether foreign assistance creates negative incentives. Absorptive capacity in African is limited, but certainly several African countries could efficiently use additional aid resources. This is principally a matter of capacity building, notably related to development knowledge. The issue of incentives is more complex. At the microeconomic level, aid may trigger rent-seeking behaviour. Progresses cannot be achieved without improvements in governance. At the more macroeconomic level, free-riding by recipient countries could happen if poverty alleviation were considered purely as an international public good. This can be avoided only if it is clear ex ante that donors and recipients have the same objectives. The Millennium Development Goals are an answer to this issue, but it remains to be seen whether all governments adhere to these objectives. Again, this is principally a matter of good governance.

Source: Drawn from a background paper by Berthélemy (2005).

THE SEARCH FOR NEW SOURCES OF FINANCING: THE UNITED NATIONS UNIVERSITY–WORLD INSTITUTE FOR DEVELOPMENT ECONOMICS RESEARCH COMMISSION

Use of public budgets to fund the supply of international public goods, while seemingly the simplest option, is clearly limited. The difficulties of increasing official development assistance, despite repeated international commitments to do so, clearly illustrate this point. That is what motivates the search for new sources of funding for the provision of international public goods. At the request of the Department of Economic and Social Affairs of the United Nations Secretariat, the United Nations University–World Institute for Development Economics Research convened an international commission to study new sources of development finance (Atkinson 2005). The commission did not examine all possible financing sources and excluded several proposals for global taxes. But several well known proposals were explored, including global environmental taxes, the Tobin tax, special drawing rights for development, the International Finance Facility, private donations, global lottery and global premium bond and remittances by emigrants. The study highlighted four conclusions:

- Not one proposal for global funding is free of criticism. Some new sources of funding could crowd out existing mechanisms, and so their introduction should be studied carefully.
- Only two of the mechanisms considered (carbon tax and Tobin tax) would provide sufficient resources to be considered relevant for funding international public goods, although other global funding proposals could make substantial contributions, such as the International Finance Facility, which would use securitization to secure funding for development, or the establishment of a global lottery or a global premium bond to encourage private contributions.
- The partial and imperfect nature of all of the mechanisms suggests the need to maximize the advantages of their implementation. This becomes easier the fewer the number of actors required for their implementation (which works against global taxation proposals).
- The advantages of a proposal increases when it promotes an allocation correction and penalizes the production of a public bad in addition to raising funds—a "double dividend".

But even though some of the proposals establish a double dividend, none is free of costs. This means that besides their fundraising capacity, their economic implications—and the distortions they generate—must also be considered.

CHAPTER 2
FINANCIAL STABILITY AS AN INTERNATIONAL PUBLIC GOOD FOR DEVELOPMENT

The financial storms that hit international markets during the 1990s made it clear that regulatory and institutional frameworks were inadequate to promote financial stability or to respond to crises and their effects at an international level. A well-known study (Dobson and Hufbauer 2001) estimates that since 1975 financial instability has reduced the incomes of developing countries by roughly 25%. Financial instability cost Latin America alone some 2.2 percentage points of growth a year in the 1980s and 0.7 percentage points in the 1990s.

Financial markets are becoming increasingly integrated internationally, with the liberalization of capital flows, rapid financial innovation (futures, forwards, options and swaps), the development of telecommunications technology and its capacity to complete orders and transactions in real time and the growth of strong institutional investors with highly leveraged hedge operations.

But the international financial arena has only a limited normative framework for preventive regulation, supervision and intervention. There are no mechanisms to ensure control of externalities derived from national decisions. This regulatory asymmetry facilitated the development of international transactions, but it also increased the risk of instability and negative effects connected with growing market interdependence.

While the institutional framework for international financial cooperation was formed some 50 years ago, the participants and interactions that are the target of regulations have changed considerably in recent decades. Several emerging economies are active on the international scene, including some potential economic giants with the capacity to affect international financial markets. The range of matters requiring international cooperation has widened: balance of payment adjustments, financial regulation and supervision, debt management and financial crisis resolution—new matters requiring new institutional and normative responses.

But as the global economy has moved further away from the harsh effects of the last financial crisis, ambitious proposals for a new international financial architecture are losing their appeal, and discussion now focuses on the technical requirements for improving information and the levels of preventive regulation and supervision of national markets. These issues are also important, of course, and can lead to improvements in market efficiency at a microeconomic level. But it is doubtful whether these methods alone can reduce systematic risks, such as economic volatility or contagiousness.

FINANCIAL INSTABILITY HAS HIGH GROWTH AND DISTRIBUTION COSTS

The current configuration of the financial system is doubly costly for developing economies. First, it increases the risk and vulnerability of economies integrating in international capital markets through the high volatility of capital flows and recurrent financial crises. And second, the market configuration restricts developing countries' possibilities of accessing public and private financing. Financial markets thus present a double stability and efficiency problem that severely affects developing country growth prospects.

A growing body of literature documents the costs of instability and financial crises (IMF 1998; Asís, Camarazza and Salgado 2000; Dobson and Hufbauer 2001; Caprio and Klingebiel 2002) to economic growth (Obstfeld 1998; Reisen and Soto 2000; Fernández-Arias and Hausmann 2000; World Bank 2001a). Griffith-Jones and Gottschalk (2004) estimate the costs of the financial crises of 1995–2002, deliberately restricting their study to financial crises (excluding bank crises) and countries directly involved (Argentina, Brazil, Indonesia, Republic of Korea, Malaysia, Mexico, Thailand and Turkey). Comparing the evolution of potential and real GDP over at least six years, they estimate the cost of the crises at $1.2 trillion ($150 billion a year) (table 2.1).

Table 2.1. Comparative output loss for each country in a financial crisis, 1997–2002

		Output loss	
Country	Period	Billions of 1989 US$	Billions of 2002 US$
Argentina	2002	25.6	37.1
Brazil	1999–2002	96.7	140.1
Indonesia	1997–2002	238.6	345.9
Korea, Rep.	1997–2002	122.9	178.1
Malaysia	1997–2002	60.6	87.8
Mexico	1995–2002	78.1	113.2
Thailand	1997–2002	210.5	305.2
Turkey	2001–02	29.0	42.1
Total		862.0	1,249.6

Source: Griffith-Jones and Gottschalk (2004).

The results are only slightly higher than those of Mendoza (2002), who focuses on bank crises more than currency crises, and are similar to the more recent results of Dobson and Hufbauer (2001), who estimate average annual GDP losses of 0.7% for Latin American economies and 1.4% for Asian economies. Bordo et al. (2001), in a wide sample, find that the loss from an average crisis approaches 9% of GDP or close to an average annual output loss of 1% and that the probability of a randomly selected country experiencing a crisis is roughly 8%. And Eichengreen (2004), in a broad survey of the literature, concludes that the cost of a financial crisis is roughly 1% of GDP growth a year, meaning that the financial crises of the last 25 years reduced the income of developing countries by a cumulative 25%.

The consequences of the financial crises were worsened by the distributive effects. The poorest social sectors of the countries involved were deeply affected by the period of instability. Sustained high interest rates benefit the rich and hurt the poor, both nationally and internationally. The retrenchments in social spending, reductions in the growth rates and expansion in unemployment as a consequence of financial crises usually have a regressive distributive impact, as in the Asian or Argentine crises (Friedman and Levinsohn 2001; Levinsohn, Berry and Friedman 1999; Manuelyan Atinç and Walton 1998). Poverty in Indonesia increased as a result of the financial crisis from 7%–8% in 1997 to almost 18%–20% in 1998 (Suryahadi et al. 2000).

FINANCIAL STABILITY IS AN INTERNATIONAL PUBLIC GOOD

Financial crises often generate high costs in economies far away from the economy that was initially involved. This ability of financial markets to create systemic effects, which are difficult to contain locally, makes financial stability a public good.

Financial stability presents the typical features of a global public good. It affects not only countries, but also the global economy. The regulatory and institutional response should have a similar reach, even if some complementary activities are undertaken in countries and some regulatory frameworks have a defined regional coverage. Internationally, efforts to limit the risks of financial instability focus on improving the strength of macroeconomic policies, applying financial codes and standards, and strengthening prudential and supervisory mechanisms in each country. Regionally, it may be effective to coordinate macroeconomic policies and set up regulatory frameworks that permit the establishing of more stable financial environments. The European Monetary System and later the European Monetary Union demonstrate how to improve financial security in a regional ambit.

Beyond such activities, however, financial markets are primarily global. Financial stability, because of its scope, is a global public good. It shares the features of a public good and a club good. Its institutional and regulatory framework is a pure public good. Any country can benefit from the rules and the logistic infrastructure for transactions within financial markets, such as those of the Society for Worldwide International Financial Telecommunications for managing transactions in convertible currencies. Yet the financial framework also operates as a club good, since some transactions (for example, access to loans) are excludable and subject to user fees (tolls) based on a country's borrowing level. Countries that engage in more borrowing will pay more fees. The less a country is involved in international financial markets, the less it will be affected by financial market instability. This explains why emerging markets, which are highly integrated into international financial markets and have a high degree of internal fragility, suffer most financial crises.

The provision of financial stability is a weakest link aggregation technology: the integrity of the financial system is dependent, in part, on its weakest component financial market, where crises can begin and affect other markets. Countries with greater economic difficulties and a weak financial system are where a crisis will start that may subsequently affect countries with sound macroeconomic fundamentals. As Eichengreen (2004: 250) notes: "countries without financial markets cannot have financial crises." At times, financial stability is a *weaker link public good* in which the smallest provision level has the greatest impact on the level of the good. The second smallest provision level has the next greatest impact, and so on. With a weaker link public good,

the smallest provider does not *solely* determine the public good's level. Thus, better financial practices by some countries can insulate them somewhat from a financial crisis originating in a crisis-ridden economy. As a weaker link public good, the desire for financial stability induces countries to use sound financial practices even though they may be affected by poor practices abroad, since sound practices at home limit this external impact. When, instead, financial stability is a weakest link public good, countries have little choice but to "shore up the weakest link" or to isolate it from the system. Shoring up activities give rise to free rider concerns as countries prefer that another country performs these costly actions.

RESOLVING ASYMMETRY INTERNATIONALLY WHILE PRESERVING AUTONOMY NATIONALLY

Advances in financial security require effective treatment of the asymmetry and inequalities between countries and markets at the international level. In an increasingly globalized world, the weakness of one part affects the entire system. The main problem is the diverse capacity of countries to access international capital markets and the consequences for these countries' effective autonomy in economic policy.

The combination of volatile capital markets and high debt to GDP ratios creates an important systemic issue for international financial markets. Emerging market economies are attractive destinations for foreign investment, so that in periods of growth they register large capital inputs. As a consequence, their exchange rate appreciates and the debt to GDP ratio falls, provided a significant part of their debt is in foreign currency. Although interest rates fall during the expansion period, that does not relieve the debt burden. Nor does it affect the profitability of foreign investors, due to the appreciation of the exchange rate, thus boosting new capital inputs.

However, the high debt ratios (more than 50% of GDP) and the limited maturity of these debts force a continuous renewal of the debt, rendering these countries highly vulnerable to any internal event (growth reduction or a political crisis, for example) or external shocks (terms of trade shock or financial contagion). In the event of a shock, the currency may depreciate, forcing interest rates to rise, reducing growth prospects and further raising the debt to GDP ratio. During the crisis, multilateral debt will replace private capital leaving the country. If the stabilization is successful, the depreciation of the currency will stop and a new cycle of private debt with short maturity will start up. If the stabilization fails, the country will plunge into financial crisis of variable duration and effects.

Fiscal policy in countries with high debt accumulation tends to be procyclical. Periods of recession worsen the debt to GDP ratio, increasing the risk of a debt event, thus requiring a tighter fiscal policy. During periods of expansion, fears of a debt event decrease and governments tend to expand. Anticyclical use of fiscal policy is lost.

The only way to deal with a high debt to GDP ratio is to keep GDP growth high and to accumulate large primary surpluses. Such objectives are difficult to achieve, however, and are to some extent contradictory. Large primary surpluses require lowering investment, worsening the character of public spending and slowing economic growth, and thus make reduction of the debt to GDP ratio harder. A combination of episodes of adjustment fatigue, as a result of which primary surpluses appear, and weak growth performance, due partly to the limited capacity of investment, ends up launching these countries into a permanent debt trap (Derviç and Özer 2005).

International financial problems differ for the poorest countries. Many of these countries are not fully integrated into international capital markets. Low GDP levels, weak institutions and underdeveloped financial systems make access to private capital markets difficult. Many countries are debt-ridden, with high public liabilities limiting the possibilities for development. With little access to private capital markets, these countries depend crucially on public finance, but options are limited by the previous levels of debt. The poorest countries need more active progress towards foreign debt relief through the Heavily Indebted Poor Countries (HIPC) Initiative, better access to the Poverty Reduction and Growth Facility (PRGF), managed by the IMF, and higher levels of foreign aid.

An important restriction on the scope of economic policy concerns management of the exchange rate. Many developing countries, wishing to improve their international reputation and provide guarantees against economic interventions, adopted totally flexible exchange rates or rigidly connected their currency to the international reserve currency. A totally flexible exchange rate regime increases transaction costs, demands a solid internal monetary anchor and risks damaging the competitiveness of the economy—through Dutch disease—in periods of massive capital inflows. A pegged exchange rate regime could have positive effects on certain internal policy objectives, such as control of inflation and capital movements, but at the cost of reduced levels of economic flexibility and increased difficulty in price adjustment against balance of payment problems.

Another important issue affecting countries' autonomy is their capacity to regulate capital transactions. Initially, recommendations for liberalization included not only commercial but also full capital account liberalization. But neither theoretical principles nor empirical evidence support arguments for an increase in the levels of discipline and efficiency from this opening of financial markets. There seems to be no strong evidence of a connection between liberalization of the capital account and economic growth (Rodrick 1998; Garret 1998; Kraay 1998; Edwards and Gaventa 2001).[3] There is considerable evidence, however, that freedom of capital movement increases the levels of instability. The experience of the last crises revealed the negative effects of financial liberalization when financial institutions and regulatory frameworks are weak.

These observations point in one direction: the need to preserve a certain autonomy to shape national economic policies in developing countries. Although there are many areas where this autonomy can be strengthened, two are especially important: the exchange rate and regulation of capital movements.

PROPOSALS FOR REFORM

Two objectives should spur reform of the international financial system: stability and efficiency. Increasing stability is desirable to prevent further financial crises and reduce contagion. Providing adequate supplies of capital, public and private, to developing countries, including the poorest, is important for economic growth. With these objectives in mind, six aspects appear particularly important in reform of the international financial system. (For a more radical proposal for a world currency, see viewpoint 2.1.)

3 Nevertheless, it is possible to admit the existence of a threshold above which the removal of capital controls is advantageous (Edwards and Gaventa 2001; Klein 2003).

CODES AND STANDARDS

Considerable progress has taken place in defining codes and standards for financial sector regulation. Codes and standards aim at improving the information available to creditors, increasing the transparency and efficiency of markets and reducing the risks of crisis and contagion. The Financial Stability Forum points out 12 areas thought to be most important for improvement (table 2.2).

The International Monetary Fund (IMF), in its Reports on Observance of Standards and Codes, follows up on implementation. It finds that the most important improvements have been in data dissemination, fiscal transparency, mon etary and financial policy transparency and banking supervision. Many developing countries favour implementation of the regulatory frameworks to improve their access to international capital markets, but most codes and standards are promoted by developed countries with little participation by developing countries (Rojas-Suárez 2005).

Table 2.2. Codes and standards

Subject area	Key standard	Issued by
Macroeconomic policy and data transparency		
Monetary and financial policy transparency	Code of good practices in transparency in monetary and financial policies	International Monetary Fund
Fiscal policy transparency	Code of good practices in fiscal transparency	International Monetary Fund
Data dissemination	Special data dissemination General data dissemination	International Monetary Fund
Institutional and market infrastructure		
Insolvency	Principles and guidelines on effective insolvency systems	World Bank
Corporate governance	Principles of corporate governance	Organisation for Economic Co-operation and Development
Accounting	International accounting standards	International Accounting Standards Committee
Auditing	International standards on auditing	International Federation of Accountants
Payment and settlement	Core principles for systemically important payment systems	Committee on Payment and Settlement System
Market integrity	The 40 recommendations	Financial Action Task Force
Financial regulation and supervision		
Banking supervision	Core principles of effective banking supervision	Basel Committee on Banking Supervision
Securities regulation	Objectives and principles of securities regulation	International Organization of Securities Commissions
Insurance supervision	Insurance supervisory principles	International Association of Insurance Supervisors

Source: Financial Stability Forum (www.fsforum.org/Standards/).

Viewpoint 2.1
A world currency?

The idea of a world currency is by no means new, but it has not had much attention in recent discussions of reform of what many call—rather too optimistically—the international monetary "system".

This system includes 184 members of the International Monetary Fund (IMF) representing about 170 currencies. Looking at the complete disorganization of currency markets and the recurrent currency and debt crises, one might well wonder why more than one currency is needed to conduct international trade and payments in a world that has prided itself, since the end of the Cold War, on globalization and has aspired to a high degree of free trade and international interdependence.

"Money-of-Account", Keynes wrote in the opening lines of his *Treatise on Money*, "is the primary concept of a Theory of Money." A money of account comes into existence along with debt and price-lists, which can be expressed only in terms of a money of account. The money of account is a public good in the most precise sense of the term, in that one person can use it without that good detracting from the utility of money enjoyed by other users.

Even more than a public good as classically conceived, money as unit of account is a "super public" good or "magical good" in the sense that an individual's utility is generally enhanced by the participation of more users. To be more precise, money as a unit of account is a "network externality," where benefits increase to each user as more agents recognize the *same* money account measure. A lonely but rational Robinson Crusoe would need an internal numeraire for economizing on thought in making personal choices, but he would have no need for a social unit of account. In a complex economy, however, it is indispensable and the more so the larger the economy. For this reason the nation state, with hardly a single exception, has always evolved into a common monetary area. Not a single country today uses more than one domestically officially created money within its territory.

The public good nature of a currency, looked at from its primary concept of unit of account, hardly requires explanation. Imagine a barter society without a unit of account. Without a unit of account, prices would be quoted in pairs. If there were n commodities, there would be $1/2\ n(n - 1)$ relative prices. If $n = 100$, then the number of relative prices is $RP = 4{,}950$.

Of course, even some barter communities would catch on and realize that with price relations such as $aX = bY = cZ$ they could find a common unit of account, such as X, so that the relative prices quoted in a unit of X is equal to $X = b/aY = c/aZ$, giving birth to a numeraire and eventually a full-fledged unit of account. In a barter economy, the unit of account would be a commodity.

And not just any commodity. By a process of natural selection, the chosen unit of value or numeraire commodity would be the most familiar, reliable and stable: familiar because people have to know its value to relate other values to it; reliable because it must not be ephemeral and subject to the vicissitudes of weather, harvests and political changes; and stable because it must reside in memory.

International monetary systems have attributes of public goods in the sense that one country can benefit from them without detracting from the benefits derived by other countries and can even increase them. Monetary unions and currency areas (fixed exchange rate zones) are examples of monetary systems that produce welfare gains in the form of reduced transaction costs, enhanced transparency of pricing and elimination of balance of payments problems and uncertainty about exchange rates. Larger monetary unions and currency areas are more stable than smaller ones because the marginal utility of money declines at a slower rate, making the liquidity preference schedule flatter.

Narrowing currency fluctuations: a basket of three currencies

How can a world currency be defined? One approach would define it in terms of gold, the historic monetary metal. Gold has the sanction of history, including the Bretton Woods Agreement in 1944, which settled on gold as the basis for currency parities. A return to the system applied before 1971, in which the United States fixed the price of gold in dollars and other countries used that "con-

vertible into gold" currency, could be the anchor for a new world currency system.

But the same factors that brought down the Bretton Woods arrangements would render it difficult, if not impossible, to make the dollar convertible on demand into gold today. No price of gold anywhere near current levels would make it plausible to convert the trillions of outstanding dollar claims into the precious metal.

Nor would the world's second most important currency area, the euro, want to take on the burden of convertibility—despite the fact that the European System of Central Banks holds half the world's monetary gold reserves. Gold may find a useful role in a future international monetary system, but the possibility of a system involving the convertibility of dollar or euro claims into gold seems unrealistic.

A better approach to creating a world currency is to start with arrangements for stabilizing exchange rates and gradually move from there. The three most important currencies in the world, the dollar, euro and yen, could be made into a basket of currencies, called, let us say, the dey. Because there is no important inflation in the dey area, it should be possible for the three dey central banks to minimize currency fluctuations using a combination of unsterilized currency intervention and monetary policies. The dey could then become the platform on which to build a global currency—let us call that the intor.

If the proposal were to be considered today, activity would start with a plan to prevent excessive depreciation of the dollar, euro or yen. There would be a period of *tâtonnement* for the central banks to get a feel for the market and sustainable exchange rates. A look at the dollar-euro exchange rate over time shows that it would have been fairly easy for the central bank to have put a floor for the euro at $0.90, or at least $0.85, when market participants and officials asserted that the euro had fallen too low. This could have established a precedent that would subsequently have allowed establishing a ceiling for the euro.

Today, one might start with the European Central Bank and Federal Reserve Board establishing a $1.30 ceiling for the euro. No doubt that ceiling would be tested by speculators, but, provided the principles alluded to above are considered, the victory of officials in maintaining the ceiling cannot be in doubt. Just as 11 European countries fixed bilateral exchange rates credibly on July 1, 1998—at once eliminating speculative capital movements—they could do the same with the dollar-euro exchange rate. A similar procedure could be conducted between the European Central Bank and the Bank of Japan, and the Federal Reserve Board and the Bank of Japan.

A monetary union of the Group of Three

Make a leap of the imagination and consider the possibilities of a monetary union of the three central banks of the Group of Three (G-3). Of course, the argument will be made that these areas are too different to have a monetary union. But in terms of economic reality, they are much more similar than the 12 countries that now make up the European Monetary Union and far more similar than the 25 countries that now make up the European Union and that at some future date will probably all be members of the same currency area.

This G-3 monetary union would not be a single-currency monetary union. The United States would not give up the dollar, Europe give up the euro or Japan give up the yen. It would be a multicurrency monetary union, a fixed exchange rate area with a common monetary policy.

Formation of a monetary union for members of either a closed economy or an open economy with flexible exchange rates requires five conditions:

1. Consensus on an inflation target (for example, 1%–3%).
2. A common index for measuring inflation (for example, the euro area's Harmonized Index of Consumer Prices).
3. Locking of exchange rates, as the European Monetary Union did in July 1, 1998.
4. A dey central bank to determine monetary policy, as the European Central Bank did for the euro in 1999–2002.
5. A mechanism for distributing seigniorage (in the European Monetary Union it is proportionate to equity in the European Central Bank).

A prime requisite for the stability of either a single-currency monetary union or a multicurrency monetary union with a fixed exchange rate is fiscal discipline, whether voluntarily imposed by

each government or agreed to by collective or consensual agreement and enforced by sanctions for violations.

The duty of the dey central bank would be to pursue monetary stability in the dey area, which represents nearly two-thirds of the world economy. Successful monetary unions need some arrangement to prevent free-rider fiscal policies. The problems should not be insurmountable in an arrangement with three central banks. There would be a great increase in efficiency in exchange and payments once the huge gyrations of exchange rates were removed and an enormous gain to the rest of the world. The dey unit should become the platform on which to base a multilateral world currency in which every country would have a share.

Creation of the intor

A strong case can be made for widening, extending and generalizing the monetary union to other countries. Other countries would benefit from stability of exchange rates among the three largest currency areas because it would become a more stable anchor for their own currencies. All countries would benefit from the adoption of a global unit of account. Countries outside the G-3 (especially larger countries) might resent trilateral dominance in money matters in which they have no voice. And a world currency is in the nature of a social contract in which every country has a juridical stake in proportion to its economic size.

The Board of Governors of the IMF, composed of the finance ministers or central bank governors of all member countries, represents a broad-based international monetary authority in which all countries have votes. Its sanction of the adoption of an international currency such as the intor, freely convertible into dollars, euros, yen and dey, would mark a great advance in the creation of an international financial architecture.

The Board of Governors could make whatever changes are necessary in the IMF Articles of Agreement. Instead of emphasizing to its clients the necessity of flexible exchange rates, the IMF Executive Board would stress the advantages of achieving stable exchange rates to an intor that is stable in terms of the main world currencies.

The process could start bilaterally between the United States and Europe, Europe and Japan or the United States and Japan, or simultaneously with all three. The core basket of the three dey currencies could be altered at the discretion of the Board of Governors. As the economies behind the currencies in the basket expand or contract in relative terms, weights assigned to the currencies in the basket would be adjusted. Consideration could also be given to changes in the currencies in the basket.

The basic plan for the world currency could be implemented in three stages:

- *Stage 1 Transition to stable exchange rates.* Involving steps preparatory to the G-3 monetary union. A gradual process could start with ceilings and floors on the G-3 currencies.
- *Stage 2 G-3 monetary union based on the dey.* Fixing an inflation target and defining the price level in terms of the dey, locking exchange rates, establishing the joint monetary policy committee and arranging for the division of seigniorage.
- *Stage 3 Creation of the intor.* Selecting a definitive name and value for the currency, the mechanism and agency for introducing it, the system and criteria for controlling its quantity, its backing in terms of currency or commodity reserves and the location of its central authority.

A world currency would level the playing field for big and small countries alike. As Paul Volcker aptly put it, "in a globalized world, we should have an international currency." Why not make one?

Source: Drawn from a background paper by Mundell (2005).

INTERNATIONAL FINANCIAL COOPERATION

The advances in codes and standards have not been paralleled by similar advances in regulatory standards for international investors, required for markets to perform properly (Kaufman 1998; Eatwell and Taylor 2000). There have been some improvements in the exchange of information and coordination between regulators. The three Basel committees began to work on common regulatory standards for application by the regulatory authorities of participating countries. The expectation was that these standards would eventually spread to developing countries through international emulation, market pressure and the persuasive capacity of the Bretton Woods institutions.

However, the limited participation of developing countries in the decision-making processes of the Basel committees may have important costs in terms not only of institutional legitimacy but also of regulatory efficiency. Many developing countries have criticized the new Basel Capital Accord (Basel II) for its restrictive effect on loans from international banks and its possible procyclical impact (Griffith-Jones and Spratt 2001).

Developing countries also have a very limited role in another new institution, the Financial Stability Forum, created after the Asian financial crisis to identify financial vulnerability and sources of systemic risk. Through its working parties, the Financial Stability Forum prepares reports on such aspects of financial markets as the establishment of minimum standards and conduct codes and control of hedge funds and offshore centres. Its capacity for influencing decisions made by regulatory authorities in developed countries is limited, however.

NEW INTERNATIONAL MONETARY FUND FINANCING FACILITIES

The most recent financial crises revealed the importance of institutions able to inject liquidity into economies suffering from acute instability. After the Asian crisis, the IMF created two new facilities for this purpose, the Supplementary Reserve Facility and the Contingent Credit Line, and in 2002 it created a unit for special operations to deal with financial contingencies in emerging market economies.

The Supplementary Reserve Facility provides resources to relieve exceptional short-term difficulties in the balance of payments caused by sudden changes in the market affecting the capital account or the availability of reserves. The Contingent Credit Line, a preventive financial instrument, is used to help countries with heavy pressure on their capital accounts.

Though a step in the right direction, these responses are insufficient. The Supplementary Reserve Facility's effectiveness at time of crisis is limited by the small scale of available credits. Adequate funds are needed to defeat speculative pressure—before an affected country's reserves are depleted. The IMF has traditionally been seen as a catalyser or coordinator of other financial resources, an appropriate role in times of stability, but clearly insufficient in times of crisis.

However, the rescue operations of the Supplementary Reserve Facility may function as a security mechanism against crises, helping to avoid problems of moral hazard by preventing irresponsible or incautious behaviour by creditors and debtors. The IMF needs to achieve a balance between its security-providing function of limiting

systemic risk and its role as guarantor of market discipline by preventing opportunistic behaviour.

The greater novelty was the Contingent Credit Line, which was designed to support countries with no risk to the balance of payments but vulnerable to the effects of contagion from crises in other countries. To be eligible, countries had to have good relations with creditors; healthy macroeconomic policy; a satisfactory reform programme for the mid-term; implemented international standards; sound indicators of fiscal balance, inflation, growth, capital flows, international reserves and the financial system; and reduced international vulnerability. Both because of the onerous eligibility requirements and because of the fear that resorting to this facility might send the wrong signal to financial markets, no countries applied to the Contingent Credit Line. In 2000 the IMF tried to make the facility more attractive by reducing the interest rate, but countries continued to avoid it. The Contingent Credit Line "ended up being neither a lender of last resort facility" that could be drawn on quickly in times of crisis, nor a "protection facility" that would ensure a country against the risk of crisis (Derviç and Özer 2005: 124).

Proposals have been presented that would avoid the problems of the Contingent Credit Line. For instance, Griffith-Jones and Gottschalk (2004) proposed a new facility that would operate automatically, with countries becoming eligible through annual IMF Article IV consultations. Derviç and Özer (2005) offer a more radical proposal, warning that the correct level of debt is a prerequisite for avoiding the risk of crisis. They propose creating a stability and growth facility, managed by the IMF and the World Bank, directed at reducing the vulnerability of countries with debt accumulation by backing country efforts to maintain growth and debt reduction over the mid-term. Countries could qualify for support even if they were not in crisis if they had high levels of debt and therefore suffered from high external vulnerability. Conditionality would be adapted to each country's circumstances and its need to grow. Support would be gradual, to avoid problems of moral hazard, while still being a stable source of mid-term financing. Adequate resources would be available at low prices to allow for effective debt reduction, while maintaining growth and social policies to fight poverty. And there would be trust-based credits of reasonably long maturity.

To sum up, reducing financial instability requires not only an effective mechanism to provide liquidity when expectations change suddenly, but also instruments to support efforts to reduce debts in countries that are a source of systemic instability. Both tasks require new sources of finance and perhaps greater operational capacity for the IMF (and the World Bank) as creditor and guarantor of the stability of the international financial system.

MACROECONOMIC COORDINATION AND SURVEILLANCE

Financial risk is strongly affected by economic policies. Promoting healthy policies in developing countries and boosting macroeconomic coordination among developed countries, especially those with influence in international markets, are necessary to reduce financial instability. These practices are international public goods with wide-reaching spillovers.

There have been few advances in this regard. Agreements at meetings of finance ministers, governors of Group of Seven central banks, the IMF International Monetary and Financial Committee and similar high-level financial groups have been quite limited. Such efforts, as the EU experience shows, may come up against the needs and

demands for national autonomy. Thus macroeconomic coordination among developed countries should be envisaged as a set of procedures for reducing the externalities resulting from economic policy decisions rather than as a strict symmetry of decisions.

Greater progress has been made in IMF surveillance of the policies of developing countries. There is more awareness of the need for preventative action, sound macroeconomic policies, an appropriate framework of regulations and supervision, minimum common codes of conduct and the provision of clearer information. New indicators of financial vulnerability have been developed that permit clearer international follow-up.

PUBLIC DEBT

The HIPC Initiative was a positive step in dealing with the foreign debt of developing countries. However, severe problems remain, including how to define debt sustainability. The established criteria (debt stock of 150% of exports and annual debt service of 15% of exports) are questionable in both theory and practice. Of the 42 countries potentially eligible for the HIPC Initiative, 15 have received substantial debt reductions, but only 7 have managed to maintain their debt at a level that is considered sustainable. High variability in export prices and volatility in growth make keeping debt below the established parameters a difficult task. Debtor countries must constantly revise the amount due and subject to cancellation by recurrently topping up to maintain sustainability. The World Bank has proposed a new composite index, and the UN Millennium Project has recommended defining sustainability according to a country's capacity to achieve the Millennium Development Goals.

Another problem is the eligibility of debt for cancellation under the HIPC Initiative, which many believe to be too restrictive. Some have proposed applying the cut-off date for bilateral debts considered at the Paris Club.

A third problem is the need to prevent debt relief activities from impeding other activities of the IMF. Some have suggested revalorisation of IMF gold reserves, currently valued at $8 billion, although their real market price could reach as high as $40 billion if sales were managed so as not to depress the market.

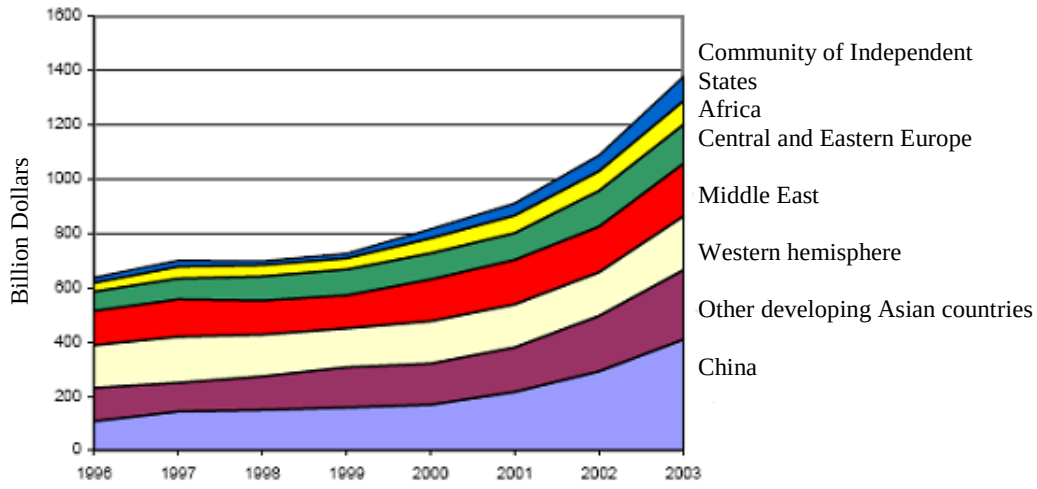
Dealing with "sovereign bankruptcy" presents yet another challenge. Various academic researchers and the IMF (Krueger 2002a,b) have proposed creating an arbitrage mechanism, a sovereign debt restructuring mechanism to avoid both collective action problems derived from the existence of a plurality of creditors and the asymmetric distribution of costs in credit agreements. The positive effect would come from a quick, quasi-judicial process that considered all the interests involved, including those of the populations of the debtor countries, which could have a positive effect at the international level. Against this statutory approach, other creditors (led by the US Treasury) defend the advantages of reliance on collective action clauses in debt contracts, which is a more decentralized and market-oriented approach.

RESORTING TO SPECIAL DRAWING RIGHTS

Developing countries, even very poor ones, keep high reserve levels as a preventive mechanism against internal adjustments, external shocks or currency crises (figure 2.1). However, accumulating reserves as a self-insurance mechanism has high costs. The re-

serves are invested in low-profit assets and cause capital to flow from developing countries to developed countries—opposite to the desired direction.

Figure 2.1. Evolution of reserves by region, 1996–2003



Source: IMF 2005.

There have been repeated proposals to use special drawing rights (SDRs) as more neutral reserve assets and as an international financial contribution to rescue packages in cases of financial crises. New issues of SDRs could be temporary, during periods of crisis only (Meltzer 2000), giving this instrument a clearly cyclical character, or permanent, linking SDRs to the provision of reserve assets and to the financing of activities connected with the provision of international public good (Zedillo 2001; Soros 2002; Stiglitz 2002). Resorting to SDRs would provide a source of finance at no cost, to developed or developing countries, and would have clear positive effects on developing countries if used correctly.

A traditional argument against resorting to new issues of SDRs is their inflationary effect. However, the evidence suggests that the additional liquidity from the SDRs would be unlikely to have even a slight effect on levels of international inflation, particularly at a time when those levels are historically low.

INSTITUTIONAL EFFECTIVENESS AND LEGITIMACY

Debate of the financial agenda also focuses on international institutions, particularly on institutional efficiency and on representativeness, legitimacy and accountability.

The most ambitious proposals call for creating a new international financial authority with regulatory and risk management functions that would provide guarantees and last resort loans and have the financial responsibility of the World Bank and the IMF (Eatwell and Taylor 2000).

Less ambitious proposals call for retaining current institutions, while increasing international, economic and financial coordination. Derviç and Özer (2005: 96) propose a new UN Economic and Social Security Council "responsible for the economic and social sphere of the international system". UN agencies, funds and programmes with duties in the economic and social fields and the Bretton Woods institutions would

come under its executive authority. Kenen et al. (2004) would assign this directive task to a new Council for International Financial and Economic Cooperation, which would include the 15 economically most important countries, represented by their ministers of finance, the UN Secretary-General, the IMF managing director, the president of the World Bank and the director of the World Trade Organization.

Other recommendations focus on strengthening existing institutions and consolidating regulatory and coordination activities (Bank for International Settlements and the International Organization of Securities Commissions, for example). The proposal to create a Forum for Financial Stability, to study in depth cooperation in supervision and surveillance in the international financial markets, would unite in one institution the economic authorities (ministers of finance, governors of central banks and supervisory authorities of the main countries) and the international financial institutions (IMF, World Bank and Bank for International Settlements) and other regulatory institutions (such as the Organisation for Economic Co-operation and Development, the Basel Committee, the Committee on Payment and Settlement Systems, the International Association of Insurance Supervisors and the International Accounting Standards Board).

Most proposals seem directed towards correcting the existing institutional framework rather than creating a new one, but there is no agreement on the guidelines for reform. The Meltzer Commission report (Meltzer 2000) recommends precise specialization of the roles of the IMF and the World Bank, with the IMF limiting its attention to managing systemic risk and operating as a creditor of last resort, and the World Bank directing its efforts towards fighting poverty and promoting reform in the poorest countries.

So precise a functional division is questionable for several reasons. First, IMF clients have changed considerably. Once the clients were mainly countries that were rapidly undergoing advanced industrialization. Today most of the clients are transition economies and developing countries with very high poverty indexes. The poorest countries, because of their rigid economies and limited productive bases, respond less to price-based adjustment. Adjustment thus needs to be accompanied by changes in the incentive system in the economy, which take time and require social action. Without the economic and institutional strengthening of the weakest economies, progress in systemic security will be limited.

Thus, the IMF should preserve its long-term financial facilities, assuming this function in cooperation with the World Bank. That there may be an overlap in activities between the two institutions seems a minor issue, a reflection of the difficulties in developing countries of establishing boundaries between adjustment financing and development financing.

A second critical aspect of the debate about international institutions concerns their representativeness, legitimacy and accountability (Alonso 2000). The Bretton Woods institutions, in particular, are suffering from a severe problem of lack of perceived representativeness and legitimacy. The 2002 Gallup International Voice of the People Survey, which collected opinions from 36,000 people in 47 countries, found that almost half of those interviewed did not believe that the activities carried out by the Bretton Woods institutions were aimed at improving people's quality of life. The global poll Multinational Survey of Opinion Leaders commissioned by the World Bank in 2002 found that more than half of respondents in Sub-Saharan Africa, South Asia, the Middle East and North Africa and Latin America believed that economic reforms recommended by the World Bank hurt poor people.

Representativeness is low in the Bretton Woods institutions and in other international financial institutions, such as the Bank for International Settlements and the Basel Committee. Although decisions made in these institutions have enormous impact on the developing world, developing countries have little influence on decision-making processes. They are also largely excluded from forums created to support the reform process of the international financial system, such as the Financial Stability Forum.

In sum, there is a problem of representativeness and accountability in international financial institutions that particularly affects developing countries, which are under-represented in the governance bodies of these institutions. This fact damages not only the legitimacy of international institutions, but also their effectiveness. As Derviç and Özer (2005: 145) have noted: "better globalisation requires more legitimate global governance."

CHAPTER 3
THE INTERNATIONAL TRADE REGIME AS A PUBLIC GOOD FOR DEVELOPMENT

International trade has grown rapidly in recent decades, creating many potential benefits and becoming central to any development strategy. But the benefits do not materialize automatically as a country opens its economy to the rest of the world. There is no clear-cut relationship between openness and development.

Arguments for free trade have their roots in comparative advantage theory, which maintains that trade enhances every country's welfare given the initial resource base, because of relative differences in countries' productivity across activities they undertake (static mutual gains from trade). Dynamic gains from trade are often related to increasing returns to scale, product differentiation and technological differences. The modern theory of endogenous growth is ambiguous with regard to whether trade liberalization alone fosters growth, as this depends on different forces of dynamic comparative advantage and whether they push the economy in the direction of activities that contribute to long-run growth through externalities in research and development, process and product innovations, value chain innovations and so on, or divert the economy away from such activities (Rodrik 2001: 26). Thus, in assessing the benefits from the trade regime, static and dynamic gains from trade need to be taken into account.

Empirical analysis is not conclusive either. For instance, while Dollar (1992), Sachs and Warner (1995), Edwards (1998) and Frankel and Romer (1999) find that trade increases income, Rodriguez and Rodrik (1999), in a review of these studies, question the robustness of the relationship,[4] and Wolff (2000) finds empirical support for models defending the creation of comparative advantage. If anything, as Rodrik (2001) observes, the only systematic relationship uncovered by empirical research is that countries dismantle trade restrictions as they get richer, indicating that today's rich countries embarked on modern economic growth behind protective barriers. Despite continuing claims of a relationship between openness and economic growth, Helleiner (2000: 5) notes that "it isn't at all obvious *either* (1) that further external liberalisation ('openness') is now in every country's interest and in all dimensions *or* (2) that in the overarching sweep of global economic history what the world now *most* requires is a set of global rules that promote or ease the path to greater freedom for global market actors, and are universal in application."

In other words, since trade liberalization alone cannot be relied on to deliver high rates of economic growth, it does not receive the same priority at the national level as it typically receives in the development policies advocated by multilateral organizations. Mendoza and Bahadur (2002: 3) therefore argue that more attention should be paid to whether the international trade regime is coherent or consistent with the development goals of the countries it is supposed to benefit.

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4 Rodriguez and Rodrik (1999) argued that the fragility of the trade and income link may stem from the assumption of a linear relationship between openness and growth. Noguer and Siscart (2004) reexamined the issue and found that open trade does raise income and found the results to be robust to the Rodriguez and Rodrik assumptions.

Today's international trade regime accepts different sets of policy instruments, and those in place when the most recently successful globalizers, the East Asian tigers, achieved their economic miracle are largely precluded by today's rules (see Bora and Pangesty 1999).[5] Today, many internationally agreed rules on trade and investment also go behind borders. Trade liberalization entails not only a reduction in trade barriers, but also compliance with World Trade Organization (WTO) requirements on subsidies, intellectual property and health standards, requiring, in turn, additional reforms on taxes, social safety nets and other institutional issues. Finger estimated that it costs a typical developing country $150 million to implement the requirements in just three of the WTO agreements (customs valuation, health and phytosanitary measures and intellectual property rights), an amount equal to a year's development budget for many of the least developed countries (Finger and Schuler 2000).

Despite successive rounds of multilateral trade negotiations under the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO), and unilateral and bilateral liberalization of trade, most developing countries have been unable to benefit from this trade regime and to better integrate into the global economy. Industrial activity and production capabilities are highly concentrated in a few economies, both industrialized and developing, and most developing countries remain on the bottom rung of the technology ladder (UNIDO 2002b). Exports of high value-added manufactured products, a driver for growth, are concentrated within a small group of developing countries. Only a few developing countries have experienced dynamic production growth and a changing export structure characterized by an increasing share of technology-intensive products. These have achieved sustainable income growth.

Discussing the issues that impede a multilateral trade regime that promotes growth and development is therefore worthwhile. A fruitful way to do so is from a public goods perspective.

THE PUBLIC DIMENSION OF THE PROBLEM

Global trade liberalization provides a global public good, an international trade regime with full reciprocity and non-discrimination among trading partners (Zedillo 2006). The international trade regime is a joint-product activity that yields outputs that vary in their degree of publicness. As such, the regime has both private and public outputs (Birdsall and Lawrence 1999; Mendoza 2003) with excludable benefits from the associated private good (for example, most favoured nation status) and non-excludable benefits from the associated public good (for example, efficiency gains to the traders). The presence of country-specific private gains from the trade regime facilitates its provision, insofar as countries are forced to reveal their preferences for these private goods and, thus, for the jointly produced public good. If the component private and public outputs are complementary (better when consumed together), then preference revelation will be fuller. This follows because the desire for the public good increases with greater consumption of the associated private good. An increase in the share of jointly produced excludable to total outputs augments preference revelation.

Since membership may be restricted, the international trade regime may be a club good. When, however, network externalities are present so that members' benefits

5 As had been the case for today's advanced industrial countries as well (Scherer and Watal 2001).

increase with group size, exclusion becomes undesirable (Funke and Ruhwedel 2001; Hummels and Klenow 2002; Rutherford and Tarr 2002). In this case, the trade regime loses its *exclusive* club status and needs to be all-inclusive. If trade creation (for members) and trade diversion (for non-members) considerations make membership restrictions beneficial, then a trade or custom union is formed with tariff barriers imposed on non-members. Such a union is welfare improving for members at the expense of non-members.

In an ideal setting a regime of free trade may be a global pure public good with non-rival and non-excludable benefits worldwide owing to efficiency gains if there are no distortions. Such an international trade regime discourages protectionalism and races to the bottom that might otherwise occur from competitive pressures (Birdsall and Lawrence 1999). Moreover, this regime minimizes the probability of costly trade wars and increases the cost of conflicts (Conybeare 1984) from lost efficiency gains.

The issue is how in practice to achieve this global free trade regime. Nations may see a strategic value to staying outside of the trading "club" by free riding on the reduced tariff barrier without reciprocating. Such actions are likely to result in retaliation or else the formation of distinct trading blocs with no tariffs within and high tariffs between blocs. Even the formation of a trading bloc requires overcoming collective action concerns, because nations are motivated to wait until others negotiate a regime and then join to claim most favoured nation status. Thus, there is no guarantee that the first-best worldwide free trade regime will be achieved. Regional trade blocs share a club-good characteristic from trade creation, whose benefits can at time display rivalry as members may lose some competitive advantage with a larger union.

Another important characteristic is asymmetry among members in level of development or in share in international trade: for example, developed countries still account for the lion's share of world trade (table 3.1). The way collective action takes place depends on the presence of group asymmetries. There is a lack of consensus among researchers about the impact of these asymmetries on the provision of this public good. The hegemonic stability theory argues that the presence of a hegemonic power promotes a stable international order (Kindleberger 1973, 1986), although with some risk of exploitation of large countries by small ones because of free riding (Olson 1965).[6] Imbalances of power in international trade may shape trade rules in favour of the most powerful (Kwa 2002).

Asymmetries also affect the benefits of the collectivity, with respect to members and non-members, because of the interactions between the groups. Although worldwide free trade maximizes income for the world as a whole, it does not do so for each of its parts. As a consequence, international trade benefits each participant only if there is some mechanism to redistribute gains within and among nations. This is one of the main difficulties for developing an international trade regime based on broad consensus.

6 According to Kindleberger, an international order can exist insofar as a hegemonic power is willing to provide certain essential public goods (cosmopolitan public goods), like a system of international security, a currency to be used in international exchange or institutions to guarantee the free functioning of the market.

Table 3.1. Share of merchandise and service exports (percent)

Exports	1960	1970	1980	1990	2000	2004
Merchandise						
Developing countries	24.5	19.2	29.5	24.3	31.6	33.5
South-East Europe and Commonwealth of Independent States	5.7	5.8	5.3	3.7	2.7	3.5
Developed countries	69.7	75.0	65.3	72.0	65.7	63.1
Services						
Developing countries	na	na	19	19	23	23
South-East Europe and Commonwealth of Independent States	na	na	2	1	2	2
Developed countries	na	na	79	80	75	75

na is not available. *Source:* UNCTAD *Handbook of Statistics* (http://stats.unctad.org/handbook).

It is useful to examine the distinction made by Mendoza and Bahadur (2002: 8–9) between fair and free trade. They assert that the current system is biased towards free trade and requires a better balance between free trade and fair trade to make this global public good beneficial to all countries. To create a fair trade regime it is necessary to consider how the gains from trade are shared across countries and over time (see viewpoint 3.1 on the need for a level playing field in international trade). Pursuing more trade among non-equals, without considering the capacity of a weaker player to develop comparative advantages, could lead to an erosion of the gains from trade over time and can even result in an increase in poverty and environmental degradation in developing countries. An international trade regime that does not deal adequately with these vulnerabilities reveals its underprovision. Clearly there is a need to help developing and least developed countries build their productive capacity.

There are many examples of developing countries facing anti-development trade rules, indicating that their development concerns are not adequately reflected in the design of the trade regime and in its decision-making process. This reveals malprovision of the international trade regime as a public good (Mendoza and Bahadur 2002: 18). Reforms must focus not only on the actual imbalances, but also on the decision-making process that generates these imbalances in the first place.

In addition, developing countries are concerned about the social costs and the implementation costs of trade-related regulations and reforms. The proposal to establish an "aid for trade" fund to help poor countries meet the adjustment costs associated with full implementation of a Doha development agenda recognizes this need.

The asymmetries concerning the individual provisions and benefits of the public good are behind the tensions in the international trade system and are at the centre of the difficulties of providing the global public good of the international trade regime. Countries obtaining high benefits from the system have an interest in extending it to more participants, since that increases their benefits and avoids the danger stemming from a weakest link aggregation technology, while those obtaining low benefits are interested in participating as long as the system provides a better balance in relation to their benefits.

Viewpoint 3.1
For whom is a level playing field in international trade a global public good?

Trade liberalization presents two problems for low-income economies (UNDP 2002; Mendoza 2003). The first is that many of them operate in an asymmetrical trade environment: they are forced to liberalize their markets to incoming manufactures, but their access to external markets for raw and semi-processed commodities is limited by protectionism. This has led to widespread calls for a "level playing field". The second is the insistence that low-income economies do more to define the global trading system, so that these inequities are not sustained.

Both these policy-related concerns derive from an intellectual architecture that, while mindful of the redistributions deriving from trade policy reform and renewed patterns of specialization and trade, is built on the premise of mutual gains from trade. But this architecture is flawed: many trading partners are structurally excluded from the benefits of trade and suffer from the extension of a liberalized trading system as a global public good.

Questioning the case for openness

The theoretical case for trade liberalization is based on three key assumptions: full employment, the immobility of capital and resource transfers to facilitate restructuring and dynamic comparative advantage. Each assumption defies reality, particularly with China's increasing participation in the global economy.

Questioning the assumption of full employment. Macroeconomic policies see unemployment as a manageable, temporary departure from a world of full employment. But an alternative body of thinking argues that there is a systemic tendency towards a reserve army of labour: as global barriers are reduced, either migrant labour saturates the market in countries formerly near full employment or imports from labour-surplus economies do the same. The net effect depresses the incomes of all whose livelihoods depend on the work that can be performed by this surplus labour force, either because wages in a formerly tight labour market are depressed or because the global labour pool forces widespread unemployment.

This is precisely what is happening in the current phase of globalization. The spectre of a global reserve army of labour is emerging to affect medium- and long-term employment and wage rates as the large labour surplus in China, India and elsewhere is made available to support global production networks.

The long-term prognosis: The number of people available to work in low-income economies dwarfs that in high-income, high-productivity economies. Much of the labour force in low-income economies is either unemployed or works at very low productivity, often in the informal sector. In many developing countries the effective rate of unemployment is high—more than 30% in some countries. In China, and to a lesser extent India, the numbers are startling. Of China's labour force of some 770 million, 100–150 million people currently work at very low levels of productivity and are waiting to be absorbed into the global economy. This surplus is equivalent to more than one-quarter of the total labour force in all high-income economies.

The absorption of the reserve labour force will take a very long time, particularly as technology becomes increasingly labour saving. But many developing economies have invested substantially in skill development. The consequence: the reserve army of labour is no longer confined to unskilled workers.

Questioning the assumption of capital immobility. Much of the capacity expansion in low-income economies, particularly in China, was financed domestically. But a considerable proportion was sourced externally, through a combination of indirect private portfolio investments into stock markets and direct foreign investment into enterprises. Following the 1997 Asian financial crisis, the developing world's share of foreign direct investment (FDI) fell. But these reduced investment flows were concentrated: Asia accounted for more than half of FDI into developing countries.

Questioning income transfers to fund restructuring. Dynamic comparative advantage must be a central component of development strategies for sustainable income growth. It requires the capacity to develop processes of upgrading by building dynamic capabilities in production. This upgrading targets not just products and process technology, but also positioning within value chains and the capacity to move from highly competitive chains to chains with higher barriers to entry.

Achieving dynamic comparative advantage and systemic capacity to upgrade requires a strategic and policy framework that includes the development of a stable macroeconomic operating environment with currency stability, affordable investment and low rates of inflation. It also requires resources to cope with market failures across a range of sectors. Underlying these industrial and technology policies to promote restructuring—particularly in the poorest countries—must be a pool of restructuring funds that governments can

draw on that are not short-term and do not require a commercial rate of return.

Aid flows can provide this form of restructuring resource. However, the absolute level of transfers of aid fell during the 1990s. And the developing world is mired in debt, so that most incoming aid funds are destined for the repayment of past inflows.

Challenged assumptions: with what consequences?

The unreality of the three key assumptions in the case for trade liberalization has several consequences. One is the growth of global excess capacity. Another is the possibility of significant changes in the terms of trade for commodities and manufactures. And a third is the extent to which this possibility explains the differential fruits of globalization.

Structural excess capacity. The rising flow of investment ambitions in the developing world coincided with searches for new production outlets by foreign investors and new sources of supply by global buyers. The result: a significant growth in capacity in many sectors that exceeds all feasible demand.

The commodities-manufactures terms of trade. Analysis of the price of globally traded manufactures leads to two conclusions. First, the greater China's participation in global product markets, the more likely it is that prices will fall. Second, this effect has a disproportionate impact on low-income countries that face intense competition from Chinese producers. The early twenty-first century may be witnessing a shift in the secular terms of trade. Instead of a decline in the barter terms of trade of manufactures against commodities, a much more complex picture is emerging: falling terms of trade for exporters of some manufactures against exporters of both some manufactures and some commodities.

Gainers and losers. The notable performance of East Asian growth rates reflects in large part China's extraordinary growth performance in GDP (about 10% annually) and manufactured exports (17% annually) since 1985. But it is more complex. Many of the raw materials, equipment and intermediate inputs underlying China's rapid growth (much of it processed for exports to other regions) have been sourced from East Asia. By contrast, the good performance of South Asia, reflecting India's sustained and rapid growth, has not entailed trade expansion within the region.

In what circumstances should global public goods be resisted?

These outcomes challenge the case for trade liberalization as a global public good, in the normative sense of "good" as a welfare outcome. This calls for alternative policy agendas designed to rebalance the structural mismatch between supply and demand, to encourage upgrading and the growth of dynamic capabilities in low-income economies and to manage global market access. UNIDO has an important role to play in the development and support of the last two agendas in low-income economies.

Policy issues

What are the consequences of the negative externalities flowing from trade liberalization as a global public good? The first is the need to manage the relationship between supply and demand as a structural rather than a cyclical issue. Proponents of across the board liberalization argue that the problem of excess capacity will be readily resolved. It might result from greater inward orientation in China and India, expanding their domestic consumption. As demand in the United States, the United Kingdom and other high-income markets contracts, demand by China for inputs from other countries might increase. Significantly expanded aid transfers to poor economies might enhance consumption power in stagnating low-income economies. These developments, it is argued, will enhance demand.

But there are several problems with this argument. For one thing, there is little sign of the political commitment required to reverse the two-decades-long decline in real resource transfers to poor countries, to allow a major expansion in global demand from them. Moreover, to the extent that these income transfers involve redistributing consumption from rich to poor countries (rather than global deficit financing), there will be no augmentation of global demand, merely a change in its composition. For another, China and India are so large that the reserve army of labour at the global level will also manifest itself at the subcontinental level. In other words, they will have difficulty balancing consumption and production domestically, even as they turn their focus inward. There is no reason to suppose that the systemic trajectory towards excess capacity will change with domestic market expansion in China and India.

A second set of policy prescriptions affects innovation. In a world of excess capacity, competition intensifies and sustainable income growth requires the capacity to produce efficiently and to innovate effectively. With the growing complexity in the pattern of price formation for different goods, sustainable income growth cannot be de-

livered merely by switching from commodities to manufactures. Instead, it requires the capacity to upgrade from commodities and manufactures with low barriers to those with higher barriers to entry and thus higher rents.

Here, as in the management of the global economy, the efficient markets as a public good argument breaks down. Abundant evidence shows that markets alone cannot upgrade dynamic capabilities in production. Effective innovation requires a holistic approach, encompassing a vibrant private sector and effective policy support. It also requires effective processes of innovation, crossing sectoral boundaries and addressing value chains. This invariably requires facilitation by national or regional governments (Kaplinsky and Morris 2001; Rodrik 2004a).

Third is the issue of policies towards openness. Effective innovation regimes do not work for all producers in an open economy, and excess capacity and heightened competition lead to the marginalization of many producers. Externalities in the extension of trade liberalization as a global public good may be positive for many global citizens (as in East Asia and the rich economies), but negative for others (in Africa, Latin America and the Caribbean, and Central Europe).

Strategic approaches

Two strategic approaches are indicated, and both challenge the central tenet of the current phase of globalization—market access. The first approach is to argue the case against openness in external markets. Instead of the level playing field demanded in the development community and policy circles, poor producers require an uneven playing field, tilted in their favour. They require preferential access in external markets, often at the expense of other low-income but more competitive economies. For example, further expansion of clothing exports to high-income economies can no longer be achieved by displacing producers in these consuming countries—it is now a battle against other developing economies, notably China and India. Special and differential treatment must endure, even if it changes as low-income economies show differential capabilities.

The second approach relates to access to markets in low-income economies. Since these economies cannot compete with China, India and other newly dynamic economies, they may need to reintroduce forms of protection that they yielded over the past two decades. But to do so, they need to learn from an era of import-substituting industrialization. In many countries domestic markets are too small to allow either scale economies or effective competition. Thus, there will be a need to foster sub-global openness with economies at a similar stage of competence, probably within regions (to allow for the regional externalities so important in modern competitive production). They will also need to attune their policy agendas to the competences of their state sectors, since weak state bureaucracies cannot cope with the detailed, prescriptive policy regimes used so successfully in, for example, the Republic of Korea and Taiwan, China, during the 1960s and 1970s.

What roles do the UN system and UNIDO play in regard to these failings of trade liberalization as a public good? UNIDO has a clear role in support of innovation (often within value chains) and in the development of clustered areas of regional innovation and trade. Particularly with the advance of systemic efficiency, where the boundaries of competitiveness involve value chains or regionally clustered economic actors, market failure is endemic. Firms need to be not only encouraged to collaborate but also provided with the skills to do so, including developing dynamic learning capabilities. Particularly in low-income countries, this requires the development of tacit skills, with considerable emphasis on support for capability building that draws on global best practices.

But many innovative capabilities are best pursued in a regional context. This support can be allied to the development of regionally clustered industrial, agricultural and service sectors, appropriately linked to trade regimes that promote enough openness to facilitate competition and innovation and allow developing countries to reap consumer surpluses through cross-border trade, without the adverse implications of full trade liberalization.

Source: Drawn from a background paper by Kaplinsky (2005).

DIAGNOSIS OF THE INSTITUTIONAL FRAMEWORK FOR REGULATION

At the global level the General Agreement on Tariffs and Trade (GATT), both as a treaty and an institution, has been one of the most important international public goods available to the world economy for the last five decades. After the Second World War, to end the unilateral trade retaliation seen in the interwar period and establish rule-based international trade, 23 countries created the GATT. The creation of the World Trade Organization (WTO) in 1995 as an independent multilateral institution offering its 149 members (as of 2004) a level playing field for trade negotiations and dispute settlements is an extension of the work of the GATT and a testimony to the ever-growing importance of global trade in world affairs. As an institution, GATT served as the negotiating forum for a series of rounds aimed at liberalizing trade among the major economies of the world. As a treaty, it provided a set of multilateral rules for the smooth flow of global trade.

Up to the early 1960s, the GATT remained a small group of largely developed countries. Much has changed since then. Successive rounds of trade negotiations have increased the number of participants and the range of areas under its discipline (table 3.2). Today, 149 countries accounting for more than 90% of the world trade in goods and services are members of the WTO.

The Tokyo Round (1973–79) and the Uruguay Round (1986–94) led to the single undertaking approach (see box 3.1 on core principles of the WTO) for accepting obligations under the GATT. Member countries could no longer choose which parts of the agreement they would sign up for but had to accept all the obligations under the GATT, although the time frame for implementing them could vary from country to country. At the 1994 Ministerial Conference in Marrakech, four main agreements were brought under WTO administration: the updated version of the old GATT (GATT 94), the Trade-Related Aspects of Intellectual Property Rights (TRIPS), the General Agreement on Trade in Services (GATS) and the Dispute Settlement Understanding. Membership in the WTO entails accepting all the agreements without exception.

Table 3.2. Trade rounds under the General Agreement on Tariffs and Trade

Year	Place/name	Subjects covered	Number of countries
1947	Geneva	Tariffs	23
1949	Annecy	Tariffs	13
1951	Torquay	Tariffs	38
1956	Geneva	Tariffs	26
1960–61	Geneva/Dillon Round	Tariffs	26
1964–67	Geneva/Kennedy Round	Tariffs and antidumping measures	26
1973–79	Geneva/Tokyo Round	Tariffs, non-tariff measures, framework agreements	102
1986–94	Geneva/Uruguay Round	Tariffs, non-tariff measures, rules, services, intellectual property, dispute settlement, textiles, agriculture, creation of the World Trade Organization	123

Source: World Trade Organization.

These modifications in the international trade regime changed the context for the next round of trade negotiations. At the Seattle Ministerial Meeting in 1999 developing countries' refusal to accept a process from whose development they had been excluded led to the meeting's collapse. The Doha meeting in 2001 avoided failure by setting relatively vague objectives, known as the Doha development agenda.

At the Cancun Ministerial Meeting in 2003 divisions fell almost uniformly along developed and developing country lines. The collective effort to develop a trade regime has become more difficult over time as the number and diversity of participants and the issues on the agenda have grown.

The expansion in membership and areas covered makes the international trade regime a de facto global joint product activity with some global public output (Mendoza and Bahadur 2002). Since countries can, in principle, interact on a level playing field with all other WTO members, the international rules of trade resemble a club good. This club-style character has been widely discussed (see, for instance, Keohane and Nye 2001; Kerr 2002; Tandon 1999; Conybeare 1984; Mendoza 2003): membership grants non-discriminatory most favoured nation status and access to all discussion forums, to the Trade Policy Review Mechanism that supervises members' trade policies and to the dispute settlement mechanism that countries apply to for enforcement of trade regulations. Both the trade policy review mechanism and the dispute settlement mechanism provide partially rival benefits subject to crowding as more situations are reviewed or disputes are subject to settlement. Congestion can be relieved as the capacity of these mechanisms is increased with membership. Non-members do not enjoy access to these features.

For many developing countries, the concessions required for GATT membership were well beyond their capabilities. A new class of membership was created—developing country status—with weaker requirements. In exchange, developed countries were able to keep control of the negotiating agenda. These hierarchies meant that developing countries demanded little from the GATT up to the Uruguay Round, having little interest in setting the negotiating agenda (Kerr 2002).

At the Uruguay Round, developed countries were concerned with gaining major concessions from developing nations, such as the opening up of markets for services, the fastest growing sector in developed countries (Yeung, Perdikis and Kerr 1999), and protection for intellectual property (Gaisford and Kerr 2001). Developing countries, meanwhile, were abandoning protectionist development strategies and embracing an export-led strategy. In a compromise, developing countries would receive increased market access for textiles, a reduction in export subsidies, improved market access for agricultural products in developed countries, and promises of increased resources for capacity building in trade. But the Uruguay Round commitments were never fully implemented.

These issues were at the core of the next WTO ministerial meetings, where developing countries increased their opposition to the rules of the current trade regime. The rules of the club had to be changed.

Box 3.1. Core principles of the World Trade Organization

Three core principles guide the way decisions are made within the multilateral trade regime. From its inception in 1948 the multilateral trade regime adopted a strong non-discrimination principle embodied in the most favoured nation clause. While overridden in practice by preferential trade agreements, this clause remains the most basic principle of multilateralism.

The second principle is national treatment. It implies that once imported goods pay customs duties (are nationalized), they have to be treated in the same way as national products, particularly with respect to domestic taxes.

The third core principle is single undertaking. Before the Uruguay Round, it was possible for a subset of member countries to reach so-called "plurilateral" agreements or "codes". These were usually subscribed to by developed countries and were non-binding for developing countries, which could adhere voluntarily. After the Uruguay Round, however, this practice was abandoned. Now, once a decision is made, all members acquire the same obligations, although the time frame for implementing agreements may vary from country to country.

Finally, a corollary of single undertaking is full consensus. To protect the weaker nations from being pushed by the stronger ones into adopting rules or codes they oppose, WTO negotiations typically do not finish until a unanimous agreement is reached among all participating members. In practice, this implies that any country, no matter how small, has veto power, with two important clarifications. First, this is not a requirement but a practice to legitimize the adopted rules (WTO articles allow simple majority voting). Second, countries that do not participate in a negotiation because they are absent cannot veto.

In recent years, many participants in multilateral trade negotiations have been discouraged by the lack of progress in trade liberalization. Because of the many exceptions, the most favoured nation clause is no longer the rule of international trade but the exception. In addition, regional agreements extend well beyond trade preferences to cover all sorts of regulations. These facts account for a significant increase in the complexity of the rules, which burdens all countries, especially the poor ones. The tremendous increase in the number of WTO members has made negotiations more difficult and time consuming, calling into question the use of the single undertaking and consensus principles.

FAIRNESS AND FAILED REFORMS

Mendoza (2003) considers three aspects of fairness for evaluating the trade regime: *neutrality,* meaning that each country should be at least as well off with the trade regime as without it; *net benefit for all*, implying that all countries should benefit from the regime; and *maximin rule,* meaning, from the point of view of developing countries, increasing net benefits from the trade regime. A trade regime built according to these fairness measures would not harm the progress of developing countries. This is not the situation of the current regime, however. For example, Harrison, Rutherford and Tarr (1996) estimate that full implementation of the Uruguay Round would cause a net annual loss of $16–$30 billion for developing countries, and Anderson et al. (2002) calculate that the benefits to developing countries of removing trade barriers in merchandise trade would reach about $108 billion a year.[7]

Even though the WTO is not a development agency, it plays a key role in improving the economic well-being of the poorer countries by enhancing their opportunities to participate in international trade flows and thereby boosting their economic growth. But in 60 years of combined existence, the GATT and the WTO have failed to persuade the civil societies of developing and least developed countries of the impor-

7 Estimate based on the assumption that high-income countries fully implement the Agreement on Textiles and Clothing. For a similar analysis, see Mendoza and Bahadur (2002); Ostry (2002); McCalman (1999).

tance of free trade for economic development. People in those countries see the WTO not as a portal to material progress and poverty alleviation, but as an international code of conduct imposed by rich countries on poor countries to serve rich country interests.

While this is a distorted perception, several features of the system have reinforced it. For example, tariff cuts under the GATT were negotiated in a reciprocal way. This implied that developing countries, with smaller economies, had less to offer than developed countries. When generalized cuts were introduced, developed countries managed to obtain exceptions or extensions in precisely the sectors in which developing countries had comparative advantages, such as agriculture, textiles, and footwear. Partly because of this, poorer countries tended to become marginalized in GATT trade negotiations.

Although the WTO has the specific objective of widening the scope of trade negotiations and levelling the playing field between developed and developing countries, many issues remain unresolved. One is the Trade-Related Aspects of Intellectual Property Rights Agreement (TRIPS), which sets minimum standards of intellectual property rights protection to be provided by WTO members and requires countries to develop enforcement mechanisms. The TRIPS Agreement allows countries to pursue different policies with respect to intellectual property rights protection but specifies minimum standards that should be attained by a designated time. The TRIPS Agreement was strongly opposed by developing countries. Since developing countries hold less than 2% of patents worldwide (UNDP 2001), the agreement implied high adjustment and compliance costs for them and a large transfer of rents to developed countries (Panagariya 1999; UNCTAD 1996; World Bank 2001a: xvii). Full implementation of TRIPS would increase the price of patent applications and would, for example, boost drug prices by between 12 and 68% (Fink 2000; Watal 2001; Lanjouw 1997; Subramanian 1995). And contrary to the TRIPS model, many developing countries have a collective ownership tradition, especially for indigenous knowledge (Oxfam International 2002).[8]

Why, then, did developing countries agree to TRIPS? One factor was pressure from developed countries, especially the United States and the European Union. Developing country governments also believed in promises that agreeing to TRIPS would encourage negotiations and allow them wider access to agricultural and textile markets in developed countries (Baldwin 2004). And business interests in many developing countries encouraged their governments to adopt stronger intellectual property rights protection in order to shield their own innovative activities in domestic markets. Stronger intellectual property rights protection can also encourage imports, inward foreign direct investment and technology licensing, all of which can lead to increased technology transfer.[9] Article 7 of TRIPS states that "the protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge in a manner conducive to social and economic welfare, and to a balance of rights and obligations." (The actual impact of stronger intellectual property rights protection covered by TRIPS is likely to depend on a country's level of economic development; see viewpoint 4.1 in chapter 4.)

8 According to the World Bank (2001a: xvii), the cost of enforcement and administration together with high prices for drugs, agricultural inputs and other key technological inputs could account for a significant share of public expenditure in many low-income countries.

9 For more on these issues, see Falvey and Foster (2005).

Another reform issue concerns the Agreement on Textiles and Clothing, launched to phase out the Multi-Fibre Arrangement over a 10-year period ending in 2005 and to develop a fairer trade regime (Spinanger 1998).[10] However, the Agreement on Textiles and Clothing was structured so that developed countries preserved some of their privileges. Developing countries did not achieve full gains from market access until the end of the 10-year period, whereas developed countries could carry out selective liberalization without violating the agreement. Safeguard provisions were also included to restrict imports if the domestic industry faced serious damage.[11] In other words, developed countries could protect domestic industries and restrict market access for at least nine years. Developed countries also used antidumping duties to protect their markets. This discriminatory trade regime has distorted specialization in textiles and clothing industries for more than four decades.[12]

A third issue is agriculture. While there have been significant reforms in manufactures trade, agriculture is still a highly protected market in both developed and developing countries. The Agreement on Agriculture, the first international attempt to reform agricultural trade policies, established an agenda for increasing market access and correcting distortions by reducing tariffs and subsidies—both desired by developing countries. Yet exemptions considerably weakened the agreement (Mendoza and Bahadur 2002; UNDP 1997).

Agricultural markets are still far from transparent. Myriad trade-distorting instruments are used, such as tariffs, tariff-rate quotas, export and production subsidies and price discrimination. However, empirical research is not conclusive about the po-

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10 The Multi-Fibre Arrangement was designed to protect local producers and jobs in importing developed countries. It laid down rules for imposing quotas through bilateral or unilateral actions when surges of imports caused disruptions in trade and production in the textile and clothing sector of importing developed countries. The quota system was applied differentially across countries and products. The Agreement on Textiles and Clothing called for a gradual elimination of quota restrictions between 1995 and 2005.

11 The contingent protection rules were part of the protocol of China's accession to the WTO. They permitted other WTO members to use protectionist instruments against China for 15 years. Those instruments covered special anti-surge clauses for textile and clothing products for four years (until 2008); general anti-surge clauses for 12 years; and initiation of antidumping cases, allowing China to be treated as a non-market economy, for 15 years. Developed countries' lobbies can also seek to use other protectionist devices such as eco-labelling schemes, labour standards rules and other regulatory devices to control imports from China. The non-tariff barriers and the technical barriers to trade may impose extra costs to suppliers.

12 The origin of the Multi-Fibre Arrangement dates back to 1961 and 1962, when the negotiations for the Short-Term and the Long-Term Arrangements of International Trade in Cotton Textiles started. The Long-Term Arrangement allowed developed countries to impose restrictions, unilaterally or through a negotiated voluntary restraint agreement, on imports from developing countries considered to be a source of actual or potential "market disruption." The Long-Term Arrangement meant breaking the non-discrimination principle of the GATT. Its provisions were preferred to those of the GATT, which allowed safeguard action, retaliation and proof of "serious injury" rather than "market disruption." The developed countries considered the Long-Term Arrangement to be more advantageous for developing countries as it offered a transparent set of rules for market access, including a guaranteed increase in quotas (of 5% per year in most cases) in place of a series of ad hoc, restrictive measures. The Long-Term Arrangement also required developed countries to restructure their industries and return international trade in textiles and clothing to GATT rules. The Long-Term Arrangement was extended twice, in 1967 and 1970. Extension of the arrangement in 1974 gave way to the Multi-Fibre Arrangement.

tential benefits of agricultural liberalization. Some studies find the potential gains from agricultural liberalization for all developing countries to be much smaller than the potential gains from liberalization in other areas, such as services and manufacturing (Charlton and Stiglitz 2004). Other studies report much higher potential gains (Cline, 2004). Despite these differences in quantitative results, empirical research points to some important issues. One is that the gains from agricultural liberalization vary considerably across countries. Another is that the absolute gains from liberalization are higher for developed countries than for developing countries (Francois 2005). A third is that while some developing countries will win from higher prices, and others will lose (Dimaranan, Hertel and Keeney 2003), overall the impact is likely to be small for developing countries. Most gains for developing countries follow from improved market access to other developing country agricultural markets. For developing countries to gain from trade liberalization in agriculture and elsewhere, liberalization must take place in developing countries as well as in developed countries.

A fourth issue is the long decline in developing countries' terms of trade, with increasing volatility weakening development prospects (UNCTAD 1999). Yet the international trade regime has not implemented efficient mechanisms to prevent this decline (see viewpoint 3.1).

A fifth issue is tariff peaks and escalation. Tariff peaks (tariffs of 15% and above) reduce developing countries' ability to export key products to the developed world, while tariff escalation (tariffs increase as products undergo additional processing) acts as a disincentive to adding value to products. Tariff peaks imposed by industrialized countries are often concentrated on labour-intensive products such as textiles, garments, footwear and leather products, which are of export interest to developing countries. Footwear and garments make up more than 60% of products affected by high tariffs and exported to developed countries by developing countries. High-technology products such as computers and office equipment face significantly lower tariffs. Tariff escalation constitutes an additional barrier to accessing new markets since the effective rate of protection increases with each stage of processing (table 3.3). Exporting processed industrial products becomes more difficult, and upgrading to higher value-added activities within a value chain is slowed. This biases exports towards unprocessed resource-based commodities with a low level of value-added (UNCTAD 2003).

Table 3.3. Tariff escalation in leather products

Region or group	Raw materials	Semi-finished products	Finished products
Asian Tigers	0.5	4.5	11.3
South Asia	0.0	14.0	32.9
North America	0.0	0.6	9.7
Sub-Saharan Africa	2.8	5.0	21.1
Oceania	0.0	0.0	7.6
Latin America	5.4	13.0	22.8
North Africa and Middle East	5.0	5.0	27.1

Source: UNCTAD 2003. *Note:* Leather products include footwear, upholstery and general products. Tariffs are average values.

A sixth issue concerns the temporary movement of workers. Included as Mode 4 in the General Agreement on Trade in Services, the temporary movement of service

suppliers is of key interest for many developing countries. Yet the restrictions imposed on such movements by developed countries are still very high for political reasons.

Finally, the WTO has been strongly criticized for being non-transparent and undemocratic, marginalizing developing countries' positions in trade negotiations (Kwa 2002). Developing countries do not have the negotiating capacity to deal with a complex WTO agenda, and this is especially crucial in the framework of the single undertaking principle. A country's share in international trade strongly influences how it deals with disputes in the WTO (Mavroidis 2002). There seems to be a contradiction between the notion of a "development round" and the reality of hard bargaining in the WTO negotiations.

Despite substantial improvements, bargaining power remains skewed in favour of large developed countries, reinforcing the benefits to rich countries and the gains of unfair liberalization. Complex rules, negotiation processes and trade disputes require investments in specially trained staff and negotiation machinery, which only developed countries can afford. The remaining imbalance stems largely from the fact that the WTO rules are not enforceable except by the threat of sanctions applied under the dispute settlement mechanism. For a small victim of trade discrimination, curtailing imports from a large offender is not much of a threat. A recent example is Ecuador. It won a trade dispute against the European Union worth $200 million. But its authorities decided not to enforce the sanction by curtailing imports from the European Union since this would have done more harm than good to their country.

Developed countries are not alone in their protectionist bias. Average tariff protection in developed countries is 0.8% for imports from other developed countries and 3.1% for imports from developing countries (the difference is explained by higher-than-average protection in sensitive sectors, such as agriculture). Average tariff protection in developing countries is 10.9% for imports from developed countries and 12.8% for imports from developing countries (WTO 2003). While developing countries are right to demand the dismantling of protectionist barriers, including producer subsidies, in developed countries, they must be ready to lower their own barriers as well. But just as agriculture and immigration policy are politically sensitive issues in developed countries, so is liberalization of trade in manufactures in developing countries. In fact, the breakdown of the Cancun Ministerial Meeting was received with some relief by developing countries, which were under pressure to liberalize their manufactures trade.

The failure to deliver equitable outcomes is the ultimate cause of the WTO crisis of legitimacy (Esty 2002; Keohane and Nye 2001). Since 1999 and the WTO Ministerial Meeting in Seattle, tension has increased in the international trade regime. Many developing countries consider that protection of intellectual property rights, the environment and other of the so-called Singapore issues (trade and investment, trade and competition, transparency and government procurement and trade facilitation) [13][14] are not of primary concern to them, and except for trade facilitation, these issues were dropped from the work programme of the Doha Round. Developing countries regard market access, antidumping measures and agriculture as their priorities. In July 2006

13 The so-called Singapore issues were introduced by the European Union at the 1996 Singapore Ministerial Meeting and were received with little enthusiasm by the other members.

14 Trade facilitation means simplification and standardization of trade and customs procedures, transport and other certifications, and information flows associated with the import and export of goods.

the Doha talks were suspended by WTO Director Pascal Lamy, when it became apparent that collective action by the negotiators from six countries, the core Group of Six (Australia, Brazil, European Union, India, Japan, and United States), had failed to reach an agreement on a compromise because of the large difference over trade liberalization (tariff and subsidies cuts) in agricultural goods. The inability of negotiators to reach a deal on talks begun in Doha in 2001 does not mean that the international collective effort to reduce trade barrier is dead. But this failure will significantly delay multilateral efforts towards freer global trade.

AN EXPANDING WTO AGENDA: COMPETITION POLICY AND STANDARDS

However, fairness is not the only problem in today's international trade regime. Another important obstacle is the expanding WTO agenda. It has been argued that it is not possible to regulate trade without including ancillary issues that affect it. The question is, which issues should be considered? As Maskus (2000) put it: "Critics of TRIPS wonder why, if [intellectual property rights] are included in the WTO to protect intellectual capital, labour standards are not also needed to protect workers, environmental regulations to protect natural resources, and competition policy to protect consumers" (Maskus 2000: 2).

Competition policy has characteristics of a public good since the benefits it provides are often non-rival and non-excludable. A lack of effective competition policies can hinder the realization of the gains from liberalization, especially for small, developing countries (WTO 1997; UNCTAD 1997; Jenny 2001; Osakwe 2001; OECD 2001; Hoekman and Holmes 1999; Evenett, Levenstein and Suslow 2001). There are many examples of cartels involving firms with headquarters in developed countries and substantial exports to developing countries (see, for example, Levenstein and Suslow 2000).

Two problems arise for competition policy: how adequately developing country governments deal with anticompetitive practices, and what international cooperation is needed to deliver this public good. Developing countries seldom have the resources to implement effective competition policies. And while there are many bilateral and regional agreements on competition policy, most multilateral principles for competition are voluntary (Cooke 2002). These principles, thus, confront a collective action problem that limits implementation. WTO involvement in competition policy raises some concerns, however, about the compatibility of the operational modalities of competition policy and trade liberalization (Tarullo 2000; Klein 1996). These worries, supported by the academic literature and practical experience, have derailed past proposals for a detailed multilateral code on competition policy in favour of broad, generally accepted principles (Anderson and Holmes 2002; Garcia-Bercero and Amarasinha 2001). Although developing countries have a stake in a global competition policy framework, in Cancun many opposed negotiations on the Singapore issues.

Environmental and health regulations and technical standards are intended to achieve objectives where the private market has failed to do so, and their absence could generate social losses. Standards can be considered a public good, involving no rivalry, although they are not necessarily non-excludable (Casella 1996; Kindleberger 1983). And unless they discriminate between sources of supply, they do not imply secondary trade costs. Yet, in the real world, they can generate important trade distortions. Since the costs of compliance with standards may be higher for foreign firms than for domestic firms, they can be used to gain strategic international trade advantages. They may be non-transparent, they may be tailored to exclude entrants into a particular market and

they may be higher than necessary to achieve a particular level of social protection (Maskus, Wilson and Otsuki 1999). The number of trade disputes over standards brought to the WTO has risen in recent years, especially those related to agricultural products and the Agreement on Sanitary and Phytosanitary Standards.

Environmental standards and labelling are also an increasing source of trade friction (Maskus, Wilson and Otsuki 1999; Jha, Markandya and Vossenaar 1999). Developing countries consider standards and technical barriers a major issue since they require technical assistance in meeting standards and are concerned about abuse of standards by developed countries to restrict access to their markets (see viewpoint 3.2 on capacity building to meet international standards).

Labour standards are not a new issue in the WTO framework, although they are not subject to WTO rules and disciplines. As early as 1953 the United States tried (unsuccessfully) to add a labour standards article to the GATT. It tried, again unsuccessfully, to negotiate an article on labour standards in both the Tokyo and Uruguay Rounds (Charnovitz 1986). At the Marrakech signing of the Uruguay Round accords in April 1994 the United States, with some support from Canada, Japan and the European Union, obtained a commitment to add the issue to the WTO agenda for the Singapore Ministerial Meeting in December 1996. This debate was negatively resolved at that meeting (Stern 1998b). Although consensus has been reached among members on committing to the set of core labour standards imbedded in International Labour Organization (ILO) conventions and on abstaining from their use for protectionism, still lacking is an instrument to enforce those conventions. The ILO was recognized as the competent body to set and deal with these standards, and the WTO and ILO would continue their collaboration on these issues.

Some WTO member governments believe that core labour standards, such as freedom of association, recognition of the right to collective bargaining, and elimination of all forms of workplace abuse (forced labour, certain kind of child labour, gender discrimination), should be brought under WTO rules and disciplines. They believe that this would stimulate member governments to improve workplace conditions and contribute to coherence in global policy-making. Developing countries fear that labour standards will be used as a trade barrier by developed countries as developed countries seek inclusion of labour standards under the WTO framework to avoid competition from countries with a low level of labour rights. The empirical work shows that labour standards do not much matter, either for trade or for foreign investment (see, for example, Rodrik 1996; Aggarwal 1995; OECD 1996b). The theoretical literature suggests that if the market produces sub-optimal labour standards, this market failure should be corrected directly rather than through indirect instruments such as trade sanctions. Trade openness in general also contributes to higher labour standards. Countries that achieved high per capita income also rapidly eliminated child labour and made progress in improving their labour standards (Panagarya 2005a: 25, 32).

Viewpoint 3.2
Capacity-building to meet international standards

Standards are part of the architecture of markets. On the face of it, they are quintessentially public goods and so may be undersupplied, especially if the costs of provision are borne in one market and some of the benefits fall elsewhere. Standards play important roles in the world economy and in economic development.

Standards and regulations: threats or opportunities?

Standards and regulations can be seen as trade barriers or trade facilitators. Those who see them as trade barriers suggest that standards and regulations are established and abused to protect domestic markets from imports (Athukorala and Jayasuriya 2003). The costs of complying with standards are exorbitant and unrealistic for both producers and exporters, especially in developing countries. Even when imposed as health and safety requirements, standards (such as sanitary and phytosanitary standards) can impede trade because of additional compliance costs or because they are set at a level that foreign producers cannot profitably meet, allowing domestic producers to monopolize the domestic market (Mattoo 2001). As a result, developing countries may not benefit from trade liberalization not only by being unable to enter new markets, but also by having difficulty maintaining existing ones (Wilson 2002; Unnevehr 2003).

Standards and regulations are also seen as trade facilitators. Recent empirical evidence suggests the potential for upgrading and integrating producers and exporters in developing countries in global value chains. Standards and regulations are designed to support market development and facilitate transactions. Standardization allows firms to reduce market uncertainty and the risks associated with research and development (R&D) by setting clear and common requirements. In addition, standards and regulations can expedite the diffusion of technical knowledge codified in specific process or product specifications, for instance, by providing the incentive to upgrade products and processes, leading to improvements in productivity (Hufbauer , Kotschwar and Wilson 2002).

More recently, Jaffee and Henson (2004) found that rising sanitary and phytosanitary standards accentuate underlying supply chain strengths and weaknesses and thereby affect the competitive positions of countries and certain market participants. They note that a few developing countries have gained access to high-value markets in industrial countries despite the existence of exacting standards. This less pessimistic view of the impact on international trade of sanitary and phytosanitary-related standards suggests that it cannot definitively be concluded that standards and regulations are either barriers or facilitators. It is more important to consider the effects of such standards in the context of wider capacity constraints and underlying supply chain trends.

Governments can help by facilitating collective action among stakeholders in addressing sanitary and phytosanitary standards. Collaboration among industries, governments, universities and research organizations is needed to attain collective efficiency and upgrading (Humphrey and Schmitz 2000, 2002). By leading domestic producers to improve their product quality and production methods, in the long run this could make producers more aware of changing standards and regulations and therefore more proactive. Nevertheless, despite efforts to strengthen sanitary and phytosanitary-related capacity, developing countries still need technical assistance from industrial countries and donor organizations to expedite technological and organizational upgrading.

Upgrading capacity

The traditional technical approach was to treat standards as public goods or services. Increasingly, trade economists have grouped standards, regulations and conformity-assessment procedures together as technical barriers to trade. It is time to return to the original paradigm, taking into account recent thinking about where the border between public and private really lies in an era of network firms. This is illustrated with sanitary and phytosanitary norms.

Tighter sanitary and phytosanitary standards are double-edged. They are clearly a public good in several respects. They raise output quality and help firms to better access markets and to lower costs through the adoption of best practices. However, they also act as a selection device, assisting producers able to adapt them and consumers wishing to pay for superior quality. The provision of standards therefore has uneven

benefits and may accentuate competitive differences based on existing comparative advantage. Where markets are highly competitive, those who gain least may go out of business.

However, many standards are based on institutions in which the public and private sectors are both engaged, and where the absorptive capacity exists such standards may be able to create a comparative or competitive advantage. From this perspective, there can be opportunities for upgrading but there are also potential threats. Their effect is highly asymmetric: small countries, smaller producers and less advanced productive systems and institutions are in a much worse initial position. Special efforts towards them may therefore be required.

Where producers are trying to upgrade into new niches, the market may be best placed to create standards for vertical Smithian trade. There is a concern, however, that where buyer power is concentrated, the norms may evolve in a manner that does not reflect efficiency, let alone fairness. The difficulty in setting uniform international standards is reflected in the increasing politicization and recent contentious votes within the Codex Alimentarius.

Several policy priorities follow:

- Participate actively in the debate on the role of standards, to complete the transformation of the vision of standards as pure barriers into a more realistic vision of standards as both a threat and an opportunity for exporting countries.
- Support developing countries in a selective and strategic manner. Analytical work is crucial to identify initial comparative advantages and basic absorptive capacities.
- Support development of the public-private interface and institutions to promote the definition of priority investment areas and the upgrading of capacity to comply with standards and regulations.

Efficient public intervention

The border between private and public goods and services is a shifting line. It is important to distinguish the two goods but also to recognize that there is no universal classification. Depending on the strength and capacities of domestic and regional institutions, the dividing line can move: market institutions can develop standards-related services in some regions but not in others, and this can change over time. The approach to defining publicness needs to take into account historical and institutional specificities.

Moreover, private and public nature needs to be assessed not only at the domestic level but also at the regional level. For example, the development of standards capacity in South Africa can have a major spillover on its neighbours. When domestic market or supply capacities do not justify national public investment, developing standards capacity at the regional level may be justified. In southern Africa, for example, it would be hard to justify investment in upgrading the standards and quality systems for many of the minor tropical crops, even in South Africa. But a regional approach would make sense, given the importance of these crops at that level and the possibility of spreading the fixed costs among more countries and producers.

A large part of standards-related activity has characteristics of a private good, notably the actual activity of conformity assessment, which is generally carried out by and for private actors. However, there are many possibilities for market failure, economies of scale and externalities in this domain. All these clearly call for public monitoring and intervention.

Excessive or inappropriate involvement by the state may discourage private entrepreneurship and worsen qualities of services (inspection and certification). This may frustrate international recognition while still increasing costs for domestic producers. In the worst case, this may condemn producers to the outskirts of lucrative markets. But excessive or inappropriate reliance on the private sector may also create serious problems, especially for smaller and weaker entrepreneurs and countries. The development of strong institutions is, in any case, required by recent moves by the principal buyers. Where costs are too high at a national level, a regional response may be needed (as in the Southern African Development Community).

The implications for public policy are clearly that governments cannot neglect standards but must think carefully about where the policy response should focus to encourage the private sector and where it should provide direct public infrastructure services. If the toughest bottleneck for the least developed countries is in conformity assessment, there is a dilemma. There are numerous market

failures, learning effects and informational externalities, but it is in the nature of this activity that provision of public goods alone cannot substitute for an effective market. The public provision has to be of the basic infrastructure, within which internationally recognized operators can provide services to local producers, who must be given incentives to use them. There is a line between appropriate and necessary public intervention, and harmful interventionism. Where that line should be drawn often has to be determined through case-by-case analysis.

Several policy priorities follow:

- Provide analytical support to countries or regions to identify where direct public intervention is needed and where encouragement and support of the private sector should be sought.
- Provide support for the definition and implementation of public intervention, with the aim of making it selective and efficient; build capacity to provide services efficiently; and benchmark and diffuse successful international experiences across countries. An area where the United Nations Industrial Development Organization has especially useful experience is in fostering public-private partnerships to provide services and in helping to minimize the costs of public intervention and to make it responsive to the needs of the private sector.

Data and analytical work

A preliminary analysis of global demand and supply could be attempted only with great difficulty because of the many limitations with proxies for both supply and demand. Nevertheless, some interesting lessons arise.

When trade concerns as a demand proxy, there is little correlation between assistance and the concerns raised. This may be because countries most able to identify concerns at the World Trade Organization are thought to be most able to respond at a national level, whether by private or by public means. The match is better for alerts, detentions and rejections by the United States and the European Union as demand proxies. But countries that are larger exporters still tend to be more present in the alerts, detentions and rejections database and are not always recipients of aid funds. The best match appears to be with EU alerts and rejections. However, this is linked to the fact that Africa is one of the biggest aid recipients and traditionally also an important exporter of agricultural products to the European Union.

An important conclusion is that more data are required and more open discussions of criteria for and mechanisms of allocations of sanitary- and phytosanitary-related funds are needed. The Standards and Trade Development Facility is a move in the right direction, but it is not yet enough. As to the scale of assistance provided, it is difficult to estimate what proportion of the need is covered. Cerrex (2003) estimates that sanitary and phytosanitary measures represent annual overheads of 2%–10% of the value of produce exported by most African, Caribbean and Pacific exporters. Cerrex (2003: 59) estimates of costs of individual projects for assisting with compliance with EU maximum residue levels for pesticides range from $59,000 to $828,000, with the share covered by aid ranging from 28% to 90%. Given that donors do not pay the full costs, the more aid there is, the greater the scale of cofunding required.

Several policy priorities follow:

- Support the effort of the Standards and Trade Development Facility in developing complete and transparent data on the distribution of aid funds for supporting activities to build capacity for complying with standards and technical norms.
- Conduct analytical work to identify priority areas for donor actions and interventions based on a set of appropriate demand proxies and on detailed country- and regional-level studies.

Source: Drawn from a background paper by Holmes et al. (2005).

Although there are arguments in favour of including new trade-related issues in the international trade regime, there are also arguments against expanding the WTO agenda. Charnovitz (1998) asserts that issues with non-trade-related goals have contaminated past trade regimes. In addition, an ever-expanding agenda creates incentives for strategic behaviour since any country with little interest in a specific issue can employ a strategic trade-related issue to reinforce its bargaining position on trade issues (Hoekman 2002).

To avoid this problem, Leebron (2002) suggests distinguishing between substantive trade-related issues, which enhance policy effectiveness, and strategic issues. Similarly, Maskus (2000) argues that the failure to make progress on trade-related issues could erode support for the international trading system. According to Maskus, competition policy should be included in the international trade regime because of its strong links to existing WTO rules and its potential institutional fit, claims that cannot be made for the inclusion of environmental and labour standards (see Stern 1998b for a review of the literature).

THE NATIONAL FRAMEWORK FOR ECONOMIC INTEGRATION

Adequate provision of the international trade regime as a public good requires national as well as international inputs. National inputs include trade and industrial policy, institutional capacity, productive capacity, trade adjustment assistance and safety nets, and the capacity of a country to supply them depends on how the international trade regime is shaped by collective actions (Mendoza 2003). There are many trade-related areas where the national framework is in short supply in developing countries. Technical capabilities to implement WTO agreements are limited. Social networks to deal with trade adjustments are weak. Institutional adjustments related to trade are costly. Infrastructure or financial markets are inappropriate to exploit the benefits of trade.

Regional trade agreements are one possible response to this inability to deliver the national component of the international trade regime. Regional trade agreements have proliferated in recent years, and several studies have concluded that such agreements among developing countries, which provide preferential trade access to members but keep trade policy with the rest of the world unchanged, are not always beneficial for the bloc as a whole, although some members may benefit because of non-competitive conditions or agglomeration effects (Panagariya 1997; Schiff 1997; Memedovic et al.1999; Memedovic 2005b; see also viewpoint 3.3 on preferential trade areas). Regional cooperation on production of public goods offers greater promise, however, than regional trade agreements (Schiff 2002).

Viewpoint 3.3
Preferential trade areas: an international "public bad"?

The most favoured nation principle is the centrepiece of the General Agreement on Tariffs and Trade (GATT)/World Trade Organization (WTO) system. If a member nation grants another member nation a tariff concession, it must extend that concession to all other member nations. The outcome is a uniform tariff across all trading partners, without discrimination.

There are two key advantages of this principle. First, if discrimination were permitted, each member nation could subject a product to as many tariff rates as it had trading partners. A bureaucrat would then decide the national origin of the product and assess the duty accordingly. With thousands of products and hundreds of tariff rates applicable to each product, this would be a nightmare for the businessman and a dream come true for the bureaucrat. Moreover, with the components of each good produced in different countries, establishing the origin of a good would itself be subject to arbitrariness. The most favoured nation principle cleans up this potential mess.

Second, the most favoured nation principle promotes efficiency. A product is imported from the nation that can deliver it the most cheaply. We buy automobiles from Japan if it can deliver them more cheaply than all other trading partners. Likewise, we buy shirts from China if it supplies them the most cheaply. Preferential tariffs, on the other hand, introduce inefficiency by allowing high-cost sellers to outcompete low-cost sellers by taking advantage of the preference. Economists refer to this phenomenon as *trade diversion*.

Thus, the most favoured nation principle represents an important public good available to the world economy. Preferential trade areas allow their members to lower tariffs among themselves without lowering them against other WTO members. All preferential trade areas involve discrimination against outsiders in favour of insiders and, thus, violate the most favoured nation principle. Nevertheless, two key forms of preferential trade agreements—free trade areas and customs unions, which eliminate internal trade barriers—have been accommodated within the GATT/WTO system through an exception contained in GATT Article XXIV. Additionally, under the so-called enabling clause, adopted in 1970 as a 10-year exception to GATT Article I but rendered as a "decision" in 1979 without an expiration date, two or more developing countries may engage in virtually any exchange of trade preferences.

Preferential trade areas as a national public bad

Economic theory concludes that preferential trade areas that are largely trade diverting and welfare worsening will be endorsed while those that are trade creating and welfare improving will be rejected. The underling reason is that producers rather than consumers are the key driving force behind policy changes and they benefit from trade diverting preferential trade areas while losing from trade creating preferential trade areas.

Three devices are commonly applied to contain competition between member country firms and to maximize the benefits to these firms at the expense of outside firms. First, insofar as preferential trade areas admit sectoral exceptions, they focus on excluding precisely the sectors in which trade creation would dominate. Second, countries use stringent rules of origin to contain competition in sectors that are subject to trade creation. Third, liberalization in sectors subject to trade creation may also be back loaded.

Preferential trade areas as an international public bad

While private producer interests can come together to forge preferential trade areas that are a national public bad and to thwart those that promise to be national public goods, from the viewpoint of the international trading system, the adverse effects of preferential trade areas on nonmembers are even greater. If two or more countries enter an arrangement that hurts one or more of them, it is their business. In the design of the rules of international trade, it is the impact of such arrangements on the rest of the world that should receive the highest priority. Preferential trade areas can adversely affect outside countries and the multilateral trading system through five major channels: terms of trade, increased protection

against non-members, fragmentation of the trading system through what Bhagwati calls the "spaghetti-bowl" effect, the stumbling-block effect on multilateral liberalization and proliferation of non-trade issues.

Is open regionalism a public good?

Some advocates of the current wave of preferential trade areas defend it on the ground that it represents "open regionalism" in contrast to the closed, import-substituting regionalism of the 1950s and 1960s. There is no single definition of open regionalism but the most obvious one is open membership. Other criteria that have been cited include compatibility with GATT Article XXIV and freedom of member countries to pursue further trade liberalization unilaterally or reciprocally.

The requirement that members be free to pursue unilateral or bilateral liberalization rules out customs unions as being compatible with open regionalism even though they are perfectly compatible with GATT Article XXIV. In a customs union, individual members are not free to lower their tariffs. Nor are members permitted to conclude preferential trade areas with outside countries on their own. This criterion rules out EU regionalism as open but not NAFTA, despite the fact that ex post the European Union has signed more new preferential trade areas than NAFTA. Therefore, the condition would seem to be neither necessary nor sufficient for a preferential trade area to qualify as open.

Compatibility with Article XXIV may be a necessary but not sufficient condition for an open arrangement. If two countries start with prohibitive tariffs and then form a preferential trade area, keeping prohibitive tariffs on outside countries, they satisfy the requirements of Article XXIV. Yet, such arrangements can hardly be characterized as open regionalism. In more practical terms, this criterion says nothing about why the regionalism of 1950s and 1960s was closed while that being pursued today is open.

The remaining criterion—open membership—is perhaps the most important. If outsiders find it attractive to seek membership, a preferential trade area can eventually encompass the entire world and thus lead to free trade for all. Despite this possibility, open membership has three important limitations that give critics reason to be sceptical. First, discrimination against non-members can occur at any time as long as the regionalism is of Article XXIV variety. Therefore, an "open" club is still likely to harm non-members.

Second, openness is not as innocuous as it sounds. As Bhagwati (1995, 1997) notes, the admission price can include several unpleasant "side payments" that are essentially unrelated to trade. These include acceptance of stronger intellectual property rights regime, investment rules and labour and environmental standards than a country would otherwise prefer.

Finally, open membership does not necessarily translate into speedy membership. It took the European Union more than 40 years to grow from 6 members to 15. The Canada-US Free Trade Agreement was concluded in 1988 and its membership had grown to only three by the mid-1990s. Attempts to join by even a small country such as Chile faced serious resistance. Larger countries such as China, Japan and India are not even on the US radar screen.

Some observers have noted that current regional arrangements are taking place after eight rounds of multilateral trade negotiations have considerably lowered trade barriers. Therefore, open regionalism can be defined as free trade areas and customs unions with low trade barriers on outside countries. While this definition distinguishes recent regionalism from earlier varieties, it does not overcome the fundamental contradiction between openness and discrimination: outsiders may face low barriers but they are nonetheless subject to discrimination relative to insiders.

For the sake of argument, even if this definition of open regionalism can be accepted, the level of discrimination at which closed regionalism turns into open regionalism has to be defined. For example, if Mexico maintains a large number of external tariffs in the 15%–20% range, keeps open the option of raising them to 35% and also has antidumping at its disposal, is it pursuing open regionalism under NAFTA? Or should external trade barriers in the United States be adopted as the critical level that distinguishes open from closed regionalism? But this definition is also problematic: even after the Uruguay Round liberalization, more than half of textile and clothing products remain subject to 15%–35% tariffs in the United States, and antidumping remains a major

trade barrier. To put the matter differently, despite lower (though by no means low) external trade barriers today, the motivating force behind regional arrangements is no different than in the 1950s and 1960s. Now, as then, discrimination is the name of the game as member countries continue to be driven by a desire to secure *preferential* access to the partner country's market.

Turning negative preferential trade areas into positive ones

The key policy question is how to turn the negative force of preferential trade areas into positive ones. Many proposals have been made to reform Article XXIV, to make pursuit of preferential trade areas more difficult or to make them more open. But since virtually all WTO members are currently pursuing these arrangements, prospects for these proposals to be taken seriously are negligible. Therefore, the only practical option is to achieve worldwide free trade more speedily. This will kill the preferences at the source: preference relative to zero tariffs is zero.

The goal of achieving free trade in industrial products by 2020 for developing countries and perhaps sooner for developed countries is not unrealistic. Except for a small fraction of labour-intensive products such as apparel and footwear, non-agricultural products in developed countries are subject to tariffs of 5% or less. Tariffs in developing countries are higher, but have dropped considerably in recent years. An agreement that phases out these tariffs over the next 15 years or so is not unrealistic. To be sure, multilateral institutions such as the World Bank and the International Monetary Fund will need to assist developing countries to ensure that the loss of tariff revenue does not result in serious macroeconomic imbalances. But such resources are likely to be well within the reach of these institutions and will be well spent on opening world markets and giving order to the world trading system.

Achieving free trade in agriculture in the next 15 years is less realistic, not least because even many developing countries are not ready for it. Nevertheless, there is reasonable scope for an agreement that phases out export subsidies and substantially lowers domestic support and border protection under the Doha Round. If the WTO members can come together to accomplish such liberalization, the problem of discrimination will be substantially alleviated.

Source: Drawn from a background paper by Panagariya (2005a).

The increase in cross-border interactions has created demand for the provision of regional public goods in a variety of areas. Based on the subsidiarity principle, there are several advantages to supplying regional public goods through regional cooperation agreements (Devlin and Estevadeoral 2002; Sandler 2002, 2004a,b). The incentives to free ride diminish as the number of countries that must supply a public good falls. In addition, matching the public good's benefit spillover range with the political domain fosters efficiency by equating the good's marginal cost of provision and the recipients' marginal benefits. Regional agreement may save on transaction costs compared with a larger decision-making jurisdiction. In particular, the presence of localized benefits promotes the evolution of an institution based on shared culture, norms and values, thereby reducing asymmetric information. Finally, regional agreements may increase the credibility and ability of a regional group to act jointly to obtain external financing for regional public goods provision.

However, there are also some disadvantages. One of the results of the proliferation of regional agreements has been the complexity of overlapping trade rules among commercial partners and a lack of transparency. In the presence of economies of scale, it may be more efficient to build institutions that provide regional public goods to several regions. And there may not be a nation with enough leadership capacity to support the appropriate regional institution and assume responsibility for some regional public goods (Devlin and Estevadeordal 2002). Moreover, economies of scope from reduced unit costs endorse providing two or more public goods in the same jurisdiction even though the benefit spillover ranges of the goods differ. This difference means that benefit recipients and funders of the goods do not match for at least one good, which then results in inefficiency.

PROMOTION AND FINANCING POSSIBILITIES

The limited provision of national public goods related to trade in developing countries has had a negative impact on the provision of the public good at a global level, since in many cases the aggregation technology of trade-related public goods is that of the weakest link.

These supply shortages are due to financial and institutional constraints. For example, to gain acceptance for its meat, vegetables and fruit in developed countries, Argentina invested about $83 million to achieve higher levels of plant and animal hygiene during 1991–96. Hungary spent more than $41 million on upgrading hygiene conditions in its slaughterhouses between 1985 and 1991. Mexico spent about $30 million to upgrade intellectual property laws and enforcement (Finger and Schuler 2000). And because the norms embodied in WTO agreements are often those prevailing in OECD countries, implementation costs are especially high for developing countries and asymmetrically distributed.

For the international trade system to function properly, developing countries require additional financial and technical support from developed countries. In part, this capacity building involves the provision of complementary national public goods to recipient countries, so that these countries can gain access to international public goods that include trade regimes. The extent to which countries are able to take advantage of improvements in market access depends on a range of supply-related factors, and in many of the poorest developing countries supply problems are so acute that the international community should give immediate assistance in productive capacity building (United Nations 2001). Since it is crucial for the proper functioning of the international

trade system that developing countries receive additional support to enable their effective participation, UN agencies such as the WTO, United Nations Conference on Trade and Development or the United Nations Industrial Development Organization should step in to provide support. And because support for legal and institutional reform based on some harmonization principle may not yield the desired benefits, technical support should be adapted to the specific needs of the receiving countries (Schiff 2002).

POLICY PROPOSALS

Changes are needed in the international trade system for full provision of this international public good. And while the WTO has not formally signed up to the Millennium Development Goals, it did make clear in its preamble to the inaugural Marrakech agreement its commitment to development. Thus the Millennium Development Goals should be an important yardstick by which the WTO is assessed.

Reforms should deal with the tensions that have emerged between developing and developed countries from the Uruguay Round. The bargain struck at the Uruguay Round entailed high costs of compliance and minimal benefits in terms of market access for developing countries (Mendoza and Bahadur 2002; see also Finger and Schuler 2000; Oxfam International 2002; Page and Davenport 1994). The multilateral trade regime is valuable only to the extent that it generates utility for its users. According to Mendoza (2003), a better balance between free and fair trade is needed to fully provide this public good.

REBALANCING THE RESULTS OF THE URUGUAY ROUND

Several changes are needed to rebalance the results of the Uruguay Round. The first is liberalizing agriculture and textiles markets in industrial countries (Mendoza 2003; Finger and Schuknecht 2001; Hertel and Martin 2001; Ostry 2002). The second is restricting the use of antidumping measures by developed countries against developing countries (Rodrik 2001; UNCTAD 2000; Raghavan 1996; United Nations 2001). The third is allowing greater international mobility of workers for trade in labour-intensive services (Rodrik 2001). And the fourth is reducing tariff peaks and tariff escalation (United Nations 2001; Mendoza 2003). As Hertel and Martin (2000) have argued, when weighted by import volumes, manufacturing tariffs on developing countries' exports to developed countries average 3.4%, while developed countries face average tariffs of only 0.8% on their exports to developing countries.

While caution is warranted in interpreting the quantitative results of empirical research, further liberalization is important for reducing poverty. Cline (2004a) estimates that 440 million people could be lifted out of poverty over 15 years if global free trade were implemented. However, most of the poverty reduction would take place in Asia, with more modest results in other regions.

Thus the benefits of trade depend not only on trade rules, but also on domestic capabilities to exploit the potential benefits of international trade. Many developing countries lack those capabilities. Therefore, not only a more development-oriented approach to trade rules is required, but also the financial and technical support to build those capabilities.

INCREASING DEVELOPING COUNTRY PARTICIPATION IN THE WORLD TRADE ORGANIZATION

Improving the participation of developing countries in the WTO requires increasing the transparency of the WTO, improving developing countries' bargaining capacity, blocking the inclusion on the agenda of items that encourage strategic behaviour and preventing coercion of developing countries by developed countries in the decision-making process (Blackhurst, Lyakurwa and Oyejide 2001; Helleiner 2001; Shafaeddin 2000; Third World Network 2001; Jawara and Kwa 2004).

In addition, the decision-making process needs to become more efficient. Ostry (2000), for example, advocates the creation of a restricted policy forum with rotating membership on the basis of geography and share in world trade (see also Schott and Watal 2000).

FOSTERING DEVELOPMENT GOALS

Fostering development goals in the international trade regime requires building comparative advantages that diversify exports and generate robust growth (Shafaeddin 1994; Gomory and Baumol 2000). Such strategies are difficult to implement in the current trade regime (Mendoza 2003; Helleiner 2001; Hausmann and Rodrik 2002; Rodrik 2001). Trade rules with a development-oriented approach would ensure sufficient policy manoeuvrability for developing countries.

The WTO agreements contain a number of provisions for the "special and differential" treatment of developing countries, allowing for granting developing countries special rights and privileges and for preferential concessions like longer time periods to implement their tariff commitments and the preferential access to the markets of developed countries under the Generalized System of Preferences (GSP).

The concept of special and differential treatment has changed over time, from one providing a range of flexibilities and "spaces for development policy," making trade liberalization supportive of development (GATT), to one that is more an instrument for helping developing countries build their legal and institutional capacities to undertake trade liberalization (WTO) but limiting the space for economic policy. The provisions included broad and largely unenforceable statements in favour of development, without distinguishing among developing country members in terms of their development needs.

Developing countries agreed to these changes and also to new commitments related to intellectual property protection, services and investment measures, in the expectation that in turn they would benefit from better market access in agriculture, textiles and clothing and from greater sensitivity in implementation from special and differential provisions. But benefits from these changes have, for the most part, failed to materialise. This has led to developing countries requesting, in the Doha Declaration mandate, that the special and differential provisions in specific WTO agreements be made more precise, effective and operational.

One suggestion to resolve the tensions arising from the politization of discussions of special and differential treatment is to define developing country access to special and differential provisions as an integral part of the provisions themselves. This could be done through a more differentiated approach using certain development-

related criteria or through explicit thresholds based on economic criteria (Keck and Low 2004: 24).

WTO rules failed to take the development needs of developing countries into account (Birdsall and Lawrence 1999; Michalopoulos 2000).[15] Rodrik (2001) has proposed replacing the Agreement on Safeguards with a broader agreement on development and social safeguards, and Mendoza (2003) has recommended creating a trade and development review council to allow developing countries, individually or collectively, to make a case for reforms of the trade regime. However, it would be important to differentiate among developing countries since middle-income developing countries would have to accept a more balanced set of rights and obligations than would low-income countries (Rodrik 2001).

PROVIDING ASSISTANCE IN COMPLYING WITH TRADE RULES

Developed countries and international organizations should provide targeted aid to strengthen laws and institutions in poor countries to assist them in complying with trade rules (Audley et al. 2003). But this also implies the need to establish a realistic timetable to implement reforms, to estimate the costs of implementation and to finance social safety nets in countries that could be negatively affected by outcomes of WTO negotiations (Mendoza 2003). The single undertaking rule for WTO commitments and obligations makes this assistance especially crucial.

IMPROVING DEVELOPING COUNTRY ACCESS TO TECHNOLOGY

For many developing countries it is unrealistic to impose state-of-the-art intellectual property laws on the model prescribed following the WTO agreement (United Nations 2001). This issue needs to be re-examined, so that incentives to innovate are compatible with development strategies and access to low-cost medicines. Some regulations have been extremely hard to implement or been counterproductive for developing countries.

A recent review of the literature provides new evidence linking protection of intellectual property to economic growth, innovation and technology diffusion. While stronger intellectual property protection is likely to benefit many developing countries with sufficient capacity to innovate, it is likely to be of little use to others, and may even impose additional costs. There is considerable scope, therefore, for countries at different stages of development to use the flexibilities in the TRIPS Agreement to enhance its benefits (Falvey and Foster 2005).

15 When general agreements conflict with the "development needs" of developing countries, WTO rules allow for exceptions to the most favoured nation clause under the Generalized System of Preferences (GSP). Begun as a system of unreciprocated concessions from developed to developing countries to support the development of infant industries in developing countries, the system has now become an instrument of pressure by developed countries to exert non-trade concessions from developing countries (in areas such as intellectual property rights, human rights, and the environment). Increasingly complex trade rules and growing empirical evidence that GSP has not benefited developing countries over the long run are directing increasing attention to this issue.

As Mendoza and Bahadur (2002) state, these reforms are not only in the interests of developing countries. Developed countries should benefit as well from the more stable and legitimate trade regime, anchored in a more participatory WTO. Without such changes, the global public good of an international trade regime will continue to be underprovided.

Any reform of the international trade system must take into account three factors. First, developing countries are not a homogenous group, sharing the same interests. For example, according to some empirical research, most benefits from agriculture liberalization would go to just two countries, Argentina and Brazil. Other developing countries would be more interested in issues such as technical assistance or greater mobility of workers. Second, empirical research also shows that developed countries would benefit much more than developing countries from trade liberalization (Charlton and Stiglitz 2004), so even for efficiency reasons the developed world should work harder to reach a broader agreement on trade rules. And third, major problems will arise if the WTO no longer serves the interests of the major trading nations (Kerr 2002). They may begin to rely more on regional trade organizations or look for new clubs. Developing countries ought to benefit more from the WTO, but this will happen only if the major trading countries remain committed to it. Any reform must avoid the withdrawal of the developed countries from the system.

CHAPTER 4
KNOWLEDGE AS A PUBLIC GOOD FOR DEVELOPMENT

Economic and social development depends on the capacity to generate, absorb and diffuse knowledge and technology. Knowledge and technology have the potential to provide benefits to large numbers of users, and the benefit received by any one user does not reduce the benefits received by others. Knowledge is often considered a public good (Stiglitz 1999), but it is more complex than it first appears. Several important qualifications must be considered. These qualifications are crucial to the design of appropriate policies to increase the rate of innovation and to guide its direction, at both the national and the international levels.[16]

ARE KNOWLEDGE AND TECHNOLOGY PUBLIC GOODS?

Technology and knowledge are neither totally private nor totally public goods (Nelson 1992; Callon 1994). Seen through the public goods lens, knowledge is only partially non-rival and non-excludable.

KNOWLEDGE AND RIVALRY

If someone develops a new method to stop headaches, and others buy, rent, imitate or steal the new method, the inventor is still able to use it. More people now benefit from the same method. While the transfer of a physical commodity (a pen, a car, a machine) implies that the original proprietor loses control of the object, nothing like that happens when knowledge is acquired or transferred to others. In this sense, knowledge has the key characteristic of a non-rival good in consumption.

But if someone has invested massively to develop the new method, the way others acquire the knowledge becomes important. To ensure some form of remuneration, the developer of the new method will want some way to exclude individuals who do not pay to use the method (excludability).

The prospective purchaser of knowledge also has to face a market that is highly imperfect. Not everyone will be willing to pay for knowledge whose usefulness has not already been demonstrated. But once the knowledge is disclosed, there is no longer a need to pay for it. There is an additional characteristic that differentiates knowledge from other goods: there are no limits to duplication, but variable costs are zero or very

16 This chapter defines *knowledge* as the human capacity to understand and make sense of external reality and *technology* as the application of knowledge to practical purposes. This distinction reflects, in terms of stocks rather than flows, the old Schumpeterian insight about the difference between *invention* (which does not necessarily have an economic impact) and *innovation* (which is the application of new ideas and designs to new products and processes). *Science and technology* are defined as the overall activities carried out by public and business actors inside and outside designated institutions. The most formalized part of science and technology is classified as scientific research and experimental development, and *statistical evidence* is regularly collected by national and international organizations.

limited and at the end of the lease the purchaser will still possess the knowledge and the developer will have difficulty preventing its further use.

If another creative inventor develops a competing device, a fierce competitive race may occur to upgrade the knowledge to make it more appealing to a prospective customer, to use current systems to protect it, to market it and to trade it. This process has all the characteristics of economic rivalry and competition and relies, of course, on the existence of methods that allow individuals to be excluded from the use of knowledge. Although there is no rivalry in use of innovation, there might be substantial rivalry in generating and upgrading it.

KNOWLEDGE AND EXCLUDABILITY

When a good is non-rival in consumption, excludability is no longer a technical issue, but rather a social construct. More than in other areas of economic life, institutions are needed to enforce the excludable nature of knowledge. Markets are incapable of proper regulation, production and distribution of knowledge, especially technological knowledge, which is likely to be applied and commercialized.

In the absence of public regulation, there is less economic incentive to generate knowledge. Inventors might concentrate on knowledge that can be exploited even without institutional regulations, such as knowledge that can be kept secret. This might imply that investments to generate knowledge would be directed towards fields that are difficult to imitate (such as aircraft) or that can be technically protected (such as DVDs) rather than fields that can be easily imitated (such as drugs) or that cannot be technically protected.

Of course, humans do not generate knowledge for economic returns only: ingeniousness and creativity are fundamental components of human nature. But in a society without public institutions and regulations, inventors are likely to keep their discoveries secret or to neglect important practical applications because of lack of incentives.

TECHNOLOGY IS NOT FREELY AVAILABLE

There are other reasons why it is difficult to apply the standard framework of pure public goods to technology. Even if the producers of a technology are willing to make the knowledge entirely non-rival and are prepared to distribute it freely, not everyone will be able to acquire it and benefit from it. The costs of imitating and acquiring the same expertise can be higher for some people than for others (Mansfield, Schwartz and Wagner 1981). Typical public goods, such as security and clean air, assume that the economic agent does not have to make any additional effort to take advantage of them. That is not the case with technology: even when producers of knowledge have the best intentions of transferring their expertise, the economic agent has to invest time, efforts and resources to acquire it—and even that may not be enough.

The literature on technology transfer from developed to developing countries has convincingly shown that technology transfer, like the generation of new knowledge, is an uncertain activity with successes and failures (Bell and Pavitt 1997; Lall 2001). Technology cannot be equated with information (Pavitt 1987). Callon (1994) introduced the relevant difference between knowledge and technology that is *freely available* (not protected by legal or technical devices) and that *can be used without incurring costs*

(that can be directly applied without additional investment by the prospective user). Freely available knowledge is a rather large basin. But to exploit this basin of knowledge, a lot of additional effort in learning, tooling up and development is needed. In this sense, the amount of knowledge that can be used without incurring costs seems to be very limited, and it refers only to knowledge that is fully embodied in products.

The practical possibility of transferring technology also depends on the complexity of the invention and on the infrastructures available to would-be imitators. Drugs can be imitated and replicated rather easily while entry barriers in nuclear physics are much higher.

If the distinction between technology that is *freely available* and technology that *can be used without incurring costs* is accepted, important implications emerge for public policy. The public good argument has a strong normative component, and it is raised to advocate the direct intervention of public agents to produce a good that individual agents otherwise will not produce.

But this assumes that the good is useful to the majority of people and therefore that it is in the public interest to have a government that will ensure the production of a good that would not otherwise be produced. On which sort of knowledge should the government concentrate? On knowledge that is freely available (even if that implies major individual costs to acquire it)? On knowledge that can be used without additional costs? Or on knowledge that has welfare implications? The priority fields may differ substantially according to the answer provided.

GOVERNMENTS AND THE PRODUCTION AND DISTRIBUTION OF KNOWLEDGE

Knowledge is so crucial for welfare and its public good characteristics are so peculiar that public players have always taken an active role in its promotion and distribution. To reward the producers of good ideas, to increase the investment in knowledge and to induce inventors to reveal their discoveries, public policies and regulations are in place in industrialized countries. Knowledge provides positive externalities that can potentially benefit the whole community. From this springs the notion that it is in the interest of the community to have public policies to foster knowledge. Governments have promoted knowledge to win wars, to increase security, to safeguard public health, to explore the universe, to improve communications and to advance education and learning. Public intervention and regulation has taken various forms. It can be subdivided into four broad areas:

- *In-house investment.* The government develops knowledge through publicly funded institutions such as research centres (examples are the National Aeronautics and Space Administration and the European Organization for Nuclear Research) and universities. This includes the training of qualified people under the assumption that they will become a "creative class". In principle, the results of government-funded and performed research are in the public domain and freely available.
- *Procurement.* The government contracts with the business sector to develop the knowledge it needs, whether embodied in final products or entirely disembodied. In the first case, the government purchases products (for example, an aircraft with given specifications) and the executing firm is required to develop the necessary knowledge to build them. In the second case, the government asks the business sector to develop new disembodied knowledge (for example, the prototype of a new vaccine). The government generally holds the property rights, although contracting

firms are likely to retain them de facto, and so may distribute the knowledge in other fields. Since the contracting firm develops the knowledge, it retains the expertise. Even if contracts require that the contracting firm eliminate all associated information, it is not possible to erase the knowledge acquired.

- *Beauty contests*. The government rewards individuals and organizations that have produced socially relevant knowledge. These rewards act as incentives for the business sector to conduct scientific and technological investigations. The contest implies that private players disclose their knowledge, and in some cases the government can acquire it as a consequence of delivering the reward. But this is more likely to be effective for the codifiable than for the tacit component of knowledge.
- *Intellectual property rights*. The government guarantees private inventors will reap the fruits of their discoveries, generally through intellectual property rights. These provide an incentive to private agents to invest in the generation of knowledge and to disclose the knowledge once developed. Intellectual property rights are designed to exclude others from the use of knowledge, to make knowledge property and to generate a market for it.

THE RATIONALE FOR INTELLECTUAL PROPERTY RIGHTS

Intellectual property rights, such as patents, copyright and trademarks, are institutional devices that should allow the owner of knowledge to protect and trade ideas and therefore should make knowledge excludable. But intellectual property rights apply to only a part of the overall stock of knowledge. They concentrate mainly on knowledge developed by profit-seeking agents that is "useful"—the component that is directly related to technological applications and that has been developed relatively recently (Andersen 2005). When intellectual property protection is obtained, technology can be sold and hired.

Intellectual property rights are based upon a pact between society, represented by the government, and the individual: the individual makes some knowledge available and the government protects the individual's ability to obtain the benefits of that knowledge. The protection consists of granting a monopoly on the economic use of the knowledge, although this is neither in theory nor in practice a total protection. First, governments grant monopoly rights on knowledge for a limited amount of time (at least, for patents and copyrights). Second, if there is a strong public interest in doing so, the government can decide to use the knowledge regardless, through compulsory licensing or expropriation.

The aim of intellectual property rights is less to protect the rights of owners of knowledge that has already been generated than to encourage investment in knowledge and to induce inventors to disclose what they know (Scherer and Ross 1990). In other words, it is based on the assumption that some static advantages—making privately generated knowledge freely available—have some dynamic disadvantages—the lack of incentives will discourage agents from inventing in the future (Stiglitz 1999). The intellectual property rights system should therefore try to balance the static and the dynamic advantages and disadvantages.

Intellectual property rights are not limited by government legislation alone, but also by the nature of a competitive economy. In the real world, intellectual property rights provide only partial protection: competitors and would-be imitators are often able to bypass the legal limitations by "inventing around" them. Consumers also often man-

age to acquire the knowledge associated with intellectual property rights without paying its costs. Knowledge is used, copied and imitated, and existing legal devices are unable to provide full protection to the singer, photographer, software engineer and inventor.

Public policies have tried to balance the private and the public interest. Without any enforcement, intellectual property rights would lose their meaning. But enforcing intellectual property rights strictly could imply collecting a fee every time that "Happy Birthday to You" is sung, although such a policy would be difficult to enforce or to consider as a welfare gain.[17] Public policy has therefore been inclined to enforce intellectual property rights with a certain relaxation, possibly on the assumption that less than perfect protection would increase welfare and reduce monopoly power.

Moreover, the somewhat relaxed attitude of governments in the face of intellectual property rights infringements is associated with the idea that the generation of knowledge is seldom up to a single individual. Innovation in contemporary society often has multiple fathers and mothers (multiple independent discoveries), each able to exploit previous knowledge, to exchange information with colleagues, to absorb what is generated in public research centres and universities. It is impossible to be a successful producer of knowledge without being an even more successful absorber of knowledge. In the world of ideas, the difference between "pupil", "absorber", "plagiarist" and "robber" is very thin. To give the full reward to the person who owns the intellectual property right does not necessarily mean that the person who most deserves it has been rewarded.

But as companies whose main products are software, cartoons, films, chemical formulae or commercial design are becoming more and more prominent, protection of intellectual property rights is also becoming more important than it was for automobile, real estate or raw material companies. A dramatic shift towards the privatization of knowledge is taking place, but it is uncertain whether this shift is creating welfare advantages (Mazzoleni and Nelson 1998; Andersen 2004; Jaffe and Lerner 2004). While intellectual property rights are an important asset for firms, especially multinational firms in high-technology industries, intellectual property rights are not necessarily associated with a commensurate increase in the amount of resources businesses devote to knowledge and innovation.

LESSONS ON APPROPRIABILITY

The current system of intellectual property rights is designed to treat all cases uniformly. Thus, the length of patents is the same, whether an invention is a radical or a simple refinement of previous inventions, and all scientific and technological fields are treated the same, regardless of their significance for economic development and human welfare.

It may well be too complex to design a system of intellectual property rights that differentiates protection according to the significance of an invention. And it is also true that the current system assumes that the economy will be able to provide some differentiation of rewards, so that a significant invention will become successful and provide substantial returns to its inventor, while inconsequential inventions may not be implemented at all. And, in cases of controversies, it is left to the courts to assess compensation for infringement, which is proportional to the damage incurred.

17 In the United States the copyright to "Happy Birthday to You" will expire in 2030 (Gorman 2005).

Evolutionary theory in economics has tried to bridge the gap between theory and the real world. Nelson and Winter (1982) found that the rate and direction of innovation pursued by firms is strongly connected to technological opportunities and appropriability. Not all fields offer the same potential for development. They present different technological opportunities, which vary according to scientific advances and structural change. Firms concentrate on areas that promise greater industrial openings.

But technological opportunities alone do not drive the direction of technological change pursued by the business sector. While business players take into account how scientific and technological breakthroughs can open new markets, they are equally careful to consider the possibilities for collecting the returns on their investments by appropriating the results of their innovations. The fields chosen for greater technological change are not necessarily those that provide greater scientific advance, but rather those that provide increased profits to firms. Firms consider appropriability, the combination of economic methods (such as lead time, market power and economies of scale), legal and institutional regulations (such as intellectual property rights) and technical devices (such as industrial secrecy and access codes) that allow (or do not allow) the innovator to obtain returns on knowledge (see Levin et al. 1987). Empirical results have yielded several lessons about appropriability.

- *Economic methods are more important than institutional methods*. To get returns from innovation, firms rely more on their ability to exploit the innovations in the market than on intellectual property rights. Innovating firms do not consider patents and other intellectual property rights as the most important method of appropriation (Levin et al. 1987). Using data from the European Community Innovation Survey, Arundel (2001) confirms that lead-time advantages are considered the most effective appropriability method in 54.4% of cases of product innovation and 46.7% of cases of process innovations, while patents are considered the most important source in 11.2% of product innovations and in 7.3% of process innovations.
- *There are significant differences across industries and technological fields*. While for some industries intellectual property rights are a key source of competitive advantage, they are not for others. Industry sensitivity to intellectual property rights is often associated with overall technological intensity. In fact, high-technology industries rely more on intellectual property rights than do traditional industries. But there are significant exceptions: for example, the aircraft industry, despite its very high research and development (R&D) intensity, relies much more on industrial secrecy than on intellectual property rights.
- *There are significant differences across countries*. The coverage and effectiveness of intellectual property rights also vary greatly across countries, and legislation is far from uniform. Despite various international treaties and agreements, intellectual property rights continue to differ across countries in rights granted to inventors and innovators and penalties imposed for violations.

  Differences are even greater in practice: while some countries are keen to enforce intellectual property rights, others are much less prepared to use the institutional machinery. Industrial countries have stricter rules for intellectual property rights than do developing countries, although even among Organisation for Economic Co-operation and Development (OECD) countries there are substantial differences in legislation. These differences are strictly associated with the fact that some countries have a very important knowledge-based industry and therefore are strongly committed to protecting it against imitators. For countries with a very small

knowledge-based industry, which tend to rely on international diffusion and transfer of knowledge, introducing strong intellectual property rights implies high costs, which are not necessarily associated with advantages.

- *Policy agendas will diverge across countries.* In a multilateral context, some countries might try to free ride, to imitate and exploit the knowledge developed elsewhere without investing their own resources in scientific and technological investigation. A weak intellectual property right regime may seem to work to their advantage since stronger protection might be thought to be in the interest of foreign rather than national firms. But a weak intellectual property right regime will provide little incentive to domestic innovation, impeding a country's ability to catch up. Generally, it is thought that catch-up will occur through technology diffusion, rather than domestic innovation. Gerschenkron (1962) in his influential book talks of the advantages of backwardness and of countries away from the frontier being able to "borrow" technology from the frontier. Here diffusion rather than innovation appears to be the method of catch-up (though see the comment below, suggesting that innovation itself may help facilitate diffusion). The argument concerning weak intellectual property rights and innovation would therefore seem to be based less on its role for technology diffusion and catch-up and more on the idea that weak intellectual property rights, by discouraging domestic innovation, result in countries relying on inefficient firms that engage in counterfeiting and imitation activities. Countries that are able to absorb the knowledge generated elsewhere are often also the most successful innovators. The Japanese case appears to be quite subtle (Maskus and McDaniel 1999), encouraging diffusion, but also incremental and adaptive innovation, particularly through the use of utility models. In the post-war period Japan, which despite often being accused of neglecting intellectual property right protection, was able to develop as a major innovator partly by encouraging the diffusion of knowledge generated abroad. Recently, the Republic of Korea and Taiwan Province of China have had the same experience. The implications of stronger intellectual property rights depend on a country's level of development (see viewpoint 4.1).

INTELLECTUAL PROPERTY RIGHTS IN DEVELOPING COUNTRIES

Within a developed society, intellectual property rights produce a static disadvantage, but from the dynamic viewpoint they increase the resources devoted to inventive and innovative activities. The same argument does not necessarily apply for developing countries. If developing countries rely on the advancement of knowledge occurring in the developed countries, existence of strong intellectual property rights in developed countries will be crucial even for developing countries.

Provided that scientific and technological capabilities are asymmetrically distributed between developed countries and developing countries, a natural question is whether developing countries have any reason to introduce legal norms to protect intellectual property. Wouldn't laws protecting intellectual property inherently advantage developed countries, which produce the bulk of innovation, and disadvantage developing countries, which do not? If developing countries introduce stronger protection of intellectual property, their firms and individuals will have to pay more for access to knowledge.

Viewpoint 4.1
Intellectual property rights, economic growth and technology transfer

Developed countries, with many potential innovators, have tended to opt for relatively strong intellectual property rights systems, with the aim of encouraging inventive and creative activities, which are seen as an important source of long-run economic growth. In most developing countries, however, genuinely innovative activities are limited, and the majority provide only weak intellectual property rights protection, if any, as a way of allowing the rapid diffusion of knowledge. For many of these countries, imitation is an important source of technological development, and providing stronger intellectual property protection is seen as shifting profits from domestic imitative firms to foreign firms and reducing output in the domestic economy rather than encouraging domestic innovative activity (Deardoff 1992). The counterargument is that stronger intellectual property protection can reward creativity and risk-taking even in developing economies, with countries that retain weak intellectual property protection remaining dependent on dynamically inefficient firms that rely on counterfeiting and imitation.

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) was established during the Uruguay Round of trade negotiations to strengthen the international intellectual property rights regime. The first comprehensive and global set of rules covering intellectual property rights protection, TRIPS specifies minimum standards that should be attained by a designated time. TRIPS covers copyrights and related rights, trademarks, geographical indications, industrial designs, patents, the layout designs of integrated circuits and undisclosed information, including trade secrets and test data.

Empirical findings on protection of intellectual property

The implications of stronger intellectual property rights depend on a country's level of development. For more advanced countries—those whose intellectual property rights regimes already meet or exceed the TRIPS standards—the evidence suggests that strengthening intellectual property rights increases growth, at least partly through increased innovation, and partly through increased technology diffusion.

For middle-income countries with high imitative capacity, the evidence suggests that strengthening intellectual property rights has no effect on growth overall. In combination with the evidence that a stronger intellectual property rights regime encourages technology diffusion through higher trade flows and increased foreign patenting, it would appear that the gains to growth from higher technology diffusion are simply offsetting the growth-enhancing benefits obtained from the imitation now precluded by the stronger intellectual property rights regime. These are countries whose intellectual property rights regimes will need to be strengthened to meet the TRIPS standards. For them the policy focus should be to encourage domestic firms to shift from imitation to innovation and to facilitate other activities with growth-enhancing technology spillovers.

For poor countries some evidence suggests that strengthening intellectual property rights encourages growth, but research sheds little light on the channels through which this occurs. Stronger intellectual property rights appear to have no effect on domestic innovation. Moreover, the impact of stronger intellectual property rights on the various channels of technology diffusion for these countries is found to be ambiguous. But these countries will need to strengthen their intellectual property rights regimes to meet the TRIPS standards. Some of these countries may be concerned that TRIPS will inhibit their firms from passing through the imitative stage that seems to be the precursor to innovative capability in relatively high-technology industries. The TRIPS obligations may make WTO membership less attractive for countries with imitative aspirations.

A country's openness to international trade also seems to be important. The evidence suggests that, other things equal, stronger intellectual property rights have a larger impact on growth in more open economies. The exact mechanism has not yet been revealed, but it appears that international technology diffusion plays an important role. Results suggest that stronger intellectual property rights lead to less domestic patenting and more foreign patenting in more open economies. While this suggests larger outflows of royalty payments,

the growth-enhancing effects of foreign patenting also appear to be stronger in more open economies. In addition to the role of trade in the relationship between intellectual property rights protection and growth, intellectual property rights protection is also found to influence trade flows. There is evidence suggesting that stronger intellectual property protection leads to larger trade flows, though mainly for countries with imitative capability and not necessarily in goods and industries considered high-technology or patent sensitive.

Since most innovation occurs in a few advanced countries, foreign direct investment (FDI) and technology licensing are, in addition to trade, perceived to be the major formal channels for international technology transfer. But while there is some evidence that stronger intellectual property rights encourage licensing, the evidence on whether stronger intellectual property rights encourage FDI is largely inconclusive. Intellectual property rights do appear to be important for some transnational corporation activities (research and development and local production) and especially in some sectors (chemicals and pharmaceuticals). This means that transnational corporations are more keen to invest in countries with stronger intellectual property rights protection in these areas. Most host countries anticipate that FDI or licensing will yield further benefits from technology spillovers to domestic firms. Such spillovers are difficult to measure, so perhaps it is not surprising that there is little conclusive evidence of growth-enhancing spillovers through inward FDI, at the economy-wide, industry or firm level.

A further important source of technology transfer for some countries is likely to be foreign patenting, with a country's market size potentially being important in determining whether increased foreign patenting encourages or inhibits growth. The evidence suggests that increased foreign patenting has a negative effect on growth in small countries, a positive effect in middle-size countries and no effect in larger countries. When attention is restricted to developing countries, foreign patenting has a positive effect on growth at high levels of intellectual property rights protection, high levels of economic development, for relatively open economies and relatively large markets. This is consistent with the broad conclusions of the literature that stronger intellectual property protection should encourage technology diffusion and that the benefits of technology diffusion should be greater in more open economies, in countries that are more developed and in larger markets where foreign firms have less market power.

Policy responses to TRIPS

The empirical evidence makes it clear that policy recommendations should vary with a country's development and its imitative or innovative capacity. The policy priority in low-income countries with weak institutions and limited research capacity, for example, should be to improve the investment environment with liberal trade policies to encourage imports of technology embodied in goods. Such countries should not be required to apply and enforce strong intellectual property rights obligations, and they should have access to mechanisms that reduce the cost of importing patent-protected goods. For developing countries with relatively high levels of innovative potential, the stronger intellectual property protection required by TRIPS can facilitate the transition from imitation to innovation. By encouraging technology diffusion through international trade and foreign patenting, stronger intellectual property rights protections will also help offset any adverse growth effects from lost imitative opportunities.

Policies related to the implementation of the TRIPS standards should be country specific. A range of policies that can assist countries in enhancing the benefits from TRIPS have been discussed in the literature:

- *Intellectual property rights–related policies.* Policies related to patent fees, the scope of patentability and the novelty requirement in patents can all contribute to the development of a domestic innovative sector and to the international diffusion of knowledge. Fees for patent applications and renewal of patents and trademarks can be set to promote innovation and diffusion. Developing countries can limit the scope of subject matter that can be patented and encourage rapid publication of patent applications, allowing domestic firms to invent around the patent. Countries can set high standards for the novelty requirements of patents, to prevent routine discoveries from being patented.

- *Competition policies.* By creating market power for patent holders, stronger intellectual property rights protection can lead to reduced sales and higher prices, which can limit technology diffusion. Several policies consistent with TRIPS can offset these costs, including price controls through reference prices or administrative ceilings, compulsory licenses entitling a domestic licensee to exploit the patent for a fixed period of time during the patent life and use of parallel imports.
- *Complementary policies.* Tax policies and regulatory regimes can be structured to avoid discouraging innovation. Investment in education, particularly in science and technology, may encourage domestic innovation. Development of a local innovative sector can enhance the benefits from international technology diffusion.
- *Technology diffusion.* For most developing countries, improved technologies will be imported. International technology transfer occurs through imports, FDI, licensing and patent applications by non-residents. Policies aimed at improving infrastructure for communication and transport and maintaining macroeconomic stability, along with open trade and investment policies, can encourage such flows, allowing countries improved access to foreign technology.

Role of multilateral organizations

Multilateral organizations can assist developing countries in meeting the terms of TRIPS and obtaining the maximum benefit from it.

Maskus (2004) argues that capacity building in intellectual property rights should focus less on the specification of protective laws and regulations and more on the technical, judicial and legal expertise underlying effective technology transfer.

Multilateral organizations can facilitate research on the economic effects of intellectual property protection and encourage the dissemination of its findings to all interested parties. More generally, multilateral organizations can reduce overall information problems by encouraging collaboration and information sharing among governments, possibly by serving as an intermediary (Saggi 2003). Technical standards play an important role in diffusing production and certification technologies, and learning technical standards is often tantamount to learning technology (Maskus 2004). Here multilateral organizations could create a pool of experts to aid standard-setting bodies in developing countries.

Multilateral organizations could encourage the development of a research culture in developing countries, including training programmes in how technology is transferred, and general finance education programmes, particularly those that can aid the diffusion of technology (Maskus 2004). Donor countries and multilateral organizations could establish trust funds to finance the training of scientific and technical personnel to facilitate the transfer of technologies that are particularly important in the provision of public goods and to encourage research in developing countries (Roffe 2002).

Maskus (2004) argues that multilateral organizations, particularly the World Trade Organization (WTO), could increase the scope for monitoring developed country efforts in the transfer of technology and could add an evaluative mechanism for the effectiveness and extent of technology transferred. Hoekman, Maskus and Saggi (2004) argue that the most powerful indirect incentive for technology transfer is for developed countries to grant significant market access for products in which poor countries have a comparative advantage. Multilateral organizations, particularly the WTO, have an obvious role to play here.

Source: Drawn from a background paper by Falvey and Foster (2005).

In recent years, a global tendency towards stronger protection of intellectual property has emerged. Inventions are patented in a much larger number of countries. Many developed country governments are concerned that the intellectual property of their national firms is not well protected abroad. Countries whose economic activity is more directly associated with non-material production are pressing international organizations, especially the World Trade Organization (WTO), to enforce a stronger intellectual property right regime, while other countries, especially developing countries, fear that this will exclude them from the knowledge generated abroad (Shiva 2001).

Governments in developed countries have started to act directly in defence of the interests of their corporations. The clearest expression of this tendency is the Trade-Related Intellectual Property Rights Agreement (TRIPS), the institutional machinery designed to protect firms' intellectual property even in countries where they do not operate and where national sources are unlikely to protect them (May 2000). Through the WTO, governments can defend their national firms and require foreign governments to protect their intellectual property.

Why have so many developing countries voluntarily signed TRIPS? One reason was the hope that OECD economies would open up their markets in return. But there are also some more specific technological reasons. It was hoped that multinational corporations would want to invest in countries where intellectual property rights were well guaranteed. It was also expected that formal protection of codified knowledge would increase the effectiveness of technology transfer, for example, by increasing the number of patents and licences in developing countries. And it is also likely that developing countries underestimated the difficulty of enforcing TRIPS in their own countries.

A review of the empirical evidence (Falvey and Foster 2005) finds no conclusive evidence that TRIPS has favoured developing countries. The general conclusion from this literature is that TRIPS will need to be toned down to allow developing countries to acquire the knowledge they lack (May 2000).

KNOWLEDGE ACROSS NATIONAL BOUNDARIES

There is widespread recognition that nations are so strongly interlinked that both the benefits and the problems associated with technological change are also interrelated. Major scientific and technological breakthroughs have an impact beyond the borders of the state that produces the knowledge. Likewise, human problems that require the generation of new scientific and technological competencies are not confined to the country where they originate. Health, environment, communications, mobility and safety all require the development of new knowledge that can potentially provide global benefits. How do public and business players address these issues?

PUBLIC INSTITUTIONS

Public funding of research and education is grounded in the notion that these will deliver some advantages to the community. The advantages can be instrumental (defence, environment, medical research) or contributions to the general advancement of knowledge (astronomy, archaeology, basic research). In all cases, the government is committing public resources and so must be able to account for the benefits provided. The nature of knowledge, however, makes it very difficult to single out a community of beneficiaries. The citizens of any state benefit from knowledge that has been generated

elsewhere (and often paid for by taxpayers of other countries), and, at the same time, have paid for knowledge that benefits citizens of other countries as well as themselves. With the non-rival nature of knowledge, this is not necessarily bad news, but this fact should be taken into account when science policy governance is discussed.

Knowledge has never stopped at the boundaries of territorial states. Through a variety of channels, knowledge has spread from individual to individual and from generation to generation, without respecting national borders. Members of the academic community have always had a strong propensity to exchange the results of their studies with their colleagues. Cross-border collaborations in academia have many channels, including academic societies, international journals, conferences, sabbaticals and mobility grants. Despite the open nature of the academic community, the bulk of public resources devoted to knowledge—especially to education and R&D—are national in scope. National governments may decide how much to spend and which fields and institutions to spend on. It is therefore legitimate to wonder whether there is still a connection between what taxpayers pay and what they receive.

The strong differences in investment in knowledge mean that some states, particularly developed countries, will contribute much more to the overall stock of knowledge than others, generally developing countries. In this sense, it can be argued that national expenditure on knowledge, even when funded and performed within the boundaries of a territorial state, is also a contribution to international public goods.

But this does not necessarily mean that developing countries will benefit from this knowledge, especially in the short run. In fact, the low level of technological capabilities and infrastructures in developing countries and a lack of resources often constrain the absorption of knowledge generated in developed countries. This is a typical case where the difference between *freely available knowledge* and *knowledge that can be used without incurring costs* becomes relevant.

The patronage of knowledge produced by governments has followed both cooperative and rival paths. Governments have generally promoted cooperation across national academic communities, and many institutional instruments have fostered cooperation. Public sources have funded joint research programmes, international conferences, international disciplinary academic associations, sabbatical years and student exchanges. In these areas, each country fosters its own academic community in order to achieve a better performance, but the methods and results are generally shared.

One way to gather empirical evidence on this form of transborder collaboration is by looking at scientific papers that are coauthored by scientists of different countries.[18] Internationally coauthored papers have increased substantially, thanks in part to the Internet and information and communication technologies. Internationally coauthored papers have more than doubled as a proportion of total coauthored papers in the last 15 years (US National Science Foundation 2002). This form of collaboration has affected all countries, but it has become more important in the areas of the world with small academic communities. While internationally coauthored papers account for 21% of papers published by US scholars and 30% of papers published by Western European scholars, they account for nearly 50% of papers published by Sub-Saharan African

18 While the number of publications generated by researchers in the business sector is increasing, the bulk of publications are still the outcome of publicly funded research. And researchers and engineers working in industry tend to publish their results in academic journals when they are not looking for proprietary claims to the knowledge disclosed.

scholars and more than 40% of those published by Latin American scholars. Regions of the world with lower scientific capabilities rely proportionally more on cross-border collaboration.

THE BUSINESS SECTOR

The business sector is becoming a more important player in the development of knowledge. Although participation by the business sector in education is still limited, firms are a crucial player in generating and upgrading professional skills. In both developed and developing countries firms contribute substantially to training. The role of firms in financing and conducting R&D is even more important: in OECD countries the business sector is the major source of financing of domestic R&D, accounting for some 60% of R&D funding in 2003.[19]

While a large portion of the results of publicly funded R&D is freely available, business-funded R&D is generally proprietary and protected through secrecy or intellectual property rights. But even the best-protected industrial secrets and the most effective intellectual property right regimes will not allow a firm to retain its advances in knowledge. Over time, other firms will imitate successful innovations, leading to the diffusion of knowledge generated by profit-seeking agents.

Firms can no longer be associated with national territory. Most firms have substantially increased activities outside their national territory. New products introduced by firms are traded in international markets, new processes are scrutinized and diffused by competitors at home and abroad. Not even the technological activities carried out by multinational corporations are strictly associated with the nation of their headquarters. In fact, leading multinational corporations have built their own innovation centres, which are both intrafirm and international. The geographical expansion of firms is also affecting their technological strategies. Whatever knowledge they produce is by definition transnational rather than national. Empirical evidence has shown the following:

- More than 15% of the innovations of transnational corporations are generated in countries other than where their headquarters are located, and that share has been slowly rising over the last 30 years (Cantwell and Janne 1999).
- The bulk of transnational corporations' foreign investment-related innovation is directed within North America, Europe and Japan. Just a tiny share of the investment flows of OECD transnational corporations moves in the direction of developing countries (UNCTAD 2005).
- There are significant variations across regions in the propensity to invest abroad for R&D. The propensity is much higher in Europe than in the United States, while Japanese transnational corporations continue to concentrate their technological activities at home (Cantwell and Janne 1999).

There are many reasons why transnational corporations prefer to expand their activities internationally (for an overview, see Archibugi and Michie 1997; Narula and Zanfei 2005). Among the main ones:

- Transnational corporations whose headquarters are in high-wage countries can exploit the wage differentials of low- or medium-wage countries.

19 http://lysander.sourceoecd.org/vl=1798u729/cl=ig/nw=1/rpsv/scoreboard/a03.htm

- To develop products that serve local markets, transnational corporations need to adapt their products to local regulations. To do that, they need to perform a substantial amount of R&D and related activities in host countries. Food and pharmaceuticals are examples (Molero and Alvarez 2003).
- Companies can "plug in" to the expertise of other countries (Cantwell and Noonan 2001).
- Transnational corporations keep offshore R&D centres in foreign countries to leverage the technological opportunities that exist there (Narula and Zanfei 2005).

Transnational corporations are important vehicles for the international spread of technology, whether they wish to be or not. They do not always succeed in maintaining ownership of their knowledge, but they often act as dispersers of skills that are further developed in the host country. Consider the software district of Bangalore. From an original foreign direct investment by Texas Instruments in the mid-1980s, a hub of excellence in information and communication technology and software has developed, supported by education policies that have led to a substantive base of university-trained computer engineers (Arora et al. 2001). This resulted in the birth and growth of a cluster of dynamic local firms, which induced other multinational corporations to invest. In this case, a deliberate policy to build competences has achieved the upgrading of regional technological capabilities.

In recent years, firms have become more willing to collaborate with other firms on their technological knowledge than is generally assumed. There is a vast literature of evidence collected on interfirm technology agreements, where the generation and application of knowledge is a key component (Hagedoorn 2002). The need to share costs and risks with others is often more important than the need to keep research projects confidential.

INTERNATIONAL ORGANIZATIONS

Finally, since intergovernmental organizations are established by states to address common problems, it seems natural that they could also play a role in improving general-purpose knowledge.

International organizations set common standards that allow all countries to benefit from best-practice knowledge. For example, transport and information and communication technologies can operate internationally only if there are agreed standards. The value of the standards increases with the number of players able to use them. Therefore, producers have an incentive to transfer the relevant knowledge and expertise related to standards to the largest number of potential users. International organizations devoted to establishing, disseminating and upgrading standards therefore play an important role in transmitting knowledge. In fact, standards have many of the attributes of pure public goods.

Second, a key component of multilateral development aid is the transmission of technological expertise. Specialized agencies such as the Food and Agriculture Organization of the United Nations, United Nations Children's Fund, United Nations Industrial Development Organization, World Health Organization and World Bank play a crucial role in allowing countries to acquire competencies. This does not happen only in development projects. When international organizations convene countries in a multilateral context, they provide an important learning opportunity. Multilateral institu-

tions thus provide opportunities for the exchange of knowledge not only from developed to developing countries but also among developing countries.[20]

Third, international organizations have promoted and funded several research centres. Research centres have been established by the United Nations University or under the auspices of UN specialized agencies. A case in point is the UNIDO International Centre for Science and High Technology.

In some fields with high fixed costs, governments have promoted joint research centres, as in the case of the European Organization for Nuclear Research (CERN). The European Union has established several international centres in areas where the costs and risks of scientific investigation are high and where the benefits are likely to be collective.

Why is publicly funded research aimed at the direct advancement of knowledge not larger than it is? The bulk of knowledge-related government spending is still directed towards national institutions. There are many explanations. First, governments are aware that R&D generates externalities and that there is an equally important localized dimension. Second, there is always a desire to keep the R&D system under direct control since it is an important instrument for long-term policies. Third, government R&D spending is not geared only to international cooperation. Despite the general tendency to make the results of R&D freely accessible, there are important areas where government-sponsored R&D is confidential (as in defence-related R&D). In other cases, governments, through procurement and other policies, attempt to support the competitiveness of their national firms and are unwilling to share or disclose information when this can help competitors.

WHAT INSTITUTIONAL FRAMEWORK?

All the considerations above show that both government and business players contribute to the international provision of knowledge, despite the fact that actions are continuous and relatively weak. The nature of knowledge allows some of its components to be distributed as international public goods even in the absence of purpose-designed institutions: governments may supply the good globally even when that is not their main motivation, and corporations may do so even against their wishes. But because firms tend to retain exclusive use of their knowledge, and governments are not necessarily keen to share it with foreigners, the generation and distribution of knowledge are not socially optimal.

SUCCESSES AND FAILURES IN TECHNOLOGY TRANSFER

The current controversy in the international regime of intellectual property rights, especially TRIPS, shows that the business interests in the international diffusion of knowledge are rather different from the public ones. Nonetheless, many developed country governments follow a two-way track: they protect the interests of their own national

20 An example is oral rehydration therapy, developed in Bangladesh to fight diarrhoea (UNDP 2001: 28). Developed countries have sufficient medical infrastructure to combat diarrhoea by providing sterilized liquid through an intravenous drip. But when this medical infrastructure is not available, a simple solution of salt and sugar has often proven effective in preventing child deaths. Since the same problem affects the majority of developing countries, it is a typical case where developing country to developing country technology transfer is needed.

companies to prevent other countries from acquiring their know-how without payment while simultaneously attempting to transfer knowledge to developing countries through official development aid.

If knowledge could be equated with information and could be transferred between economic agents at no or very limited cost (regardless of the accumulated skills, productive activity, geographical location and absorptive capacity of the receiving agent), it would be a pure global public good. But even in the absence of intellectual property rights, knowledge cannot be acquired without cost nor will prospective users necessarily gain any advantage from it. The amount of knowledge freely available and readily acquirable is very small. From this it follows that the main obstacle to technology transfer is not industrial secrecy or intellectual property rights but rather the lack of absorptive capacity in developing countries.

Developing countries lagging in technology can benefit from a stock of knowledge that is freely available (neither secret nor legally protected) if they upgrade their absorptive capacity. They must be active learners, investing massively in human resources in order to scrutinize, choose, modify, improve and apply the stock of available knowledge. Only a few developing countries, such as the often cited Asian tigers, have managed to do so (Hobday 2003; Viotti 2002; UNIDO 2002b, Memedovic, 2005a).

Responsibility for successful technology transfer does not only rest with public policy in developing countries, however. International organizations also have an institutional mandate to facilitate the diffusion of knowledge, and governments of developed countries should deliberately pursue policies that promote knowledge transfer. A successful strategy for technology transfer from developed to developing countries should therefore consider both the generation and transfer of knowledge.

Often, technology transfer is seen as a two-stage process. In the first stage, knowledge is generated in some geographically concentrated centres of excellence. In the second stage, once the knowledge is considered suitable for technological applications, it is distributed in firms, industries and countries. This strategy is based on the notions that transmission costs are small and that technological innovation can occur without direct contact with users. This strategy, applied frequently in the past, has led to remarkable failures.

A prominent example was the research system of the former Soviet Union. R&D was heavily centralized to prevent duplication and take advantage of economies of scale and scope. R&D was fully publicly funded on the assumption that the government would be able to transfer the results to all interested potential users equally (Hanson and Pavitt 1987). In reality, the concentration of resources in a very few large research centres of excellence reduced competitive incentives. And local users of knowledge—the various productive units scattered across the vast Soviet territory—were often unable to use this knowledge because it failed to meet their specific needs or because they lacked the appropriate expertise to use it. Practical problems encountered in production shops were not properly addressed since R&D centres were too remote. Similar failures in transferring knowledge have also been experienced in countries with large-scale programmes in fields such as defence and space.

PROMOTION POSSIBILITIES

Investing in knowledge provides enormous advantages for economic and social development. In the long run, advantages will probably repay the costs and will be distributed internationally and across generations.

But this long run is often too long, especially for the millions of people whose hardships can be alleviated by technological knowledge already available or nearly available. The increasing interdependence of societies, the difficulty of retaining the results of knowledge within national borders and the emergence of global challenges in fields such as health, security and environment demonstrate the need for a strategy of global governance that promotes increased coordination among national efforts and an enhanced role for international organizations that are dedicated to knowledge generation and dissemination. Currently, most research activities are planned and implemented at the national level without international coordination, even within the restricted club of the most technologically advanced countries. Radical changes in policy attitudes will be needed to foster investment in knowledge as an international public good.

This chapter has highlighted some of the special characteristics of knowledge as a public good. Knowledge can be considered a pure public good since it is non-rival in consumption and is often not excludable. But the generation of knowledge will not necessarily benefit economic and social development unless it is actually put to use through technological applications. Public policy should therefore focus not only on the production of knowledge, but also on its distribution (see viewpoint 4.2 on creating and disseminating knowledge).

First, the fact that profit-seeking agents finance, create and use a substantial amount of knowledge implies that it is often made excludable through industrial secrecy, access codes or intellectual property legislation. These barriers can be lowered or even removed through appropriate incentives. Public policy should resolve the dilemma of static and dynamic advantages of intellectual property rights: in the short run, weakening intellectual property rights might increase the amount of freely available knowledge, but in the long run it might reduce incentives to invest in knowledge, at least the part financed by profit-seeking business.

Over the last 20 years, the proportion of business-funded R&D has increased, while publicly funded R&D has remained stagnant or even declined. There is no evidence that the growth of business funded R&D has occurred at the expense of the public component. But to increase the amount of freely accessible knowledge will require a greater financial effort from public sources. Reform of the system of business incentives might also be effective. This could include incentives for the diffusion of innovations as well as for the protection of innovation. Greater efforts at the regional level would also be valuable (see viewpoint 4.3)

Second, freely accessible knowledge becomes useful only when prospective users have the necessary absorptive capacity (Abramovitz 1989; Bell and Pavitt 1997). This has major implications for an international technology transfer strategy. Building absorptive capacity requires time and investment: infrastructures, education, training and R&D labs are needed to assimilate and take advantage of the existing stock of knowledge. The policy implication is that concentrating on the supply side without taking the absorptive capacity of recipient agents (individuals, firms and even nations) into account could lead to a waste of resources.

Third, knowledge as an international public good will not be used in the absence of greater coordination and collaboration among national governments and international organizations. Many national governments develop their own science policy agenda on the implicit assumption that sooner or later they will benefit from basic research funded and performed elsewhere. But when such an attitude becomes general, the free-riding syndrome prevails: each country is tempted to wait until others invest in finding a solution. This leads to underprovision of the knowledge public good. Increased coordination and collaboration necessarily imply a greater financial commitment to knowledge, but also to accountable governance. It is unlikely that more public resources will be directed to the international dissemination of knowledge if stakeholders are unable to assess what these resources are used for.

Fourth, the current distribution of scientific and technological capabilities has an important effect on the priorities of scientific and technological investigation. Capabilities are strongly concentrated in developed countries. Not surprisingly, public expenditure and other government intervention for advancing knowledge are generally directed towards the specific situations of these countries rather than those of humanity more widely. It is understandable that governments of developed countries use the resources provided by their taxpayers foremost to serve the needs of their constituency rather than the needs of developing countries. Likewise, business companies invest according to prospective economic returns rather than to satisfy the needs of humanity. Therefore, neither pubic nor business expenditure will automatically address the most important global human needs.

In the long term it is desirable and feasible that developing countries expand their research capabilities and contribute to the generation of knowledge. In the short term, however, knowledge to address the basic human needs of developing countries relies on the willingness of developed countries. If more resources are to be put into financing R&D for basic human needs the targets and priorities need to be clear and visible, with the financing fully transparent and accountable. This will require different national and international governance systems.

Viewpoint 4.2
Creating and disseminating knowledge

The gap between developing and developed countries in their formal ability to produce knowledge (and in the actual production of knowledge) is larger than the gap in incomes per capita. The good news is that the gaps in connectivity are not as great and are narrowing, at least in terms of basic access. The best news is that the gaps in education are even smaller and are narrowing even faster.

- While the average per capita income of the high-income countries is 65 times that of the low-income countries and growing, the difference in research and development (R&D) expenditure is estimated at 94 times greater in high-income countries.
- The difference in the production of basic knowledge as measured by output in scientific and journal articles is 42 times greater in high-income countries than in low-income countries. However, the difference in the production and sale of commercially relevant knowledge (as measured by royalties and licensing fees) is much larger, probably about 200 times greater.
- The difference in phone connectivity and Internet users per thousand persons is just 23 times higher for high-income countries and has been falling. But the number of computers per thousand people is still 68 times higher. In education, as measured by enrolment rates, the difference is just 2.3 times greater for secondary education and 6.6 times greater for higher education in high-income countries. This difference has been narrowing over the past 10 years (the differences were 2.7 times greater for secondary education and 9.4 times greater for higher education).

The greater provision of global public goods, and of knowledge in particular, can help redress some of the growing inequality and tensions. While it is difficult to estimate the precise costs, it is clear that there is tremendous potential to increase the welfare of the developing world by making a concerted effort to provide knowledge as an international public good. It could also be argued that this could be achieved without much increase in current aid budgets—if the aid were used more effectively, with a greater focus on the transfer of knowledge and the strengthening of domestic knowledge capabilities, and were directed towards developing new international public good knowledge addressing some of the most devastating problems developing countries face.

Creating new international public goods knowledge

There is ample scope for increasing the production of international public good knowledge in specific areas where there are good expectations of high social returns. A recent analysis of 292 published studies shows that the median social return to agricultural research was 48% a year and that the average return was 100%. For agricultural extension services the medium returns were 63% and the average returns were 85% (Barton 2004a in Alston et al. 2000). For medical research there have been fewer cost-benefit studies. However, there are some dramatic examples of spectacular rates of return in some areas of preventive medicine.

One way to subsidize the production of this knowledge is to mobilize global funds, as was done to fund the green revolution. Initiatives along these lines include the Global Environmental Fund and extensions of the work of the Consultative Group on International Agricultural Research in tropical agriculture.

Another way is to use demand-pull mechanisms. These involve a commitment to purchase a new product, such as a new effective AIDS vaccine, provided it is developed to certain performance parameters. A good example is the proposal to encourage R&D on an AIDS vaccine by commitments to purchase the vaccine once it is developed. Variants of demand-pull are government procurement contracts or prizes for the development of new technology.

Other mechanisms include building research consortia among potential public developers or even among public and private developers who are working or could be convinced to work together on some of the needs of developing countries. Potential problems would be coordination

and the allocation of intellectual property rights for a successful product or service.

Improving development policy knowledge as opposed to specific technical or organizational knowledge also requires support of an international public goods type. The rapid rate of increase and dissemination of knowledge, and the increase in globalization, are opening up some new opportunities and foreclosing others. It is no longer good enough to advise countries to follow the historical patterns of developed countries, for example, by following labour-intensive export strategies.

International public goods knowledge should be developed more systematically by the international development institutions. Think tanks, companies, non-governmental organizations and national and local governments in developed and developing countries all have a role here.

A third possibility is to reverse or even reduce the strong drive towards intellectual property rights. There is some recognition that regimes established as part of the Trade-Related Aspects of Intellectual Property Rights Agreement may be too onerous for the least developed countries. There is also some concern that the tendency towards the privatization of knowledge is harmful even for developed countries.

This is clearly a contentious area. However, to the extent that intellectual property rights regimes are made less strict and less binding, more knowledge will be in the public domain and more will be available to transfer. The drawback is that there may be a disincentive to initiatives to create new knowledge. Although this has been argued by many on theoretical grounds, there have been no clear empirical studies confirming this expectation. The issue of the most appropriate intellectual property rights regime from a global perspective, rather than a narrow national perspective, deserves further research. This is particularly important now that the production and dissemination of knowledge are increasingly global rather than national.

Disseminating knowledge

Disseminating existing knowledge to meet the needs of developing countries is probably more important than creating new technical or policy knowledge, at least in the short run. For example, it has been estimated that a program using existing technology more fully to prevent and treat HIV/AIDS and malaria would be among the most economically desirable and cost-effective interventions in developing countries (Barton 2004a citing Mills and Shillcutt 2004; the ranking of interventions in several sectors can be seen at www.copenhagenconsensus.com). More generally, raising average local productivity across all sectors of a developing economy to the average productivity of developed economies would increase average incomes in developing countries by several factors—much more than by the development or introduction of any new technology.

The scope of action here is extremely large. International institutions can play an important role in collecting and distilling existing knowledge, and improving access. At a basic level this means making the information available. One example is the Development Gateway, which uses the power of information and telecommunications technology to provide a gateway to development knowledge—including technical, organizational and managerial, and policy knowledge. Other organizations, such as the United Nations Industrial Development Organization and World Health Organization, have also developed websites to disseminate existing knowledge.

The problem is not only what information is available, but what it is relevant for, how to access it and how to use it. This usually requires distilling the knowledge to its essentials and providing a mechanism to facilitate its transfer. Even when knowledge is in the private domain, it is still useful to know what knowledge exists, what it can do and what it would cost to get access to it. In addition, international organizations could buy up the rights to relevant patents and then transfer the knowledge as part of development projects or as part of regular business.

Supporting the development of domestic capacity for effective use

The inability to use knowledge locally is probably the most serious problem in knowledge transfer. Overcoming this problem requires local institutions, education and skills. International institutions can help establish or strengthen the relevant institutions, providing technical assis-

tance and training. This can be done as part of development assistance or investment operations in developing countries. Development institutions and bilateral aid programmes can support free-standing projects to help a country develop specific institutions or capabilities such as metrology and quality control centres, standards research laboratories, extension and productivity centres, technology parks, business incubators, schools, universities and specialized technical training institutions. More broadly, it also involves improving the whole economic incentive and institutional regime at the core of the development challenge.

What international institutions can do

International institutions such as the UN agencies are well placed to contribute to these efforts, to lead a major advocacy drive for knowledge for economic development by getting governments and especially the private sector to do more in this area. They can use their convening power to raise awareness of the problems and to illustrate what kinds of actions are working.

The UN agencies could also provide more systematic information on the knowledge dimensions of the economic development challenge and co-ordinate the actions of the many international players. These efforts could be structured around six key actions:

1. Propose and sponsor the creation of more knowledge as an international public good.
2. Create more policy knowledge.
3. Fund more research on a better intellectual property rights regime.
4. Increase the focus on transferring and disseminating knowledge.
5. Enlist contributions from the private sector more directly.
6. Encourage all international agents to do much more to develop the domestic human capital, research, and institutional capabilities of developing countries, so they can participate effectively in the knowledge-driven international environment.

Much more needs to be done to address asymmetries in global governance structures, which constrain the opportunities for developing countries to benefit in an increasingly competitive international system. This links with the other elements of this project on international public goods, including the trade system, the financial system and the management of natural resources and the environment.

Source: Drawn from a background paper by Dahlman (2005).

Viewpoint 4.3
Improving regional innovation systems

Ideas and knowledge have always been important to production and growth, but today their contribution as formalized ideas and knowledge within production is central to the knowledge economy, where increasing amounts of production are positioned. Regional innovation systems are both a useful framework for studying economic and innovative performance and functional tools for enhancing the innovation processes of firms. They do this by knitting together knowledge flows and the systems on which they rely, building trust and confidence in institutional reliability, and generating institutional self-knowledge and collective dissatisfaction with the status quo. A regional innovation system comprises a set of public and private institutions that produces pervasive and systemic effects to encourage firms within the region to adopt common norms, expectations, values, attitudes and practices that nurture a culture of innovation and enhance knowledge transfer processes. A national system of innovation cannot adequately do this.

Lessons from successful innovation support services

Regional innovation systems are a powerful instrument for accelerating economic growth. In line with new economic growth theory, they rest fundamentally on the notion of public goods provision, where market failure to support innovation is evident. They encourage collective entrepreneurship; exploit social capital advantages where these exist and build networks where they do not; and provide specialist, small-scale enterprise and innovation support services, regional financing and investment vehicles and labour market adjustment services. Producing innovation creates a three-way relationship of innovation, entrepreneurship and talent formation interacting systematically over time, evolving as local and global conditions dictate.

Innovation is the commercialization of new knowledge. Knowledge may be generated inside a firm or a public goods organization practising "open science", such as a university or major public research institute. Exploitation of the discovery or invention generally follows an intensive period of the application of examination knowledge, such as a patent application, to release intellectual property rights by licensing, trade sale or formation of a spinout company. These three types of knowledge integration are fundamental to an increasing amount of what is called "open innovation" and offer opportunities to innovative developing country firms. Other examination knowledge opportunities arise through clinical trials and patient testing of candidate products.

Incubation is extremely important in nurturing new businesses, in technology as in other sectors. Funding programmes may be influenced at the idea stage by multilateral assistance organizations, but if there is inadequate follow-up by private or public programmes, new businesses are likely to be stillborn. Even when there is a relatively generous national funding programme for incubators and associated infrastructure, without seed-funding for new businesses, such programmes are likely to be ineffective. Thus there should be appropriate multilevel governance of incubator programmes with pump-priming from multilateral external assistance organizations. Then infrastructure on a scale beyond the resources of regions should be supplied by national programmes. Finally seed-funding must be established at regional, municipal and local levels through associative public-private partnerships.

Innovation support is fundamentally a public goods activity justified by a general failure of the market to come forward and anticipate a rate of return on capital investment in incubator facilities. There is virtually absolute market failure in the provision of necessary finance for incubatee firms in many cases, although some systems have performed better than others (Brazil, for example). A case in which innovation advantage was systemically constructed by linking excellent science and technology (talent) to entrepreneurship (incubation) and innovation (financing) in the absence of both entrepreneurship and innovation resources is that of Israel. Moreover, Israel shows that public goods may be in advance of market thinking in the provision of systemically interacting innovation support, but that public goods may transform into private goods once a profitable return on investment can be envisaged or demonstrated. The

introduction of public goods may thus contribute to reducing the asymmetric information uncertainties that caused market failure in the first place.

Knowledge exploration institutes may adapt to a systemic innovation posture at the regional level in part by retraining management and researchers, engaging in public goods strategies of subnational institutions or opening and recruiting new businesses for an incubator.

Policy areas for improving innovation

Several policy areas need to be tackled before the innovative performance of developing countries can be advanced by strengthening innovative capabilities at regional and local levels.

A stimulation from exogenous sources is needed where evidence exists that innovation mechanisms work successfully in neighbouring countries with comparable developmental trajectories. The United Nations Educational, Scientific and Cultural Organization's (UNESCO) sponsorship of the incubator concept through the Association of European University Rectors is a case in point. But it is not enough to alert and advise if the resources necessary to achieve aims are absent. Tighter partnerships with national governments are required for implementation. Cofunded pilot projects based on successful experimentation in comparable settings are an obvious means of achieving this where recipient organizations show receptivity to innovative candidate solutions.

There is clearly a role for the United Nations Industrial Development Organization (UNIDO) to initiate the regional innovation system-building process, perhaps in partnership with UNESCO, beginning with regional conferences to ensure that national stakeholders are receptive and willing to invest heavily in innovation infrastructure (exploration, examination and exploitation dimensions). At national and subnational levels it is important to ensure that seed-funding and other risk investment capital are available and tailored to local needs and potentials. UNIDO must follow through on these ideas with committed development cofunding for knowledge centres, partnerships and networks.

At the national level a general policy to adopt approaches that suit changing global conditions is a fundamental responsibility. This can be achieved with vigour in science and technology policy, for example, by redirecting traditional ivory tower research institute and university practice towards more market-facing academic entrepreneurship. Science policy ministries must interact positively with ministries of industry and employment to recognize the strains involved in organizational transformation—and to avoid wasteful duplication. The necessity for academic entrepreneurship to have an outlet in specific or generic incubators means that such policy transitions and investment redirections could be pilot projects cofunded by multilateral external support organizations at specific experimental and institutional levels.

In general, training for management, entrepreneurship and knowledge exploitation should be mainstreamed in higher education institutions specializing in innovation studies. Practical experience of nuts and bolts elements such as incubation should be pursued, with knowledge transfer through internships. Innovation performance must be benchmarked against comparator countries and regions. Subnational development agencies must fine-tune regional innovation system policies to better integrate system interaction and improve knowledge flows.

A regime that creates positive climates for investment in spinout firms, whether from public good organizations or from private companies, is reinforced by government regulatory, taxation and incentive policies at the national level. But every region is distinctive economically. Thus the regional or provincial level becomes an active integrator of multilevel public and private investment pools for seed-funding and subsequent venture capital opportunities. Israel did this successfully as a small country. Other examples reveal successful and unsuccessful venture capital vehicles with public status (as in Wales) or private, though formerly public, status (as in Scotland). It is also possible for private sector vehicles to have an immediate public presence in the investment syndicates (Northern Ireland). This stage is thus crucial in building knowledge entrepreneurship. The regional system, if well integrated, is an appropriate partner, interacting vertically and laterally with key stakeholders in building knowledge entrepreneurship.

Generally speaking, knowledge transfer centres should be public where estimates of market

strength suggest that private solutions are inappropriate. But to ensure regional and national commitment, policy instruments such as seed capital funds cofunded by public-private partnerships are a suitable way to proceed. If services are successfully provided and firms improve profitability, privatization should not be ruled out. Privatization could be a central part of the job description of knowledge transfer centres, where appropriate. Where there is market failure in the supply of innovation services, regional innovation systems must be public entities, although firms that use them in the system are presumed to be private. Thus systems should expect to be more or less pure public goods with some joint private element at the outset, if it is feasible. Thereafter, profitable elements may evolve into jointly funded public-private entities. A membership subscription arrangement can turn the service into more of an associative or club form of good.

Talent formation in clusters at more prosaic levels is also a crucial factor in innovative competitiveness. The Italian ceramics industry has historically emphasized marketing and design skills, which served the industry well in global markets and may be extremely important in any restructuring to face mounting competition from China. Spain's ceramics cluster, by contrast, has deficiencies in this aspect but strengths in the science of ceramics. A forum and consensus approach towards change in complex and unstable competitive environments may be an advantage of considerable value for correctly balancing the skills mix from the labour market.

Business and industry associations can serve their overall membership better when they are confederated or consolidated with one voice than when they are fragmented. In the case of successful real services units or centres, tailored to meet customer and member needs, the absence of basic scientific research in the cluster may not be a problem if technology can be bought as needed from elsewhere. These are usually regional and local interactions rather than national or international ones, although pilot projects to establish such support vehicles in clusters can help the aims of collective entrepreneurship by supplying common business services, networking opportunities and representation at overseas trade fairs and exhibitions.

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Conclusion

Implanting regional innovation systems that disburse public goods is desirable in developmental terms. It also fits modern economic growth theory by stressing global trade, increasing returns to agglomeration and the key role of public goods such as ideas and knowledge. The approach is seen fully to engage with distinctive responsibilities at all economic governance levels. UNIDO and other multilateral external assistance organizations can be initiators, securers of national support, advisers and cofunders of pilot projects.

National governments should take the lead in policy formation and reform, funding and cofunding packages in science, industry and employment ministries to ensure that transformation of research cultures towards market opportunities is thoughtful and well planned. Policy-related funding for infrastructure and pump-priming (early stage stimulation by seed-funding to get initiatives going) is also key. Financing for incubation and seed-funding are best conducted at the regional level with local fine-tuning regarding talent and skills formation and the building of strong multilevel interactions. Regional funding of specific initiatives for venture capital, entrepreneurship and skills adaptation is also appropriate, as is cofunding such activities with the private sector wherever possible.

Source: Drawn from a background paper by Cooke (2005).

POLICY IMPLICATIONS

Since the amount of public expenditure devoted to R&D for global issues is likely to be limited, a crucial aspect will be to identify to which fields of knowledge generation to direct the investments. Can an international public good framework provide guidelines? The fields considered important by broad agreement are usually those that are mutually advantageous for current and future generations and that are less likely to be associated with sectors where trade rivalry exists. Astronomy, space, theoretical physics, environment and health are ideal candidates and, not surprisingly, areas where active collaboration and even permanent international research centres have already been established. Despite an increase in cooperative international public programmes, the bulk of the funding continues to be national in scope. How should the fields be selected?

Human necessities differ across geographical areas. Consider health research. Poor countries undertake a tiny fraction of world health R&D, although they bear 90% of the total disease burden (10/90 gap; see Global Forum for Health Research 2004). The countries that carry out the other 90% of health R&D might have very different priorities since many of the diseases affecting developing countries have already been eradicated in developed countries.

A typical case is scientific research on vaccines. Knowledge leading to the identification of successful vaccines is very close to a pure international public good: vaccines are costly to invent, but can be produced and transmitted at rather low cost,[21] and they can provide benefits globally and across generations. (There is an intergenerational advantage if the vaccines are available to future generations or if the disease is eradicated.) A successful World Health Organization programme on smallpox eradication has generated advantages for both developed and developing countries (see Fenner et al. 1988). For example, it is estimated that the United States recovers its own share of investment for smallpox eradication every 26 days (Tenkorang and Conceição 2003).

With appropriate investment, vaccines can be developed for some of the major fatal illnesses of our age, such as malaria, tuberculosis and AIDS. These three diseases are responsible for some 5 million deaths a year. It has been estimated that an investment of $1.5 billion a year for 15 years could lead to the development of effective vaccines (Archibugi and Bizzarri 2004). Yet R&D investments are negligible, at $55 million (malaria), $150 million (tuberculosis) and $400 million (AIDS) (Archibugi and Bizzarri 2004). The relatively higher investment in vaccines for AIDS is due to the fact that this disease is a top priority for developed countries, while malaria and tuberculosis are not a major concern because they have been largely eradicated.[22] It is significant, however, how that globalization is changing the outlook of developed countries as well: inward migration is bringing tuberculosis back, and outward tourism is exposing people to malaria. And now there is a risk of avian influenza. Vaccines are therefore an area in which both developed and developing countries will have an advantage and an interest in in-

21 Certainly, it is much easier to transfer the knowledge necessary to successfully administer vaccines between countries than to transfer the knowledge related to nuclear programmes or even specialized machinery. However, even in the case of vaccines it is not possible to ignore absorptive capacity. Woodle (2000) shows the difficulty encountered by developing countries when they have to rely solely on external supply sources.

22 The only high-income country with reported malaria cases is the Republic of Korea (UNDP 2003: 258, table 7).

vestment. The relative advantage for developed countries will be comparatively smaller than the advantage for developing countries, but this should not obscure the fact that developed countries will obtain much higher returns from this investment than from many others.

An increased financial commitment to these and other issues should be informed by several lessons.

- *Coordination rather than centralization.* Centralization of R&D and innovation in a few world centres is not recommendable. Duplication is not necessarily undesirable in achieving scientific and technological advances since competing teams will explore alternative paths and are likely to expand the frontier of knowledge. It is highly desirable to disseminate information among teams from the beginning, but public research institutions are generally more willing to disseminate the results of their work than business R&D centres. A system of incentives that rewards intermediate and final results might help to increase information flows.
- *Generation along with diffusion.* A policy aimed at increasing the generation of knowledge is effective when it considers from the start the problems associated with technology transfer. Generating knowledge without taking into account the needs of final users has too often led to knowledge that is not transferable or that is too expensive to transfer.
- *Integration among partners.* Laggard countries should be integrated into core activities from design through implementation, to help transmit learning and build skills. Teams of excellence will not all come from the same countries. International cooperation between centres in developed and developing countries has proven the most effective way to spread expertise.
- *Strengthen international organizations.* The generation and diffusion of knowledge also requires institutional change. While national R&D and innovation facilities are crucial in a strategy to produce knowledge for development, they are not necessarily the best institutions for the exchange of expertise. International organizations can become hubs of research excellence in specialized areas; they can expand their role as network facilitators; and they can help to set priorities, taking into account broad human needs.

Knowledge is seldom a pure international public good. But it might move close to becoming one if attempts to augment it are coupled with appropriate policies in developed and developing countries. Developed countries should show their willingness to enlarge the research agenda by taking into account the priorities of developing countries and opening the gates of their innovation system to newcomers. Developing countries, rather than expecting to be handed knowledge from developed countries, should support resources to increase their absorptive capacity.

CHAPTER 5
ENVIRONMENT AS A PUBLIC GOOD FOR DEVELOPMENT

Economic activity can put pressure on ecosystems and degrade environmental quality. Some environmental problems are global, making cooperation among countries essential for dealing with them. Some national problems also result from economic activities abroad. That is why an outlook broader than national is required.

This chapter reviews the relationship between the environment and development and focuses on the environment as an international public good. It examines the current institutional framework for tackling environmental problems and uses the limitation of ozone-depleting substances (Montreal Protocol) and the mitigation of global climate change (Kyoto Protocol) to illustrate the challenges of international provision of environmental public goods. The chapter concludes with proposals for managing their provision.

ENVIRONMENT AND DEVELOPMENT—CONVERGING TOWARDS SUSTAINABLE DEVELOPMENT

Alternative theories try to model sustainable growth as combining environmental quality and permanent growth of per capita income through technological change. These attempts to combine ecological and development goals have resulted in the concept of "sustainable development."

Economists generally distinguish two definitions of sustainability. The first argues that a development path is sustainable if it provides constant and growing utility, or well-being, to future generations, assuming natural assets to be fully substitutable (Solow 1993). The second puts stronger constraints on growth, arguing that natural assets (or some of the functions they perform) cannot be replaced and that benefits can be ensured for present and future generations only by conserving resources and protecting environmental quality (Daly 1995). This second definition implies environmental regulatory reforms to ensure intergenerational equity. More recent definitions incorporate environmental sustainability along with economic and social development as three pillars of the concept (World Bank 2003b).

Social considerations of sustainable development focus on equity (Kaul et al. 2001) and are based on intergenerational justice, which demands that the satisfaction of current needs not risk the ability of future generations to satisfy their needs (Barrett 1996). Sustainable development involves multiple difficulties for action and management, since the challenge is to deal with both natural resources and the destiny of humanity. Different approaches to sustainable development have been taken in different regions, with some calling for new concepts and systems (box 5.1).

Institutional responses to environmental threats highlight the relationship between the environment and development. Principle 4 of the Rio Declaration stipulated: "to achieve sustainable development, environmental protection shall constitute an inte-

gral part of the development process and cannot be considered in isolation from it" (UN 1992). At the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, Agenda 21 made the protection of climate and biodiversity a priority in world environmental policy.

Box 5.1. The Asia-Pacific countries' approach to sustainable development: green growth

Green growth seeks to harmonize economic growth and environmental sustainability by promoting "fundamental changes in the way societies produce and consume" (ESCAP 2006). It calls for new concepts and systems to de-link economic growth and environmental degradation.

Green growth focuses on demand-side management and on the promotion of environmentally sustainable decisions through market, economic and fiscal systems. Ecotaxes and other economic instruments are recommended as a means of influencing decision-making for greater environment sustainability at the individual, firm, community and government levels (see viewpoint 5.1 for an example of an ecotax and viewpoint 5.2 on eco-effectiveness).

Source: ESCAP 2006.

In the debate on development priorities and environmental protection, the approaches and perspectives of developing and developed countries do not always coincide (Azqueta 1994). International responses have tended to focus on risks that are greater for developed countries. For example, the agreed solution is often to replace toxic substances and pollution-emitting technologies with more benign ones, tasks easier for developed countries than for developing countries (World Bank 2003b).

People living in poverty are more vulnerable to environmental damage and to the loss of access to natural resources (World Bank 2001b; UNDP 2003; WRI 2003). The relationship between environmental deterioration and per capita income also extends to urban areas, with ecological degradation tending to be worst in the poorest urban neighbourhoods (Heal 2001; WRI 2003). Although poorer countries have contributed less than richer countries to the deterioration of the environment, they are affected by the depletion of global environmental assets.

Poverty reduction and environmental protection are also closely connected to achieving the Millennium Development Goals. Goal 1, to eradicate poverty and hunger, and goal 7, to ensure environmental sustainability, are linked through ensuring access to clean drinking water, appropriate sanitation facilities, and biodiversity (UNDP 2003).

Viewpoint 5.1
Carbon dioxide tax: a role for China and India in sustaining the environment and mitigating climate change

By 2025 both China and India will be very large economies. Estimates predict that China's gross world product will be 7.6% (up from 3.5%) and India's 2.7% (up from 1.5%). Many Chinese and Indians under the age of 50 in 2025 will have grown up in a period of rapid economic growth and increasing prosperity, and the middle classes of both countries will have grown enormously.

Rapid growth and increased GDP imply a rising demand for energy, especially electricity. China and India are both well endowed with coal, which is especially relevant for climate change, but both are short of oil relative to their prospective needs. By 2025, China's demand for oil will be more than twice Japan's and India's will approach Japan's.

China is already the largest consumer of coal, accounting for a quarter of the world's total, and its use is expected to grow rapidly despite vigorous programs for introducing nuclear and hydropower and for importing liquefied natural gas. India accounts for about 7% of current world coal consumption and its use of coal is also expected to grow significantly, though less dramatically than it will in China.

World carbon dioxide emissions are projected to increase 1.9% a year to 2025 (on the assumption of world economic growth of 3.0% a year). China's carbon dioxide emissions are projected to grow 3.3% a year, the highest rate in the world among large countries or regions, with Brazil (3.1%) and India (2.9%) not far behind. China's share of world carbon dioxide emissions will increase from an already significant 12% in 2000 to 18% in 2025, exceeding that of Western Europe by 2010 and rapidly approaching the US share of 22% in 2025. India's share will reach 5%, making it the fourth largest national emitter after Russia and putting it well ahead of Japan. China's projected growth in emissions of 3.8 billion metric tons by 2025 far exceeds the US projected growth of 2.4 billion tons, and India's projected growth far exceeds Japan's. In view of these trends, the problem of greenhouse gas emissions cannot be seriously addressed without engaging cooperation from China, India, Brazil and other rapidly growing economies. The world has a great interest in the character of expansion in these countries in the next two decades.

Worldwide agreement on national greenhouse gas emission targets that are strong enough to limit growth in atmospheric carbon dioxide concentrations is likely impossible, at least for several decades to come. It is hard to imagine an effective formula for national targets that will be acceptable both to developed countries, such as the United States, and to developing countries with aspirations for rapid growth, such as China and India (Cooper 2001). The targets of the Kyoto Protocol are keyed to a base year, 1990, which is unappealing to countries that desire and expect rapid economic growth.

Another approach is needed if human sources of climate change are to be addressed seriously. A leading alternative approach is to focus on concrete national commitments to action rather than on emission targets. One such action to deal with negative externalities from human action, favoured by many economists, is to tax the offending activity. The idea would be to tax carbon dioxide emissions from major sources around the world, particularly the burning of coal, oil and natural gas and the making of cement, unless the carbon dioxide released from such processes is prevented from entering the atmosphere through sequestration. The eventual rate of the tax would be calibrated to the desired reduction in carbon dioxide emissions, although the initially agreed tax should be at a level sufficient to attract serious attention to tax-avoiding emissions reduction.

The attraction of a carbon dioxide tax to China and India would rest less in its contribution to avoiding climate change than in its contribution to reducing air pollution, which derives heavily from burning coal and increasingly from automotive emissions in the larger cities. Above all, a tax would be attractive as a source of revenue, greatly needed by the central governments of both countries. China and India are unlikely to impose stiff carbon taxes on their own, because of concerns about loss of international competi-

tiveness in energy-intensive industries such as steel production. But this effect would be neutralized if the tax were imposed as part of a broad international agreement.

A uniform incremental tax on the major sources of carbon dioxide emissions would introduce an incentive, worldwide, to reduce carbon emissions. Responses to the tax would of course differ from country to country. Where emissions can be reduced at a cost lower than the tax, reductions can be expected. Where the cost of reducing emissions exceeds the tax, the tax will be paid. In either case the cost of fossil fuels will be raised everywhere, proportional to their carbon content, as they should be if emissions are to be reduced. A uniform tax is economically efficient, in that reductions will be greatest where the cost of such reductions is least. A universal tax will also avoid geographic relocation of industries to evade the tax—a potential weakness of the Kyoto Protocol, with its limited geographic coverage.

Making the tax fiscally neutral, either by increasing expenditures or by using the new revenues to reduce other taxes, could minimize macroeconomic effects. Moreover, developing countries could be granted a longer period of time to introduce the tax.

Mitigating climate change will require the active participation of rapidly growing energy-using countries such as China and India. A target-based regime such as the Kyoto Protocol will not appeal to them. A regime based on common action, such as imposition of a worldwide carbon tax, could have that appeal, mainly for the revenue it would provide without any loss of international competitiveness.

Source: Cooper 2005.

Viewpoint 5.2
Ecoefficiency versus ecoeffectiveness

"Efficiency is doing things right; effectiveness is doing the right things."

Peter F. Drucker (2002)

The principle of ecoefficiency promotes reducing, minimizing and limiting the size of ecological footprints. More specifically, ecoefficiency strategies focus on maintaining or increasing the value of economic output while simultaneously decreasing the impact of economic activity upon ecological systems (Verfaillie and Bidwell 2000). Environmental sustainability, based on the principle of ecoefficiency, has become a leading issue in economic development. The ultimate aim is maximization of economic value with minimal ecological impact.

Ecoefficiency begins with the assumption of a linear flow of materials through industrial systems: raw materials are extracted from the environment, transformed into products, utilized, and eventually disposed of. Ecoefficiency approaches then seek to minimize the volume, velocity and toxicity of this "cradle-to-grave" dynamic, but at all levels of decision-making accept the ultimate and inevitable demise of materials as useful resources.

In the material realm, ecoefficiency can be said to encompass the concepts of dematerialization, increased resource productivity, reduced toxicity, increased recyclability (downcycling), extended product lifespan and cleaner production. Each of these strategies presupposes a system of production and consumption with a linear cradle-to-grave flow of materials that inevitably transforms resources into waste.

Strategies for toxicity reduction largely focus on replacing the most hazardous materials with others that pose fewer problems to humans and ecological systems throughout their lifespan or after disposal. Moreover, strategies for generating increased recyclability and extended product lifespan seek to prolong the period until resources acquire the status of waste, for instance by increasing product durability or reprocessing post-use material for use in lower value applications. Though recycling strategies begin to approach ecoeffectiveness, the large majority of recycling actually constitutes downcycling because the recycling process reduces the quality of materials, making them suitable for use only in lower value applications. Their lifespan has been prolonged, but their status as resources has not been maintained. For example, when plastics get recycled into countertops, valuable materials are mixed and cannot be recycled again. From the same perspective, mixing metals dilutes their value and increases their ecological impact. When rare and valuable metals like copper, nickel and manganese are blended in the recycling process, their discrete value is lost forever, and creating new stockpiles is extremely costly, both economically and ecologically.

Ecoefficiency as a negative approach

In the short-term, ecoefficiency strategies have the potential for tangible reductions in the ecological impact of industrial activities and provide opportunities for significant cost reductions. But such strategies are insufficient for achieving economic and environmental objectives in the long-term. Although ecoefficiency reduces resource consumption and pollution and may provide temporary economic advantages, it lacks the long-term vision for establishing a truly positive relationship between industrial activity and nature. Ecoefficiency strategies tend to address the symptoms rather than the causes of ecological problems by setting goals and using practices that sustain an unappealing compromise between industry and the environment.

Current corrective action programs are inherently ecoefficient in that these programs seek quick fixes to improve the present situation. However, decreasing the amount of extracted raw materials and limiting the amount of toxic emissions into the atmosphere do not solve the problem of pollution of the environment and precious materials being wasted. These methods indirectly generate more problems because they establish a waste management practice that is not beneficial to the relationship between economy and ecology. Moreover, legislation that provides incentives in this direction may hinder the development of new and healthier technologies, resulting in sub-optimal solutions.

Ecoeffective corrective action

Typically, biodiversity is much higher in developing economies than in highly developed economies. In this context, traditional economic growth always means damage to the environment and loss of biodiversity.

The concept of ecoeffectiveness offers a positive alternative to traditional ecoefficiency approaches, as it aims for the development of environmentally benign products and systems. In contrast to approaches of minimization and dematerialization, the concept of ecoeffectiveness involves the transformation of products and associated material flows in such a way that these form a supportive relationship with ecological systems and future economic growth. The principal goal is not to minimize or delay the cradle-

to-grave flow of materials, but to generate cyclical, cradle-to-cradle "metabolisms" that enable materials to maintain their status as resources and accumulate intelligence over time (upcycling). This inherently generates a synergistic relationship between ecological and economic systems—a positive reunification of economy and ecology. The characteristic of zero waste then arises as a natural side effect of efforts to maintain the status of materials as resources.

Materials that flow optimally through the biological metabolism are called biological nutrients. Biological nutrients are biodegradable materials (or the result of biodegradation processes) that pose no immediate or eventual hazard to living organisms and that return safely to the environment to feed biological processes. Biological nutrients can be natural or plant-based materials, but also include materials like biopolymers and other synthetic substances that are safe for humans and natural systems. The biological metabolism includes processes of resource extraction, manufacturing and customer use, as well as the eventual return of these materials to natural systems, where they can be transformed into resources for economic activity again.

After it has been used, a consumer product can return to the natural environment, becoming a nutrient for living organisms. For example, a biological nutrient textile can be used as garden mulch after its useful life as an upholstery fabric. An ice cream wrapper can be designed such that once it is thrown away it dissolves safely into the ground, supporting the growth of plant life through seeds added to the wrapper material (Newcorn 2003).

A technical nutrient is a material, usually synthetic or mineral, that has the potential to remain safely in a closed-loop system of manufacture, recovery and reuse, maintaining its highest value throughout many consecutive product life cycles (McDonough et al. 2003). Technical nutrients are integrated into durable goods that are used by customers but owned by the manufacturer, either formally or in effect. This strategy is mutually beneficial for both. The manufacturer maintains ownership of valuable material assets for continual reapplication in production processes while the customer receives the product without assuming its material liability. The process also fosters long-term producer-consumer relationships. Consider, for instance, a television or a washing machine that is leased to a customer for a defined period and then returned to the manufacturer, which uses the materials again for producing equivalent or higher-quality products.

Ecoeffectiveness encompasses a set of strategies for generating healthy, cradle-to-cradle material flow metabolisms. It is modelled on the successful interdependence and regenerative productivity of natural systems. In nature, nearly all outputs from one process become inputs for another. The concept of waste hardly exists. The blossoms of a cherry tree bring forth a new generation of cherry trees while simultaneously providing food for microorganisms, which in turn nourish the soil and support the growth of plant life. Elements within a natural system may be highly inefficient. With the growth and release of thousands of cherry blossoms, only a few may become new cherry trees. However, if the cherry tree is viewed as part of an interdependent natural system, then the overall effectiveness of the system becomes clear.

In ecoeffective industrial systems, the material intensity per service unit of each individual element is irrelevant to the effectiveness of the whole. As long as the materials that enter an industrial system perpetually maintain their status as resources, the system is perfectly ecologically effective and no waste is produced. For example, if the secondary outputs (trimmings) from the production of a textile are composed such that they become inputs for ecological systems, then it is ecologically irrelevant whether they are included in the commercial product. Even if the material intensity per service unit of the textile mill was astronomically high, the system as a whole would be highly ecoeffective because the trimmings would become productive resources for natural systems.

If industry is driven by systems that are inherently destructive, making them more efficient will not solve the problem and may even aggravate the damage done (for example, the rebound effect) (Berkhout et al. 2000). Slimming down material flows per product or service unit (ecoefficiency) is only beneficial in the long-term if the goal of closing material flows (ecoeffectiveness) has first been achieved. Once effectiveness has been achieved, efficiency improvements are not an environmental necessity, but a matter of equity. They are necessary to ensure a fair distribution of goods and services.

The solution is the design of products and industrial processes that turn materials into nutrients (resources) by enabling a perpetual flow within one of two distinct metabolisms: the biological metabolism and the technical metabolism (McDonough and Braungart 2002). As such, a cradle-to-cradle design enables the creation of a wholly beneficial specially designed industrial system driven by the synergistic pursuit of positive economic, environmental and social goals.

Source: Braungart et al. 2005.

The challenges that the international community faces in managing the environment efficiently while attending to sustainable development are complex and diverse. They are related to problems of market and policy failure, both affecting private sector responses, such as subsidies for energy consumption (World Bank 2003b).[23] An effective response requires actions from the local to the national and the international levels (box 5.2). The global scope of many environmental problems complicates both the organization of solutions and the establishment and fulfilment of the rules (Ostrom et al. 1999).

For core activities, various factors may condition the success of collective actions. These include differences in national interests, lack of information or technological ability to find substitutes, the number and role of players and intergenerational factors. Complementary actions, such as transferring technology and diffusing best practices, require local capabilities. Shifting national responses, the varying strength of interest groups and efficiency differentials impede efforts to coordinate solutions that favour the environment.

Box 5.2. The role of international organizations in the provision of environmental public goods

The United Nations Development Programme (UNDP), in its 2006 Annual Report *Global Partnership for Development*, provides clear examples of international organizations enhancing the provision of environmental public goods in partnership with local governments and the private sector and local communities.

For example, in Moldova the UNDP is helping to empower communities economically through its Agenda 21 initiative. By involving citizens in decision-making and promoting public-private partnerships, this effort integrates sustainable development principles into local authority policies.

Some small-scale projects can deliver big results. In Gaza projects funded by grants from the Global Environment Facility helped women fruit producers acquire solar-powered machines to dry fruits and herbs more quickly and efficiently. This environment-friendly initiative has enabled the women to expand their businesses and sell their produce in local markets.

UNIDO is supporting small and medium enterprises in their efforts to incorporate environmental considerations in their products and production processes through building business partnerships with large and small companies. It is cooperating with BASF, a transnational chemical corporation, on a UN Global Compact project to establish a comprehensive eco-efficiency analysis tool for small companies in developing countries, to be applied through the network of National Cleaner Production Centres (viewpoint 5.3). Morocco has agreed to participate in a pilot phase to test a customized version of the tool. If the tool proves useful, it will be made available to small companies in more than 20 developing countries (UNIDO 2002a).

International organizations can also help governments strengthen regional cooperation on environmental issues. For instance, UNDP established the Transboundary River Basin Initiative, a platform for dialogue and consensus building for countries that share the same water resources. In another example of regional cooperation supported by international organizations, UNIDO has been selected by the Multilateral Fund for the Implementation of the Montreal Protocol as the implementing agency for an investment project to assist the Chinese

23 Sectors accounting for most global subsidies—agriculture, fisheries, transport and energy—are also those with the largest emission of greenhouse gas and other forms of pollutants.

government in phasing out production of ozone-depleting substances in household refrigerators.

Finally, international organizations can also help local governments communicate with civil society about environmental problems with development implications. A partnership between the UNDP and United Nations Environment Programme (UNEP) supports environment-based policies in Cambodia, Kenya, Nicaragua, Rwanda, Tanzania and Vietnam. Through a Poverty and Environment Initiative both organizations help governments integrate environmental concerns into the poverty reduction strategy process. The programme also supports dialogue among policy-makers, nongovernmental organizations and community groups on poverty-environment linkages and the use of environmental indicators in local and national planning.

Source: UNDP 2006; UNIDO 2002a, 2005 and 2006.

Viewpoint 5.3
Cleaner Production and new technologies

Cleaner Production is a holistic and integrated method for dealing with environmental issues. It recognises that most of our environmental problems—such as global warming, toxic pollution and loss of biodiversity—are caused by the way and rate at which we use natural resources for production.

The approach questions the very need for natural resource consumption and looks for other ways to satisfy that need. Clean production systems use less energy and fewer natural resources. Resources flow through the production-consumption cycle at slower rates. The approach also deals with the transformation of products and associated resource flows in such a way that these form a supportive relationship with ecological system and future economic growth. The approach also acknowledges the need for public and private participation in political and economic decision-making.

Developments in environmental action

Industrial activity is of major importance to economic development, but it is also a cause of environmental degradation and pollution. In the course of time, industrialised nations have responded to environmental pollution and waste in five characteristic ways:

- By not recognizing—or ignoring—the problem of environmental pollution.
- By diluting or dispersing pollution, so that its effects are less harmful or apparent.
- By seeking to control pollution and wastes (the end-of-pipe or pollution control approach).
- By trying to develop and improve environmental technology that will help close the loops in material flow streams during the production process and facilitate reuse and recycling.
- By implementing Cleaner Production through the prevention of pollution and waste generation.

Conventional pollution control approaches, using end-of-pipe measures (after-the-event "react and treat"), have been used to treat polluting substances and waste by such methods as neutralisation and evaporation at the end of the production process. But the level of treatment has often been limited and solutions have proved less effective than they initially appeared. End-of-pipe technology has frequently simply shifted waste or pollutants from one environmental medium to another, as with air- and water-pollution control devices that produced concentrated hazardous waste for leaking landfills (UNIDO 2002c).

In the mid-1980s recycling of waste and energy recovery gained momentum. But recycling has proved insufficient, as it often suffers from limited or unpredictable markets for its products (UNIDO 2004). Since the beginning of the 1990s, concepts such as Cleaner Production, pollution prevention, waste minimization and ecoefficiency represent an intellectual shift away from the issue of what to do with pollution to the issue of why pollution is generated and how it can be prevented. These concepts all comprise attempts to maintain the same level of output while using fewer inputs and producing less waste, improving the efficiency of natural resources use and reducing pollution (UNIDO 2002c).

In 1998 UNEP issued the International Declaration on Cleaner Production. The goals of the Declaration are to encourage support for the adoption of Cleaner Production activities, intensify the commitment of the various actors involved, promote international cooperation and spread awareness of the concept. More than 1,700 regional and national parties have now signed the Declaration (UNEP 2001).

At the national level, most developed and some developing countries have introduced environmental and other policies, strategies and instruments to support the application of cleaner production, resource efficiency and waste minimization measures, as well as renewable energy. However, enforcement of these policies has often been problematic, especially in developing countries.

At company level, either as a result of the international context or because of changes in their business strategies, many transnational corporations, have made public commitments to the principles of pollution prevention or other environmental principles such as those included

in the Global Compact or have adopted environmental managements systems such as ISO 14001 or EMAS (European Union Eco-Management and Audit Scheme). A number of these companies are also beginning to use their market power to require an equally stringent commitment to environmental performance from their suppliers (UNIDO 2004).

Cleaner Production processes

The Cleaner Production approach to environmental management involves reducing the amount of inputs (energy, water and raw materials) per production unit, eliminating toxic raw materials, minimising pollutants or waste throughout the entire product life cycle and incorporating environmental concerns into the design and delivery of services. It is seen as a superior alternative to traditional pollution control systems for minimising environmental problems, because it saves resource inputs and reduces waste.

Cleaner Production can accrue additional benefits to firms:

- Cost-saving through reduced wastage of raw materials and energy.
- Improved operating efficiency.
- Better product quality and consistency, because factory operation is more predictable.
- Recovery of some wasted materials (UNIDO 2004).

Cleaner Production does not deny economic and industrial growth, but it insists that growth be ecologically sustainable (UNEP 2001). This dual aim is to increase productivity by ensuring a more efficient use of production inputs and to achieve a better environmental performance. Cost savings are one of the most important direct economic benefits from implementation. Lower water consumption, higher energy efficiency or reduced need for input materials results in lower operating expenses (UNIDO 2002c).

Traditionally, Cleaner Production has focused on production processes, but this has changed in recent years. Efforts now intend to reduce the environmental, health and safety impacts of products throughout their entire life cycles by the design of environmentally friendly but cost-effective products.

Cleaner Production approaches involve more than just the application of cleaner technologies. Technical solutions alone are not sufficient in addressing the challenge of ecological progress. Effective management and organization, as important as technological application, require new attitudes and management practices and the application of available know-how.

Policy aspects of Cleaner Production

Cleaner Production programmes are positioned at the intersection of the Millennium Development Goals of environmental sustainability and poverty reduction. Although sustainable development requires much more comprehensive cultural changes within industry, governments and communities, Cleaner Production and preventive environmental management may provide a first step towards sustainability (UNIDO 2002c).

To accomplish environmental sustainability it is essential to improve the efficiency and effectiveness of the way natural resources are being used to form supportive relationships with ecological systems and economic growth. For instance, waste can be eliminated if it contains reusable substances of high value. Depending on adequate technology, residuals can be reprocessed, either as raw materials for secondary processes or as inputs for the production of new products.

Differences in pollution intensity on the firm level are largely caused by variations in technology, industrial practices and pollution-control regulations. Firms that want to adopt Cleaner Production methods need to possess a variety of skills and means. Among the prerequisites are technological capabilities, availability of technical and organizational information and affordability. The high implementation costs of cleaner technologies have been a major barrier to their application in developing countries. International efforts must concentrate on accelerating development while controlling environmental impacts through enabling technology adoption.

Committed policy actions are needed to increase international assistance in cleaner technology transfer from developed to developing

countries. Policy interventions for industrial environmental management should go beyond the traditional domain of environmental policy and regulations to enhance the technological capabilities of the private sector in developing countries, especially small and medium-size enterprises, in order to enable them to utilize technically proven innovative cleaner technologies and compete competitively in domestic and international markets. This requires sizeable investments in engineering skills, assistance services, information dissemination measures and incentives to reward favourable practices (UNIDO 2004).

Sustainable development can only be achieved when traditional pollution control approaches are combined with policies focussing on Cleaner Production. Pollution control measures through the regulation of waste and pollution emissions from production processes do not by themselves provide for easing the pressures from the current pattern of economic growth.

Source: UNIDO 2002c, 2004, 2005 and 2006; UNEP 2001.

THE ENVIRONMENT AS A PUBLIC GOOD

Public goods related to the environment can be classified by their nature (pure or impure) and their geographic scope (global or regional). Restoring and protecting the ozone layer and curbing global warming are examples of pure public goods that follow summation technology in their provision. These public goods are also looked at as a subset of negative externalities, which the market fails to internalise (Memedovic, 2006).

Impure environmental public goods include club goods, whose benefits can be excludable to a certain degree (international protection of ecosystems in national and transnational parks, for example)—and commons, which involve partial rivalry in their consumption (the preservation of river fishing activities and efforts to preserve the Amazon region are examples) (Sandler 2001). Without sensible policies these commonly owned resources risk depletion from overuse, because individuals do not account for the crowding externality that their consumption imposes on others. At times regulations may exacerbate the problem if they provide perverse incentives to exploit the commons at an even faster rate. For example, past actions to limit the length of a fishing season have led to investment in fishing vessels that can land a greater harvest in less time (faster vessels equipped with sonar, for example). Other regulations to curb fishing efficiency have resulted in wasteful cost.

The main difficulty with the provision of most environmental public goods is a lack of information on individual preferences for the good's use (Cline 2004a). These externalities can be corrected through various instruments:

- Multilateral organizations and treaties are usually needed for dealing with the underprovision of pure and impure environmental public goods, like protecting the ozone layer and curbing global warming, which follow the summation aggregation technology in their provision. Other instruments can also be used ranging from market-based instruments, to support for research development and to voluntary mechanism. Market-based instruments are designed to include external implications of an agent's action in his decision-making. Possible means of market internalization are a corrective tax (for negative externalities), or subsidy (for positive externalities) (Azqueta and Ferreiro 1993; Sandler 2004b: 71).[24]
- Another market-based corrective instrument is assigning property rights to agents in the bargaining process to maximise welfare. Quotas can be introduced allowing for limited activity, which is consistent with the social optimum. Quotas can take the form of permits that impose extra costs (such as pollution permits) and can be traded. Pseudo markets for trading pollution permits, similar to the emissions trading scheme initiated under the Kyoto Protocol on Climate Change, could reduce pollution and ensure a more efficient and fairer allocation (Sandor, Bettelheimand and Swingland 2002).
- Support for research and development and for innovation is important for the development of new long-term options and for the shift to a low-carbon economy. For developing countries, this also assumes capacity building programmes in specific science, engineering and technology areas and thus greater international cooperation and collaboration.

For an overview of instruments used for promoting energy efficiency see UNIDO (2007).

- Voluntary mechanisms can also work. For instance, in the Netherlands, to achieve an overall national energy-efficiency improvement target of a 20% reduction in energy use between 1989 and 2000, voluntary agreements were reached between government ministries and the largest energy-consuming sectors (UNIDO 2007: 62). Communities can also take different approaches to property rights and can develop valuable cooperation skills to avoid resource degradation and depletion (Feeny et al. 1990).
- Finally, market-based incentives can be combined with public information disclosure (compiling reliable indicators of underprovision of environmental public goods and reporting them regularly) enabling various stakeholders (firms, bankers and consumers) to make informed decisions. Better information would enable better bargaining. Media may also be important in this.

LOCAL AND NATIONAL INSTITUTIONS

In recent decades, environmental issues have moved to the highest levels of national policymaking in many countries—either through the creation of a Ministry of Environment or other institutions and agencies dedicated to sustainable development. Local governments also manage and provide environmental public goods, such as participating in decentralised environmental action, as defined by Agenda 21 (WRI 2003).

Local governments have more knowledge of some aspects of the natural environment and of the agents involved in the production and use of environmental public goods. Enabling local communities to manage their natural resources is crucial for dealing with eradication of poverty. Recent initiatives such as the Equator Prize focus on improving the abilities of local communities to foster sustainable development and to link achieving economic development goals with environmentally friendly behaviour (Timmer and Juma 2005).

Some public goods (water supply and utilities) are increasingly being provided by private entities, mainly due to privatization processes (Heal 2001). Privatization can stimulate cleaner production, as demonstrated by China, Brazil and India. A country's choice to use cleaner technologies (see viewpoint 5.3) could lead to cleaner production systems in other countries, through demonstration effects (Heal 2001).

INTERNATIONAL INSTITUTIONS

Over the last 30 years the international community has been actively involved in designing a supranational institutional network to deal with the international provision of public goods (table 5.1). The institutional process started in 1972 with the United Nations Conference on the Human Environment in Stockholm, the first world environmental conference that laid the foundations for action at the international level. Since then, international agreements have become the most frequently used instruments for international regulation of the environment.

Table 5.1. Major international conferences and agreements on environmental concerns

Year	Event	Main issue/outcome
1972	United Nations Conference on the Human Environment in Stockholm	Recommendation on the creation of a UN environmental organization.
1982	Stockholm +10 conference in Nairobi	Newly industrialising countries and the effects of explosive urbanisation.
1985	Vienna Convention for the Protection of the Ozone Layer	Multilateral cooperation on research, systematic observation of the ozone layer and monitoring on the production of depleting substances. Led to the Montreal Protocol on Substances that Deplete the Ozone Layer in 1987, which focuses on phasing out the production and use of a number of potentially harmful substances.
1987	World Commission on Environment and Development report "Our Common Future", also known as the Brundtland Report	The concept of sustainable development introduced.
1989	Basel Convention to control transboundary movements of hazardous wastes and their disposal	As of October 2003, the Basel Convention has 158 parties.
1992	United Nations Conference on Environment and Development in Rio de Janeiro (Earth Summit)	The Rio Declaration on Environment and Development; and Agenda 21, a blueprint for action on sustainable development, which integrated environmental matters into economic and development goals and led to a redirection of national and international policies.
1992	Convention on Biological Diversity (adopted at the Earth Summit)	Requires countries to formulate national strategies for the protection of biodiversity and integrate these into national policies for environment and development. Developed countries are called upon to assist developing countries with the implementation of these strategies in order to enable them to meet the Convention's objectives and to achieve global biodiversity benefits. The three main goals of the Convention are conservation of biodiversity, the sustainable use of its elements, and fair and equitable sharing of benefits from the use of common resources. Many actions have been undertaken on the global scale, but strong cooperation and commitment in this area is clearly lacking. Much still needs to be achieved by the global community in protecting biodiversity.

Table 5.1. Major international conferences and agreements on environmental concerns (continued)

Year	Event	Main issue/outcome
1992	United Nations Framework Convention on Climate Change (adopted at the Earth Summit)	Climate change acknowledged as a serious problem for the Earth. Calls for avoidance of human interference with the Earth's climate system by stabilisation of atmospheric greenhouse gas concentrations. Established the framework for the Kyoto Protocol on Climate Change (1997).
1998	The Rotterdam Convention	Convention focused on steps needed in monitoring the import and use of hazardous chemicals and pesticides. It came out with a mandatory practice on the Prior Informed Consent Procedure for certain hazardous chemicals and pesticides in international trade. In 2004 the Rotterdam Convention on PIC Procedure for certain hazardous chemicals and pesticides in international trade became an international law.
2001	The Stockholm Convention	It focuses on eliminating or reducing releases of 12 persistent organic pollutants (POPs), the so-called Dirty Dozen, to protect human health and environment through legal and administrative measures to minimize and prohibit the production and use of intentionally and unintentionally produced and used POP chemicals and through management and disposal of stockpiles in an environmentally safe method. It calls for changes in the production process of industries and for cleaner production systems. The Global Environmental Facility (GEF)[a] is the designated interim financial mechanism for the Stockholm Convention, which entered into force in May 2004.
2002	World Summit on Sustainable Development in Johannesburg	The Johannesburg Declaration highlights sustainable development, poverty reduction and environmental protection.

a. The Global Environment Facility (GEF), established in 1991, helps developing countries fund projects and programs that protect the global environment. GEF grants support projects related to biodiversity, climate change, international waters, land degradation, the ozone layer and persistent organic pollutants.

Source: Based on UNEP 2006; UNIDO various documents.

Some 300 international treaties have been drawn up, and countries have signed and ratified about 60% of them. In the 1970s and 1980s, treaties were aimed at specific problems, such as contamination, species preservation and conservation. In recent decades, new goals pertain to depletion of ozone layer, climate change, loss of biodiversity and use of hazardous chemicals. One of the most important new aspects is the empha-

sis on equity in the provision of environmental public goods and the need to improve the redistribution of benefits related to environmental conservation and the reduction of greenhouse gas emissions.

A network of multilateral mechanisms emerged from these international conferences and agreements; among them are the United Nations Environment Programme (UNEP) and the Commission on Sustainable Development. The commission ensures effective follow-up to the Earth Summit and is responsible for observing the progress on the implementation of Agenda 21 and the Rio Declaration on Environment and Development. UN regional commissions and specialised agencies like UNIDO also implement environmental programmes according to their respective mandates and competencies.

Regional groupings—such as the Group of Eight (G-8), the European Union, the Association of South-East Asian Nations (ASEAN), the African Ministerial Conference on the Environment and the Council of Arab Ministers of Environment—have policies to protect the environment. Civil society organizations (non-governmental organizations, universities and private organizations) and information exchange networks between governmental and non-governmental organizations support decision-making on the provision of environment public good.

Overall, the international regulation framework for managing, regulating and conserving the environment is shaped by soft legislation that depends on voluntary behaviour—non-binding rules, norms and action plans—and by multilateral environmental agreements that bind signatories.

This institutional framework contributes to better and broader understanding about the importance of international management of environmental public goods. But it also suffers from several weaknesses that may have consequences for global governance. Its institutional complexity may hinder effective international management if coordination processes are not improved (WRI 2003) to strengthen the effectiveness, efficiency and coherence. Industrial and trade policies still give too little attention to the connection between industrial development, trade and environmental necessities. Nor are the mechanisms for providing environmental goods well understood by all countries.

There is no systematic vision for environmental matters—and no overarching mechanism that links them. As a result, many years may elapse between the negotiation and ratification of treaties. There is also little enforcement of objectives and schedules and no central oversight of the financial and technical resources to ensure agreement fulfilment. This results in wide gaps between the regulatory framework for environmental goods and their provision.

Two examples of international collective action—with very different outcomes—are the Montreal Protocol, dealing with elimination of the use and production of substances that deplete the ozone layer, and the Kyoto Protocol, dealing with the effects of greenhouse gas emissions on the world's climate system. While the first is perceived as the most successful international agreement, the second is considered much less successful (Sandler 1997, 2004b).

MONTREAL PROTOCOL—THE MOST SUCCESSFUL INTERNATIONAL AGREEMENT

The Montreal Protocol deals with elimination of the use and production of ozone-depleting substances (ODS), like chlorofluorocarbons (CFCs), halons, hydro-chlorofluorocarbons (HCFCs), methyl chloroform, methyl bromide and carbon tetra-chloride, which are used in industry, households and agriculture. These chemicals can remain in the atmosphere for a very long time. The ozone layer is essential to life on earth as it absorbs ultra-violet B-radiation from the sun, which at the earth's surface causes health hazards to human life (melanoma and non-melanoma skin cancers, more eye cataracts, weakened immune systems, reduced plant yields) and damages the aquatic animal and plant ecosystems.

The Montreal Protocol was signed on September 1987 by 130 parties accounting for more than 83% of the consumption of ODS at that time. Reduction goals increased in subsequent revisions, as did the number of signatories, reaching 182 countries by June 2008. Amendments to the Montreal Protocol were made at conventions held at London (1990), Copenhagen (1992), Montreal (1997) and Beijing (1999).

In 1990, a Multilateral Fund was set up to help developing countries that are large consumers and producers of ODS to eliminate these substances in line with their obligations under the Protocol and at an agreed schedule.[25] With the assistance provided through the Multilateral Fund developing countries that produce CFCs are able to achieve the Montreal Protocol targets and some of them are expected to meet their production phase-out commitments at least a year in advance.

Notwithstanding its success, the 2006 assessment report by the World Meteorological Organization (WMO) indicated that even with full compliance with the Montreal Protocol by all parties, the depletion of ozone layer would not be a thing of the past. It is expected that recovery of the ozone layer will not take place before the middle of this century, mainly because of the long lifetimes of the ozone depleting substances

Concerns also remain about the full implementation of the Montreal Protocol by all countries within the stipulated time schedule. This adherence to the phase out schedule is important due to the precedent bad consequences of ozone layer depletion. Since 1979, stratospheric ozone has decreased over the entire globe. The ozone layer is between 3% and 6% below 1980 levels in mid-latitudes. The ozone layer over the Antarctic has steadily weakened since measurements started in the early 1980s.[26]

The land area under the ozone-depleted atmosphere over Antarctica increased steadily to more than 20 million sq. km in the early 1990s and has varied between 20 and 29 million sq. km since then. The levels dropped to record lows following the June 1991 volcanic eruption of Mount Pinatubo in the Philippines. In 2000, the area of the ozone hole reached a record 29 million square kilometres. On 12 September 2000 the largest and the deepest ozone hole was recorded, but it dissipated early in October. While no hole has appeared elsewhere, the Arctic spring has seen the ozone layer over

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25 Developing countries eligible for financial assistance are those with an annual per capita consumption of ODS of less than 0.3 kg a year, as defined in Article 5 of the Protocol. They are referred to as Article 5 countries.

26 UNEP/WMO, 2006, Scientific Assessment of Ozone Depletion [http://pdftohtml.spiritofanime.com/pdf2html.php?url=http://www.unep.org/ozone/pdf/execsumm-sap2002.pdf]; Canada's National Environment Indicator [www.ec.gc.ca/soerree/English/indicator_series/new_issues.cfm?issue_id=5&tech_id=21].

the North Pole thin by up to 30%, while the depletion over Europe and other high latitudes varies between 5% and 30% (UNEP 2004).

The production of CFCs, with large ozone depletion potentials (ODPs[27]), still accounts for the largest share of ODS production in ODP tonnes. The shares of HCFC and Methyl Bromide are slowly and steadily increasing.[28] Current international legislation has mandated production caps for HCFCs; its production in developed countries is prohibited after 2020 and in developing countries after 2030, but not all nations have officially agreed to abide by these limits.

The consumption of CFCs has decreased with respect to total consumption of ozone-depleting substances, while at the same time the consumption of HCFCs has steadily risen over the last few years. Unless all countries stop the production and consumption of Methyl Bromide and the HCFCs, the recovery of the ozone layer will be delayed.

There has been a significant decline in the production and consumption of ODS from around 1,800,000 ODP tonnes in 1989 to around 170,000 in 2002. This incredible decline in the production and consumption of ODS is clearly the result of the protocol. Many countries during this period had achieved zero levels of production in CFCs and halons.

This has led to many people calling the Montreal Protocol a success, unparalleled on tackling a global environmental issue. But the world community needs to exert caution, as there still exist some challenges which need to be addressed and can be summarized in the following points.

Some countries have yet to ratify the ozone treaties, and the London, Copenhagen, Montreal and Beijing Amendments. Since all countries have not ratified the Protocol and the subsequent treaties there is always an element of risk that there could be a possible increase in the consumption and use of the banned ODS. Concentrations of halons continue to increase, as there has been no alternative to replace existing fire fighting equipments, which contain halons that are released whenever a fire is being put out or during testing of equipment.

Many countries, especially developing countries and countries with economies in transition, are facing challenges and problems in adhering to the phase-out target schedules of the Montreal Protocol. Although assistance has been provided to some of these countries more assistance may be needed in helping all the parties to achieve the targets.

While consumption levels in the developed countries have been virtually phased out, the Montreal Protocol can only succeed if the developing countries or, more importantly, emerging economies phase out these substances. Therefore it is imperative for implementing agencies to focus their attention on these developing countries that are likely to emit more of these ozone-depleting substances.

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27 ODP is a number that refers to the amount of ozone depletion caused by a substance. Scientifically the ODP is the ratio of the impact of a chemical compared to the impact of a similar mass of CFC-11 on the ozone.

28 The HCFC compounds are viewed as temporary replacements for the CFCs as they have shorter atmospheric lifetimes than CFCs but they still contain chlorine and have the potential to destroy stratospheric ozone.

Some of the major targets yet to be reached include total phase-out of CFCs, halons and carbon tetrachloride in developing countries by 2010, total phase-out of methyl chloroform and methyl bromide in developing countries by 2015, total phase-out of HCFCs in developed countries by 2020, and total phase-out of HCFCs in developing countries by 2030.[29]

The problem is compounded by illegal trade. The scope for black market trade is very high due to high taxation on production of banned ODS in developed countries. Because developing countries have longer periods to meet their targets, traders in developed countries are trying to create a market for recycled substances using them also as exports to developing countries. In addition, while consumption of most ozone-depleting substances is forbidden, industrialized countries still produce some banned ozone-depleting substances, primarily to meet the most essential uses and to supply developing countries.

The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer is a landmark agreement that has successfully reduced the global production, consumption and emissions of ozone-depleting substances (ODSs). ODSs are also greenhouse gases that contribute to the radiative forcing of climate change. The ODS contribution to radiative forcing most likely would have been much larger if the ODS link to stratospheric ozone depletion had not been recognized in 1974 and followed by a series of regulations. The climate protection already achieved by the Montreal Protocol alone is 5 to 6 times larger than the reduction target of the first commitment period (2008-2012) of the Kyoto Protocol[30]. Additional climate benefits that are significant compared to the Kyoto Protocol reduction target could be achieved by actions under the Montreal Protocol, by managing the emissions of substitute fluorocarbon gases and/or implementing alternative gases with lower global warming potentials

Finally, the health hazards caused by ODS cannot be ignored even with the full implementation of the Montreal Protocol targets. A major concern that confounds the international community is the existence of time lag between the release of ozone-depleting substances, their impact on the stratosphere, and the development of skin cancer31. This is not caused by the depletion of the ozone layer but more probably more related to changes in behaviour of humans. An increase in skin cancer related to ozone layer depletion lags the depletion by 20 to 40 years.

KYOTO PROTOCOL: BEYOND 2012

The release of various greenhouse gases, notably carbon dioxide (CO_2), methane CFCs, and nitrous oxide (N_2O) in the atmosphere contributes to changes in climate and global

29 Report of the Nineteenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, UNEP/OzL.Pro.19/7, 21 September 2007, [http://ozone.unep.org/Meeting_Documents/mop/index.shtml].

30 Velders, G.J.M., S.O. Andersen, J.S. Daniel, D.W. Fahey, M. McFarland, The importance of the Montreal Protocol in protecting climate, Proc. Natl. Acad. Sci., 104, doi: 10.1073/pnas.0610328104, 2007.

31 There is also an important delay between ozone depletion and for development of skin cancer. The maximum increase in skin cancer from ozone depletion is expected in 20-40 years.

warming.[32] The increases in the temperatures around the world over the last five decades have been accelerated by intensified human activities.

Gases from using carbon-rich materials like petroleum, coal, and natural gas that are exploited to gain energy, are responsible for the lion's share of greenhouse gas emissions. Non-CO_2 greenhouse gases (resulting from agriculture, industry, energy and waste treatment) and emissions due to land-use changes (timber harvest, land-clearing and deforestation, forest re-growth and shifting cultivation) contribute to approximately 40% of overall global greenhouse gas emissions.[33] In many developing countries, due to their agro-based economies and significant deforestation practices, the non-CO_2 greenhouse gases represent the highest share of total emissions.[34]

The consequences of climate change can be seen in rising sea levels, glacier declines, a shoot down of the Gulf Stream, coastal flooding, heavy rainfall, extreme heat waves, increasing hurricane activity and extinction of species. The climate change affects the productivity of farmlands, fisheries and forests. People are increasingly exposed to the risk of water stress, diseases, loss of land and biodiversity (loss of mangrove forests, coral reefs, fish populations), which affects the quality of their lives (human health, migration, cultural diversity, resource conflicts, and so on).

To control for climate change, stabilizing the concentration of the atmospheric greenhouse gases that have been increasing at a faster rate in the last two decades is called for. International discussions often consider that the concentration of CO_2 in the atmosphere should not exceed 550 parts per million volume, approximately 10 gigatons (see Blanchard et al 2003). Higher concentration levels mean higher and more unpredictable risks for natural systems and society. The CO_2 emitted today stays in the atmosphere for up to 200 years; hence reducing these accumulated concentrations will take a long time.

It is vital to accept that problems at the local level are major factors that act as a catalyst in damaging the global climate. But dealing with the problem at the local level is becoming difficult as the United States, the major greenhouse gas emitter, is not doing much to cut emissions. Both in absolute figures and in terms of average per capita emissions, the United States leads the emissions levels from developed countries (table 5.2).[35] Emissions per capita in the United States were five times the world average in 2002.[36]

Intensified industrialization and urbanization in some developing countries also puts more stress on the earth's atmospheric concentration level. The relative growth of CO2 emission has been highest in developing regions, especially in Asia in the period

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32 The Kyoto Protocol also addresses hydrofluorocarbons (HFC), perfluorocarbons and sulphur hexafluoride.

[http://unfccc.int/resource/cd_roms/na1/ghg_inventories/english/8_glossary/Glossary.htm].

33 Van Vuuren et al (2006) estimate that currently non-carbon dioxide greenhouse gases (methane, nitrous oxide, perfluorocarbons, hydrofluorocarbons and sulphur hexafluoride) contribute to about a quarter of the global greenhouse gas emissions.

34 These figures come from Baumert and Pershing 2004. The estimates of land-use related carbon fluxes, however, are very uncertain.

35 In 2002, of all developed countries only Luxembourg emitted more CO_2 per capita than the United States.

36 The average emissions on the world level were 3.93 metric tons per capita in 2002 (World Bank 2006).

1990–2004 (table 5.3). The industrial sector accounts for more than one-third of global primary energy use (Price et al 2006) and for 36% of carbon dioxide emissions (IEA 2007, cited in UNIDO 2007). In 2004 global energy-related CO2 emissions from the industrial sector were approximately 10 gigatons of CO2, representing 37% of global CO2 emissions. Developed countries accounted for 35% and transition economies for 11% of global CO2 emissions from the industrial sector while the remaining countries accounted for 54% (Price et al. 2006: 13). The largest emissions from industrial energy use were in several Asian countries (China, Taiwan Province of China, Hong Kong SAR, Republic of Korea, and Vietnam), accounting for more than a third of global CO2 emissions due to increasing energy-intensive industrial production and the heavy use of coal in the industrial and power sectors. (Price et al 2006: 13).

Table 5.2. Carbon dioxide emissions of countries with emissions higher than 1% of world emissions in 2004 (ranked by percent of world total)

Country or Area Name	Carbon Dioxide Emissions (CO_2); Thousand Metric Tons 1990	Carbon Dioxide Emissions (CO_2); Thousand Metric Tons 2004	Percentage Change from 1990 - 2004	Rank In 2004	Share in World Total (%) 2004	CO_2 Emissions Per Capita Average
United States	4,821,190	6,049,440	25.48	1	22.20	20.06
China	2,400,350	5,010,170	108.73	2	18.39	2.43
Russian Federation	n.a.	1,524,990	-23.19	3	5.60	9.71
India	682,137	1,342,960	96.88	4	4.93	0.89
Japan	1,071,360	1,257,960	17.42	5	4.62	8.89
Germany	981,038	808,767	-17.56	6	2.97	9.94
Canada	416,086	639,403	53.67	7	2.35	17.64
United Kingdom	579,709	587,261	1.30	8	2.16	9.69
Korea, Republic of	241,315	465,643	92.96	9	1.71	8.36
Italy	389,960	449,948	15.38	10	1.65	7.50
Mexico	413,512	438,021	5.93	11	1.61	3.63
South Africa	332,040	437,032	31.62	12	1.60	8.46
Iran (Islamic Republic of)	218,393	433,571	98.53	13	1.59	4.70
Indonesia	213,964	378,250	76.78	14	1.39	1.16
France	364,036	373,693	2.65	15	1.37	6.43
Brazil	209,671	331,795	58.25	16	1.22	1.77
Spain	212,274	330,497	55.69	17	1.21	7.16
Ukraine		330,039	-45.02	18	1.21	6.48
Australia	278,645	326,757	17.27	19	1.20	17.16
Saudi Arabia	254,949	308,393	20.96	20	1.13	12.77
Poland	347,776	307,238	-11.66	21	1.13	8.06

na is not available.

Source: UNIDO calculations based on CDIAC data; United Nations Common Database, United Nations Statistics Division, 2006.

Table 5.3. World carbon dioxide emissions by region, 1990–2004

Region	CO_2 emissions (million metric tons)		Share of world total, 2004 (%)	Percentage change, 1990–2004
	1990	2004		
Developing regions				
Africa	**270.63**	394.14	3.66	45.64
Latin America and the Caribbean	**49.99**	**77.86**	0.72	55.75
Asia without Japan	2594.29	5476.49	50.88	111.10
China	1,886.01	3827.33	35.56	102.93
India	380.21	765.12	7.11	101.24
Oceania without Australia and New Zealand	2732.25	5692.52	52.89	108.35
Developed regions				
North America	**1,910.82**	2294.31	21.32	20.07
Europe	**1,815.62**	1376.33	12.79	-24.20
Japan	245.96	432.68	4.02	75.91
Australia and New Zealand	137.96	216.65	2.01	57.04
World	**8,260.49**	**10763.75**	100.00	30.30

Note: Regional classification according to United Nations "Composition of macro geographical (continental) regions, geographical sub-regions, and selected economic and other groupings."

Source: UNIDO calculations based on Energy Information Administration Database, Office of Energy Markets and End Use, International Energy Statistics, 2008.

Therefore, it is necessary to see how country and especially developing country governments and industries can implement sustainable approaches to economic development, including sustainable methods of production and environmentally sound technologies, and use renewable sources of energy in their goal of achieving higher economic growth and infrastructure development (see viewpoints 5.2 and 5.3).

The Kyoto Protocol, which came into force on 16 February 2005, sets legal quantitative emission reduction targets for developed countries and countries with economies in transition. These countries, known as Annex I Parties, have legally binding targets to reduce their overall emissions of six greenhouse gases by an average of 5.2% below 1990 levels in the period 2008–2012 (the first commitment period), with specific targets varying from country to country. However, the achievements of the Kyoto Protocol have been limited. This is because the United States and Australia did not ratify the Protocol. Some developed countries like Canada fail to comply with the established targets. The main achievement of the Kyoto Protocol was the initiation of emissions trading and creation of the carbon market, both with a potential to reduce emission and to ensure more efficient and fairer distribution of obligations.

Even with the implementation of the Kyoto Protocol there are many concerns about whether the international community can stabilize climate change in the long run. The reasons are several. First, the steps undertaken by the United States as the largest emitter in controlling its emissions are not favourable. Second, it is too early to suggest

whether all countries will be able to achieve the Kyoto Targets. Third, whenever there has been a decline in emission volume during the last two decades this was mainly during the time of economic slowdowns. It is not in the interest of any country to have a stagnant economy. This means that the slowdown in CO_2 emission can be made possible only if the economic growth is driven by the adaptation across all sectors of environmental friendly technologies like electricity generation, transportation, industry, buildings, agriculture, forests and fisheries. Finally, there is no general uniformity by various organizations, governments and industries to tackle this problem on a unified basis.

Experts, governments, economists and scholars discussing international collective actions to deal with climate change beyond 2012 have developed a great number of alternative proposals representing the general perception that the Kyoto Protocol is not sufficient for dealing with the global warming challenge. Aimed at addressing Kyoto's perceived flaws and underpinning its strengths, the proposals vary widely in scope—from building on the basic Kyoto architecture and modifying singles issues, to new comprehensive and alternative approaches.[37] However a number of common themes may be identified among the proposals.

First, the majority of the proposals suggest continuation of the international collective action under the auspices of the UNFCCC, considering that climate change is a global concern requiring global cooperation. A few proposals, however, contemplate the alternative approach of undertaking negotiations among a limited number of like-minded states (for example, beginning with bilateral negotiations between countries with domestic emissions trading schemes and then broadening the regime to others). Almost all the proposals include some form of developing country participation and burden sharing.

In sum, while the Kyoto Protocol does not perform well by most criteria, no single proposal performs well along all the dimensions either, because of the tensions and trade-offs that exist among the criteria.

An efficient and cost-effective emission abatement proposal would require the participation of all countries in actively reducing their greenhouse gas emissions. However, equity concerns favour the exemption of developing countries from emission reductions. While some proposals try to address this conflict by allocating "headroom" emission allowances to developing countries, the environmental outcome is hindered. On the other hand, proposals that maximize environmental outcome may be inconsistent with dynamic efficiency and undermine participation and compliance incentives, and those that focus on cost-effective implementation only occur conditional on participation and compliance. Other proposals including various kinds of domestic policies and measures appear better at promoting compliance and participation, but are less likely to be cost-effective. Finally, even policies that address intergenerational equity, protecting future generations (presumably better off than current ones), can translate into fewer resources to help today's poor in developing countries and conflict with distributional equity concerns.[38]

Based on the trade-offs it becomes a challenge to identify and develop a single proposal that can effectively perform well on all criteria. Moreover, most of the proposals have only been designed on paper and have not yet undergone a political process. It

37 Based primarily on the work by Bodansky 2004 and Aldy et al. 2003.

38 This paragraph draws primarily on Aldy et al. 2003.

is important to bear in mind that the Kyoto Protocol has come into force as a result of many years of negotiations and political processes, and some could consider it as the limit to what is politically feasible in spite of its many flaws. However, new negotiations and policies will have to advance the efforts beyond 2012. Therefore it is important to consider all the alternative proposals, especially as they have been developed in response to the imperfections in the current regime. Working around the common themes and combining the best performing elements of different proposals could help shape a policy that balances the different dimensions and is as efficient, cost-effective, fair and inclusive as possible.

ALTERNATIVE MECHANISMS FOR DEALING WITH GLOBAL WARMING ISSUES

Besides Kyoto Protocol alternative policy instruments, such as carbon taxes, quotas and property rights are also proposed for correcting the underprovision of this public good. Carbon tax is the imposition of additional cost on each tonne of emissions. Those who have to pay higher prices would seek alternatives. Thus, carbon taxes would provide incentives for the reduction of emissions and also revenues for national governments. At the international level, these revenues could be used for achieving development objectives, and a fair distribution would be guaranteed because the wealthiest countries would pay most of the tax (Sandmo 2004).

Quotas involve some form of allocation, but would be unlikely to have the same distributional effect (Cline 2004a). Quota allocations based on population, rather than total energy use, would distribute quota rents to large economies with low income per capita (for example, China and India), whereas the carbon tax approach would distribute the quota equivalents on a basis of economic strength and hence the ability to pay the tax. An additional difficulty concerns the degree of uncertainty over the response of carbon-based energy supply and price demand. The carbon market is a policy-driven market. Decisions concerning framework conditions and operating guidelines, as well as issues like National Allocation Plans, linking access to finance to clean development mechanisms (CDM) and joint implementation (JI) and the future status of the Kyoto Protocol, will all affect price fluctuation and market developments. Nevertheless, policies designed to prevent global warming—whether tax-based or through quotas—are long-term strategies and should therefore be subject to periodic revisions.

Finally, an approach based on property rights has led to the creation of the emission trading system, which could be adapted and extended into a worldwide market for trading CO_2 emission rights. The emission trading system includes two types of policy frameworks, namely "cap and trade" and the offsets (or credit) trading system allowing for trade in allowances and in credits. These frameworks can exist at international, national and sub-national (regional) levels (Ward 2005).

Under the cap and trade framework, once the overall quantitative limit (a cap) on the aggregate emissions for a group of emitters is determined over a period of time—usually reached through negotiation—then the cap is divided into tradable emission units (or allowances) among the emitters in the group, thus setting emission targets for the emitter. If one emitter has emitted less than allowed and the other more than allowed then the first emitter can trade its surpluses with the second. Efficiency is served because those that value carbon emissions more will purchase emission rights from those that value them less. In the process, net welfare is maximized. Each emitter will be better off, and the objective is reached at lower costs.

The EU has established its own entity-level cap and trade programme to help manage a portion of the emissions it is responsible for under the Protocol (Box 5.3). In the US and Australia, state governments are heralding emissions trading initiatives independent of their central governments' policies and Kyoto. There are also discussions about possible linkages of such markets with the Kyoto market.

This policy framework has also provided for the flexibility of obligations under the cap and trade framework through allowing for trading in credits for projects that occur outside the cap and trade policy framework. They allow emissions inside the main group to be higher than they otherwise would be. Developing countries do not have emission targets. Projects in developing countries that reduce emissions and that would not have occurred in the absence of the CDM are considered an acceptable offset to emission reductions that could occur in industrialized countries with Kyoto emissions targets. The CDM provides additional tradable units into the overall system, that is, more supply to the carbon market created by the Protocol.

Offset trading programmes do not need to be connected to a cap and trade emission-trading programme. The denomination of the credit can be tonnes of emissions or some other measurement unit related to the obligation. Because there are willing buyers and sellers of the tradable credits, a market exists.

Box 5.3. The EU Emissions Trading Scheme (EU ETS)

The European Union Emissions Trading Scheme (EU ETS), a multi-nation, industry-based cap and trade programme involving some 11,500 EU installations, started on 1 January 2005 and dominates the international carbon market. EU ETS covers some 12,000 installations, mostly utility combustion plants, oil refineries, iron and steel plants, energy intensive industry, such as cement, glass, lime, brick and ceramics production facilities, and the pulp and paper industries. For these industries, emission trading has become a means of managing the financial risks and opportunities in complying with greenhouse gas emission obligations. Companies participating in the scheme can use credits obtained through JI and CDM projects. The EU ETS not only provides the conditions for the cost-effective reduction of the CO_2 emissions, but also the incentives for business and industry to invest in countries covered by the JI and the CDM mechanisms, such as Russia, Ukraine or Kazakhstan. This in turn leads to the transfer of the new environmentally sound low emissions technologies and contributes to achieving the national objective of sustainable industrial development in these countries.

The emission trading within the EU ETS and eventually the global trading (as envisaged in the Kyoto Protocol) is a new issue for business and industry. Participation in emissions trading requires development of new skills and expertise at the company-level. UNIDO global forum activities focus on enhancing the understanding and operations of emissions trading and its linkages with the project-based mechanisms of CDM and JI. It provides for expert discussion and knowledge sharing among the participating countries that recently joined the EU and some countries with economies in transition that are likely to become hosts of JI and CDM projects.

The Kyoto Protocol includes both frameworks at the international level. Its Article 17 is an example of cap and trade framework. Under the Kyoto Protocol's emissions trading scheme, Annex I Parties,[39] which have legally binding targets under the protocol, can buy allowances (certified absence of carbon emissions) from Annex I countries that have not reached their emission limits if they do not meet their reduction commitments. JI and CDM further allow these countries to earn credits by investing in

39 Annex I Parties include industrialized countries and transitional economies.

clean energy programmes and other CO_2-reducing measures, such as reforestation (UNFCCC). Trade in credits has more impact on reducing CO_2 emission than trade in allowances.

This has led to the creation of carbon market, a main achievement of the Kyoto Protocol. Each ton of CO_2 emission obtains a commercial value governed by market forces. Traders are now monitored on a daily basis by a large international emissions trading business sector, emission units can be measured (or estimated) with acceptable accuracy, emission units are held and tracked in a secure registry system and there are enforcement mechanisms to ensure that the obligation is enforced.

The carbon market has been growing fast. In the first half of 2006, 12 billion euros worth of carbon was traded, five times more than in the same period in 2005. The buyers of credits are participants in the EU Emissions Trading Scheme and Japan's voluntary reduction scheme. The sellers are developing countries, offering the projects that deal with cutting the emissions of some factories. The projects have to be certified by the UN. Most of the credits sold in the beginning of 2006 were HFC projects.[40]

There may be another form of obligation placed on a group of emitters on a voluntary basis. This may be a carbon fund, established to buy outcomes of emissions reductions or sink enhancement activities. Although most of the carbon funds that have been established to date are connected to cap and trade or credit trading programmes, they do not have to be. Air miles carbon offset programmes, for example, can be seen as managed funds created by voluntary consumer donations, which then are used to buy the emission reduction or sink enhancement activities. It is conceivable that large institutional funds could be created for a similar purpose (Ward 2005).

The emission trading system and carbon market encourages the internalisation of externalities because economic agents—such as firms—treat CO_2 emission costs as production costs. This provides incentives to reduce emissions as well as to achieve efficiency gains through the use of less polluting technologies (Vela 2005). Emission trading stimulates investments in CO_2-saving technology and also emergence of a new market for traders of emission certificates and credits, for professional experts, and for other service providers. There are also some concerns. Trade in allowances can also create extra costs that are passed on to consumers while purchase of credits from developing countries may result in EU companies and thus consumers paying much more for the actual price of reducing emissions.

FACTORS INFLUENCING THE FORMATION AND OPERATION OF THE MULTILATERAL ENVIRONMENTAL REGIME

Although ozone layer depletion and climate change are both global pure public bads, global collective action to reduce them has met with drastically different success to date.

Collective action to curb ozone depletion (Montreal Protocol) and efforts to reduce global warming (Kyoto Protocol) are examples of pure public goods, sharing the same properties of publicness, that of the summation aggregation technology—the level of their overall provision is a function of the cumulative contributions by individual contributors. Yet their effects were not equally successful. According to Sandler (2004b),

40 *The Economist* 2006.

understanding the properties of a public good is not always sufficient to ensure its effective provision through collective action. Besides the free riding problem that may arise, other underlying factors may also play a role, such as a lack of information on the costs and benefits of acting, the role of leading players, the number of participants and the level of technological progress in the field. It is important to identify and understand how these factors influence the success of an environmental regime's formation and operationalization (table 5.4).

Table 5.4. Factors influencing the success of the environmental regime

Underlying factors	Montreal Protocol	Kyoto Protocol
The availability of information on the costs and benefits of the specific corrective action	Cooperative gains were achieved because the leading country governments, especially the United States, were more informed about the cost-benefit analyses of reducing ozone-depleting substances. The dominant strategy for the leading player, the United States, was to curb CFCs based on the calculations. Other developed countries followed suit.	Governments were less informed of the cost-benefit of climate change and of trying to mitigate it. Predictions based on modelling exercises of what is going to happen to climate in the next 100 years are tricky. The complexity of predications arises from many reinforcing and counteracting factors at play, and various uncertainties are involved in this analysis. According to recent estimates, the economic costs of climate change account for –3% of average global outputs (Nordhaus 2006). The estimation of the costs of mitigation in terms of global output ranges from 0.2% to 1 % of GDP a year. (*The Economist* 2006). Most calculations in the economics of climate change do not take into account the possibility of eventual extreme risks of catastrophic climate change and what happens if those risks materialize. Such an approach, followed in defence and financial stability, should be considered as well.
Leadership	The strong commitment and leadership of key industrial countries, particularly the United States, were essential, as those countries were the highest consumers of the most important ozone-depleting substances, CFCs.	Absence of leadership from key polluters. The world's largest emitter of greenhouse gases, the United States, is signatory to the Protocol but has not ratified it, making its requirements non-binding. Other major polluters, such as China and India, have ratified the Treaty but are not obliged to reduce emissions under the specifications of the current agreement, despite being large greenhouse gas emitters. If the United States as key polluter does not lead the efforts to cut emissions other big polluters will be indifferent.

Table 5.4. Factors influencing the success of the environmental regime (continued)

Underlying factors	Montreal Protocol	Kyoto Protocol
How many countries and activities would be affected by underprovision?	Less uncertainty about the impacts on individual countries: all countries could suffer from ozone depletion.	Costs of climate change are expected to be higher in some regions than in others (for example, higher in India than in Brazil), and the impact assessments of climate change on economic and social life and their distribution, both temporal and geographical, have not yet produced convincing conclusions.
Concentration of interest and political pressure to oppose the agreement	Concentration of interest and little political pressure to oppose the treaty and its amendments.	Significant uncertainties about global warming processes and their consequences keeping countries from making commitment. Mitigating climate change assumes spending real money today in exchange for uncertain benefits in the far future.
Technological breakthroughs/ substitutes	Major players searched for substitutes, which were found for some ozone-depleting substances, like CFCs, and other harmful materials that also generated profits for the affected businesses. Even major producers of CFCs, with strong commercial interest, were to gain from CFC reductions due to profitable substitutes. Commercial interests were concentrated. The Protocol has remained mostly limited to those industries dealing with the ozone-depleting substances. Finding replacements for CFCs was much easier for developed countries than for developing countries.	Lack of viable alternative technologies and substitutes that would compensate industries for economic losses from the Protocol's measures. Commercial interests not so concentrated as for CFCs. Industries that incur the costs of emissions reductions are not likely to be the same as the ones that will gain from possible substitutes.

Table 5.4. Factors influencing the success of the environmental regime (continued)

Underlying factors	Montreal Protocol	Kyoto Protocol
Number of participants suffering from underprovision and number of participants contributing to the underprovision	The impact of outcomes differs based on geographic location. Countries at the higher latitudes are more at risk from ozone holes. Mainly requires involvement of manufacturing industries, especially chemical industries.	Controlling greenhouse gases involves more players, making the process of international cooperation more complicated in this area. Efforts may affect different industries in almost every country. Achieving reductions relates not only to manufacturing but also to agricultural activities. Larger contributors are nations with large rain forests (Brazil and Indonesia) and agricultural countries with methane and nitrous oxide emissions (China, India and the United States). High population growth in some countries also puts pressure on the ability to curb greenhouse gas emissions through increasing demand for food, shelter and energy. Greenhouse gas emissions are wide-ranging and changes require the involvement of millions of people, requiring national government policy to influence domestic behaviour.
Treaty flexibility, norms, standards and enforcement mechanisms	High flexibility and norms of good behaviour established. The treaty mandates could be easily changed when new circumstance appear (new substitutes, new information, or treaty–mandated reductions are exceeded). The treaty framework united environmental, political and commercial interests. Special status given to developing countries (delayed compliance) as minor producers of CFCs was feasible and sufficient to concentrate collective action on major producers. Early ratifiers persuaded others to sign the treaty through positive incentives (delayed compliance by developing countries) and threatening with trade sanctions. Innovative financial mechanism used: Multilateral Fund was established to finance the Montreal Protocol.	Complicated collaborative processes. Special status given to developing countries, especially to key emitters, will keep the industrial polluters from ratifying the Kyoto Protocol. Some cutbacks will have to be mandated to all countries, with some allowed differentiation over time. A treaty instrument for global warming needs to be designed that accounts for its unique aspects.

Table 5.4. Factors influencing the success of the environmental regime (continued)

Underlying factors	Montreal Protocol	Kyoto Protocol
Intertemporal/ generational	The reduction of CFCs under the Montreal Protocol will result in clear benefits for current generations as well.	The benefits from actions taken today will come in the distant future, while the political and economic costs are borne by the current generation. Climate change is not expected to do much damage within next 50 years, so at a normal discount rate mitigating climate change today does not seem worthwhile. The effects of reducing greenhouse gas emissions require a much longer time span to take hold. Cutting emission gradually is a much cheaper than doing it quickly. The wide distribution of benefits across countries amplifies the free rider problem.

Source: Sandler (2004b: 215–18; 225; 232–34; 257–59; 269); Braungart et al. 2005; Cooper 2005; Rock 2006, *The Economist* 2006; Memedovic, 2006; Nordhause 2005.

POLICY ISSUES

The undersupply of environmental public goods has become a major issue on the international agenda. Finding appropriate mechanisms to correct this deficiency is crucial, both for mitigating environmental degradation and for supporting economic development.

Although many other agents may contribute to the provision of environmental public goods, the participation of national governments remains vital. Countries have different abilities in assuming the commitments to sustainable development. In addition, actions by national governments may be insufficient, due to spillover effects that reach beyond national borders. In this context, international collaboration gains special relevance. Several suggestions for the international debate follow:

- *Considering complementarities.* Most environmental impacts from human activities are intergenerational in character, with direct consequences for the management of environmental public goods. Global problems such as depletion of the ozone layer and climate change have consequences for both present-day societies and future generations. Each of the mechanisms highlighted in this chapter—regulating, cooperation, establishing rights of exchange—represents measures for promoting action on the international level. Therefore, their implementation may as well be complementary.
- *Avoiding earlier mistakes.* Developing countries, especially those at low incomes, have fewer financial options and are more vulnerable to environmental problems. Many of these countries also depend heavily on natural resources, making the conditions of their environment crucial to their progress. Sustainable development requires averting repetition of the polluting practices during the industrialisation of developed countries. Governments should thus take notice of the ecological consequences of their industrialisation efforts, and the international community should provide strong incentives for developing countries to leapfrog the historical errors of developed countries.
- *Accommodating different needs.* While greater international coordination could help prevent opportunistic free rider behaviour, it is also essential that international differences be considered from a principle of common but differentiated responsibilities. Developing countries have specific concerns and priorities for the environment, especially in the realm of sustainable development. It is therefore important that the agenda for international environmental public goods reflect primary concerns of different countries and population groups in a balanced manner.
- *Improving the coordination of global and regional efforts.* The success of some international agreements suggests the need to reinforce international treaties and convince countries of making further commitments. At the same time, greater decentralisation in the provision of environmental public goods should be considered. Governments could support the development of capabilities in local entities with closer ties and greater knowledge about specific aspects of the environment. It is also important to strengthen information sharing and to foster an integrated approach for environmental problem-solving across disciplines and institutions.
- *Moving to environmentally friendly production.* Technological improvements can promote economic dynamism and development and simultaneously lead to more environmentally friendly production processes. The application of clean and effi-

ciency-improving technologies, in both material and energy use, is a good example. To increase the capabilities of developing countries, international efforts should be directed at technology transfer and the creation and dissemination of specific scientific and technological knowledge.

- *Educating everyone*. The intergenerational scope of environmental issues underlines the importance of education and learning. It is essential that governments implement education policies and training practices, which can build environmental awareness about more sustainable use of natural resources and stimulate environment-friendly changes in consumption patterns.

CHAPTER 6
CONCLUSIONS AND POLICY RECOMMENDATIONS

Traditionally, foreign assistance has provided private goods and social overhead capital to recipient countries not only to reduce abject poverty but also to provide the necessary preconditions for sustained economic development. Social overhead capital—schools, bridges, highways, law enforcement, communication systems, waterways, irrigation systems, courts—often consists of national public goods for residents. This social overhead capital is necessary for markets to function; for example, law enforcement is required to protect property rights, while courts are needed to adjudicate property right disagreements.

In giving foreign assistance, donor countries have been motivated by a combination of altruism and self-interest. Altruistic gifts are based on a desire to improve the well-being of those less fortunate even when it means giving up some of the donor country's own savings or consumption. In contrast, assistance is founded on self-interest if the donor stands to gain directly or indirectly from its actions. This self-interest may manifest itself in aid that results in stronger allies, military bases, or better trading partners, which was true for the Marshall Plan following World War II. The practice of conditionality, whereby aid is tied to recipients abiding by certain stipulations—introducing certain policy reforms or purchasing technical assistance from the donor country, for example—is another instance of assistance being driven in part by the donor's interests. In recent years the practice of conditionality has lost support because it may weaken recipient countries' sense of ownership of their development plans. Such practices may also inhibit recipients from developing their own expertise while paying too much for donor-supplied services or inhibit development by imposing practices on a recipient that are foreign to its culture or way of doing business.

GROWTH IN FOREIGN AID FOR NATIONAL AND INTERNATIONAL PUBLIC GOODS

Interest has been growing in the provision of foreign aid in the form of national and international public goods. International public goods include goods whose benefits are non-rival and non-excludable to two or more countries. For example, assisting a developing country to implement sounder financial practices reduces the likelihood that financial crises will arise in that country and spread to other countries or hurt foreign investors with portfolio or foreign direct investments in the country. Similarly, assisting a country to switch from chlorofluorocarbons to more ozone-benign substances benefits all countries by limiting ozone-shield depletion. In fact, as these examples show, donor-provided international public goods generate benefits that may assist the donor country as well, thereby providing additional incentives to support aid. For aid-funded international public goods, donor self-interest derives from the nature of the public good supplied and not from explicit stipulations on recipient behaviour. Such benefit spillovers may make this form of aid an easy sell to the donor country's constituency.

Recent studies have documented an increase in foreign aid support of national and international public goods. The World Bank (2001a: 110–13) estimated that $5 billion is directly spent annually on aid-assisted international public goods and another

$11 billion annually on complementary activities that permit developing countries to use these goods. Such complementary activities include primarily the provision of national public goods that improve education, health, governance and the environment. Te Velde, Morrissey and Hewitt (2002: tables 5.1 and 5.2) show that the financing of both national and international public goods grew from just over 16% of foreign assistance in the early 1980s to almost 40% in the late 1990s. In an updated study te Velde (2006) indicates that the share of foreign assistance supporting both international and national public goods doubled between 1983 and 2003. About 45% of foreign aid funded these two classes of public goods in 2003.

Estimates by Raffer (1999) indicate that such support varies from 20% to 40% of official development assistance depending on the definition of public goods assistance. Although estimates will vary widely until researchers agree on how to measure public goods aid, different studies still find that more aid is either financing international public goods directly or preparing recipients to take advantage of the benefits of these goods. In recommendations for reforming aid the United Nations (2001) High-Level Panel called for increased support of international public goods in health and other key sectors and cautioned that this support must be in addition to traditional poverty-alleviating assistance.

The need for international public goods for economic development is tied, in part, to globalization—the increase in cross-border flows of all kinds. First, increased capital flows associated with globalization mean that financial crises may have more far-reaching consequences than in the past. Developing countries increasingly rely on capital inflows to finance domestic investment and economic development. These flows have in some instances replaced loans and grants from multilateral organizations.

Second, advances in transportation and communication networks and in production networks facilitate cross-border flows from externalities (for example, transnational transmission of diseases, the contagious anxiety caused by large-scale terrorist events, and international dissemination of best practices), so that countries' welfare is more interrelated in today's globalized world.

Third, technological advances, by enabling countries to identify cross-border externalities, create the need for international public goods such as transboundary air pollution control to address these externalities. These advances may also give rise to new international public goods and externalities in an increasingly interdependent world economy. Thus, for example, the development of nuclear energy created nuclear wastes that have to be stored for generations.

Fourth, globalization leads to more trade, which also gives rise to international public goods concerns, including the importation of contraband and the creation of pollution havens.

This chapter has two main purposes. It distils the basic messages of the Report. And it presents some policy recommendations regarding the allocation of foreign assistance, the choice of jurisdiction, the proper sectors to support and the design of institutions.

BASIC MESSAGES OF THE REPORT

This section highlights five main messages of the Report and prepares the way for a discussion of policy recommendations.

DEVELOPING COUNTRIES NEED INTERNATIONAL PUBLIC GOODS FOR DEVELOPMENT

To function in today's global economy, developing countries require a host of international public goods that promote good governance, financial stability, technological progress, health and commerce. Without these goods developing countries are unable to compete, prosper or attract capital from abroad. In a globalized world social overhead capital involves international public goods as well as national public goods. Thus developing countries must be sufficiently integrated in the world's trade regime to find markets for their export sector, which is often a leading sector for development. International public goods—reduced urban pollution, improved disease control, better sanitation—not only increase welfare in developing countries but also promote their development and growth.

This need for both national and international public goods for development is recognized by the Millennium Development Goals, internationally agreed goals and targets for knowledge, environment, health, and governance public goods. To further knowledge, the Millennium Development Goals focus on universal primary education for both men and women. The targets for environmental sustainability call for increasing the supply of potable water and reversing losses in natural resources. Environmental sustainability in developing countries will have positive spillovers not only on neighbouring countries but also on other countries by limiting harmful transnational externalities. A better environment has secondary health influences, since air pollution leads to respiratory diseases and water pollution leads to water-borne diseases. The achievement of the goal of global partnerships can improve health, governance and knowledge in developing countries through best practices and technology transfers. Additionally, the elimination of unfair practices can provide developing countries with more viable markets for their exports. The development partnership goal also speaks to governance because partnership means that steps are taken to allow developing countries to engage with the developed world.

INTERNATIONAL PUBLIC GOODS DIFFER ACCORDING TO THEIR THREE BASIC PROPERTIES, WHICH AFFECT THEIR EASE OF PROVISION

International public goods come in a variety of forms because they differ in their three basic properties: non-rivalry of benefits, non-excludability of benefit recipients and the technology of aggregation. The prognosis for successful collective action critically hinges on these three properties. Some combinations of these properties imply that the goods will be provided efficiently, with little need for intervention or explicit policy. For example, weakest link public goods will be provided optimally with no outside guidance when benefiting countries possess similar tastes and resource endowments (Sandler 2004b: 61–68).

When, however, both developing and developed countries are involved, developing countries will have fewer endowments and will be unable to afford the level of provision for the weakest link public good considered adequate by developed countries. This applies to actions to monitor and contain an infectious disease outbreak, for example. Because the least action fixes the effective supply of a weakest link public good, the rich nations then have a motive to shore up the weakest link suppliers through in-kind or income transfers. The issue becomes how the developed countries confront the free rider problem of wanting other rich countries to take the lead in shoring up the weakest links. Multilateral organizations can coordinate these efforts as the World

Health Organization did in eradicating smallpox and is currently doing in eliminating polio.

Another example of a potentially non-problematic international public good is a best shot public good—one that is adequately provided for all countries when just one or a few countries have the ability to supply the good. This is especially the case when the pool of benefit recipients includes a rich country with a strong preference for the good even if it has to supply it alone—for example, the United States funds the Centres for Disease Control and Prevention.

The provision of many international public goods for development confronts collective action difficulties. Policy is then needed, and this may require institutional arrangement such as multilateral organizations, partnerships and treaties. Since policy-making resources are scarce, efforts must focus on the international public goods that, by their nature, pose a collective action difficulty. Sometimes, institutional design can be used to give the international public good a set of properties more conducive to provision. Recent action to have donors earmark contributions through multilateral organizations to support specific sectors may augment donor-specific joint products, increasing the motivation to give. In some instances the comprehensive development framework and the pursuit of partnerships have altered the properties of associated international public goods and motivated generosity by augmenting favourable joint-product combinations (Sandler 2004b: 129–43).

PROPERTIES OF INTERNATIONAL PUBLIC GOODS DETERMINE THE REQUIRED CORRECTIONS AND MOST APPROPRIATE INSTITUTIONAL ARRANGEMENTS

It is primarily the properties of international public goods that dictate the corrections required. Alternative property rights assignments or sharing rules—whether the catch in a fishery is distributed among exploiters by effort or output—may address some open-access commons concerns (Cornes and Sandler 1996: 283–90). In other cases taxes or quotas are appropriate. The properties of international public goods also point to the most appropriate institutional arrangement. For goods with readily monitored and excludable benefits, club arrangements can be used, so that countries can join private collectives to obtain the public good, financed from congestion-internalizing tolls. For the good to be efficiently financed through a toll arrangement, use of the good must give rise to crowding or non-zero marginal cost. The arrangement cannot work efficiently if the marginal cost from use is zero, because then the toll is zero. Clubs present a dilemma because developing countries may not be able to afford the payment and so cannot gain access to essential development activities—for example, access to INTELSAT and the satellite-based communication network. The solution is not to resort to less efficient allocation mechanisms but to provide aid to fund developing countries' membership.

For other international public goods the institutional decision may involve payment arrangements for benefit recipients. Thus, cost sharing among participants can circumvent the free-riding problem, as has been used since 1974 to underwrite peacekeeping missions by the United Nations. This organization also uses cost sharing to support its operations through membership fees. The World Bank and the International Monetary Fund (IMF) give large stakeholders more voting privileges to increase donor-specific benefits and provide private incentives to be generous to the many development functions that these institutions supply. International organizations that cre-

ate specialized agencies are attempting to better serve a particular international public good and its recipients. Certainly, the World Health Organization was established to better fulfil health needs, especially in developing countries.

As discussed below, institutional design also involves choosing the proper decision-making jurisdiction when, say, deciding between an international or regional facilitating institution. A current debate involves the proper development bank—the World Bank or a regional development bank—to support some international public goods whose benefits are confined to a well-defined domain (Kanbur 2004).

COMPLEMENTARITY OF NATIONAL AND INTERNATIONAL PUBLIC GOODS

Traditionally, development assistance focused only on providing private goods. More recently, the need for both national and international public goods is now understood to promote development (Sandler 1997; World Bank 2001). National public goods play a complementary role for international public goods, because national public goods are required for developing countries to take advantage of international public goods. Without adequate hospitals and medical staff, a developing country is unable to take advantage of medical breakthroughs and best practices that are international public goods.

FOUR INTERNATIONAL PUBLIC GOODS, THEIR CHALLENGES AND POTENTIAL REMEDIES TO PROMOTE DEVELOPMENT

This message concerns the four key international public goods highlighted in chapters 2–5. Each presents challenges and potential remedies to promote development.

Financial stability. Financial stability generally involves weakest link or weaker link international public goods, with poor financial practices in developing countries hurting these countries by turning away capital inflows that offer increased employment, technology transfers, aggregate demand and savings. Poor financial practices also create negative spillovers for neighbouring and investing countries stemming from financial losses. Neighbouring countries can also suffer by being associated—perhaps unfairly, owing to propinquity—with nearby financial crises that lead to bank runs, with some banks becoming insolvent owing to insufficient reserves.

Such financial governance failure can be corrected through best practices such as those incorporated in the Basel Capital Accord, which was first adopted by the Group of 10 (G-10) countries (Sandler 2004b: 9). Once developing countries adopted the accord, they had little choice but to abide by it because to do otherwise would signal risks to would-be investors. The IMF monitors adherence and supplies stop-gap liquidity to developing countries to forestall crises. Thus there are clever ways to foster financial stability in developing countries that require little explicit intervention. The weakest link nature of this international public good provides the right incentives for developed countries to define better operating procedures and for developing countries to embrace them.

International trade regime. International trade regimes yield joint products with purely public good outputs (more unrestricted commerce) and country-specific outputs (most favoured nation status). The public goods outputs offer far-reaching gains, while the country-specific outputs motivate countries to be part of the regime. The real issue is how to achieve global free trade. As an interim measure regional trade blocs are likely

to form, with trade creation within the bloc and trade diversion between blocs. These regional trade blocs can also offer regional public goods, as in the European Union. But there is no clear roadmap on how to move from a patchwork of regional trade blocs to a global free trade system. The World Trade Organization has assisted in this transition, but the process is far from completed.

Trade offers developing countries a way to expand their markets and to grow. It also offers a pathway to improve social welfare by importing some products at cheaper prices than home production. Developing countries have received asymmetric and smaller benefits than developed countries from freer trade in recent years due largely to rich countries' protection of agriculture and other primary commodities that greatly burden developing countries, whose export sector relies on such products.

Unlike for financial stability, incentives are less well aligned for trade. This can be rectified by engineering trade regimes with either a higher proportion of country-specific benefits or net improvements for a larger set of countries. More countries can see a net improvement from the international trade regime if developed countries believe that the dynamic gains from expanding markets outweigh the short-run losses from ending tariffs. The collective problem involves compensating individuals who lose in the short run from freer trade so that all can gain in the long run. Countries must be assured, however, that their actions will be reciprocated by other countries, and ensuring reciprocity requires an international institution.

Knowledge. Knowledge public goods for development highlight the conflict between static and dynamic efficiency (Stiglitz 1999). Patents and other knowledge-exclusion mechanisms create short-term welfare losses by excluding those with a positive marginal willingness to pay when the marginal costs of another user is near zero. This exclusionary practice, however, maintains strong incentives for investing in knowledge and new technologies owing to patent-protected property rights that result in higher short-run profits. This should induce more investments in discoveries, which correspond to dynamic efficiency gains. But these dynamic gains create ever greater hardships for the developing countries that cannot afford access to the new technologies and, thus, fall farther behind.

One policy solution is to increase assistance to developing countries to give them access. Another solution is to offer information products and technologies at lower prices in developing countries through a two-tier price scheme. For such schemes to work, however, arbitrage schemes must not be available that would enable agents to buy the product (say, a computer program or drug) at a low price in a developing country and then sell it in a developed country at a higher price but still below the patent-protected price.

Once developing countries can afford access to new technologies, agents in these countries must still acquire the absorptive capacity to gain from these innovations. Here, UNIDO and other multilateral organizations can play an essential role in creating and financing this capacity. Many collective action problems must be surmounted for international knowledge public goods.

Environment. Environmental public goods abide by a host of different aggregation technologies—summation, weighted sum, threshold, weakest link and others—so there are myriad provision prognoses. For reciprocal bilateral externalities where, say, country A imposes air pollution on country B while country B imposes river pollution on country A, the countries should be able to bargain to an efficient outcome. Greater difficulties are involved when there are a large number of polluters and recipients and the

externality is unidirectional. But even then, if the identity of the polluters and recipients is known, a treaty can be self-enforcing, particularly when there is significant self-pollution accompanying transboundary pollution, as there was with the Helsinki Protocol for sulphur emissions (Murdoch, Sandler and Sargent 1997). When there are harmful pollution spillovers, developed countries often have an incentive to assist developing countries for international and transregional environmental public goods. For ozone-shield-depleting chlorofluorocarbons, the Montreal Protocol sets up a multilateral fund through which developed countries subsidize the switchover to more benign substances by developing countries.

Corrective policy is tied to the properties of environmental public goods—for example, the direction of income redistributions depends on the publicness properties. For weakest link environmental public goods income redistribution is to the poor countries so that they can bring their provision (and thus everyone else's) up to an acceptable standard. Best shot environmental public goods require redistributing income to the most likely provider even if this means a more unequal distribution of income among recipient countries. The transboundary range of spillovers is often the key determinant of the treaty membership. Regional pollution in developing areas poses the greatest difficulty because developed countries may not have a direct interest in curbing localized pollutants. Moreover, there may be no country in the region with the capacity to curb regionwide pollutants. These are the cases where foreign assistance is especially important. Regional agreements can also play a role in supporting these efforts.

POLICY ISSUES AND RECOMMENDATIONS

This section investigates several policy issues and proposals regarding international public goods for development. These goods are associated with a host of policy concerns, many of which have already been addressed in the Report. Some new ones are also raised.

WHICH JURISDICTIONAL LEVEL?

Given differing spillover ranges for international public goods, a crucial question concerns the jurisdictional level at which these goods should be provided. The principle of *subsidiarity* supports a match between the decision-making jurisdiction and the spillover range of the public good. Thus, a national public good should be provided by a national government, a regional public good should be supplied by a regional organization, and an international public good should be supported by an international institution. By matching the decision-making jurisdiction and the good's economic interests, subsidiarity seeks to foster allocative efficiency, whereby those affected by the public good cover the marginal cost of its provision. When the coordinating jurisdiction extends beyond the spillover domain, it is anticipated that some agents who do not benefit will be subject to fees or other financial burdens, thus resulting in oversupply. When the coordinating jurisdiction is a subregion of the good's spillover domain, then it is anticipated that decision-makers will fail to adjust for benefits received by those beyond the jurisdictional domain, so the public good is undersupplied.

Another argument in favour of subsidiarity is to curb transaction costs by limiting participants to those with a stake in the associated activity. By emphasizing the essential decision-makers, subsidiarity fosters repeated interactions and thus promotes cooperation even in perverse situations where incentives are not usually aligned. Sub-

sidiarity also bolsters interaction at the local level for public goods with small spillover domains. Localized interactions draw on shared cultures, norms and values and thus curtail asymmetric information.

The subsidiarity principle raises concerns for supplying public goods for development because many developing countries require assistance for their national and international public goods. By its nature foreign assistance means some relaxation of subsidiarity since the supplier may necessarily be outside of the spillover range of the public good.

There are other grounds for not strictly adhering to subsidiarity. First, strict adherence would result in an excess of jurisdictions since public goods have diverse spillover domains. Second, economies of scope may justify providing two or more public goods in the same institution to take advantage of unit cost savings even though the spillover ranges of the international public goods do not coincide. Third, economies of scale may justify using institutions with a larger jurisdictional mandate than a good's spillover range to save on unit cost. Fourth, the proper jurisdiction may not exist, so that subsidiarity may sometimes have to be ignored. For a transtropical public good such as action to limit river blindness, the world community had to rely on a multilateral institution—the World Bank—to alleviate the problem. Fifth, the need to address best shot and better shot public goods, where efforts must be pooled, may necessitate that an international institution supply some regional public goods, because it is easier for such bodies to amass large amounts of money.

The upshot is that national and international public goods for development should be supported by bilateral and multilateral (regional and global) organizations. The cost savings from scope economies represent a key rationale for using regional and international institutions to support a host of different international public goods. To adapt support of regional public goods to constituent needs, there are grounds for increasing the capacity of regional institutions. This policy will also curtail "mission creep" in international institutions that supply an ever-increasing number of public goods that possess less than global spillovers. Better linkages between regional and international aid institutions should adjust for previously unrecognized complementarities between regional and international public goods. Specialized agencies—UNIDO and others—within international institutions must promote the supply of public goods that are tied by a common function, such as the pursuit of industrialization. Subsidiarity should serve as a guiding principle that is not too strictly followed.

SUPPORT OF PUBLIC GOODS: SPATIAL CONSIDERATIONS

The empirical analysis of te Velde, Morrissey and Hewitt (2002) establishes that the bulk of foreign assistance for public goods funds national public goods. This support makes sense because these goods are necessary for development and are a prerequisite for taking advantage of international public goods.

In recent papers Sandler (2005) and Sandler and Arce (2007) argue that regional public goods for development are relatively neglected. Their argument is based on a number of considerations. First, in contrast to international public goods, regional public goods are unlikely to yield benefit spillovers to donor countries, thus limiting their funding. Second, international institutions are better funded than their regional counterparts, which is due to a culture of contributing to international bodies. Thus, these bodies are well equipped to finance international public goods. Third, developing

regions often lack a lead country that can coordinate actions to provide infrastructure—interstate highway systems and waterways, for example—to advance regional development. Fourth, some developing regions are plagued by conflict that inhibits the supply of regional public goods. Fifth, there may be no clear entity that can obtain loans and provide collateral at the regional level for regional public goods.

Thus, there is a need to make sure that regional public goods are not ignored; actions to expand the capacity of regional development banks can foster the provision of regional public goods. There is also a need for specialized agencies within the World Bank and in the United States to support region-based activities.

INSTITUTIONAL DESIGN FOR INTERNATIONAL PUBLIC GOODS

There are some institutional design principles to highlight. When exclusion can be practised and the international public good displays crowding, clubs are a low transaction cost means for financing such a good. Even some regional club goods—such as tunnels, bridges and waterways—can be privately provided by clubs. Foreign aid should support access to communication, transportation and other clubs for developing countries so that they have the same advantages as rich countries.

Another design principle is to exploit novel forms of organizations so as to offer the right incentives to member nations. When, for example, helping to finance regional public goods, regional development banks should rely more on grants than on loans. A country has little incentive to take on debt if the loan funds a regional public good with spillovers to other countries not saddled with the debt. Thus, the division between loans and grants must be geared to the mix of country-specific and regionwide benefits.

Institution engineering that augments country-specific joint products provides incentives for countries to fund international public activities. Recipient-specific joint products provide a sense of ownership, while donor-specific joint products motivate generosity. Recent calls to take away quota-based voting in the IMF would eliminate a motivating donor-specific benefit. Public-private partnerships offer an institutional form that takes advantage of diverse participants' comparative advantage. As such, partnerships economize on transaction costs while maximizing output. Institutions for funding international public goods must also limit overlap of functions. Currently, international institutions appear to be pursuing some of the same functions—the United Nations and some of its specialized agencies, the World Bank and others have focused on promoting a sustainable environment.

SECTOR CHOICE

In the late 1980s, following publication of the Brundtland Report (Brundtland 1987), foreign aid to the environmental sector increased greatly and accounted for the largest share of foreign assistance until the mid-1990s (Mascarenhas and Sandler 2005: 1102). After the East Asian financial crisis of 1997 foreign assistance was redirected to governance and other capacity-building activities. During the late 1990s the health and knowledge sectors also attracted more foreign assistance (Mascarenhas and Sandler 2005: 1101–03).

As best practices emerge, governance will correct itself in developing countries through self-enforcing incentives, provided that these countries possess the requisite capacity. As indicated earlier, if developing countries are to attract capital they have little

choice but to adopt best practices such as the Basel Accord. Thus, the share of assistance going to governance should begin to decline as this capacity is obtained. In its place institutions such as the IMF will need to monitor for trouble, having ready an action plan to correct the problem and minimize the contagion when instability or crises are discovered.

Although the share of assistance going to the environment has declined in recent years as the share going to governance has increased, aid-supported environmental activities will remain high because of significant donor spillovers, especially for transboundary pollution concerns. Free riding will plague the provision of environmental public goods, so many of which are summation based. Greater incentive compatibility and thus more efficient collective action will be associated with pollutants adhering to a weighted sum aggregator (sulphur, for example). The real worry is to make sure that donor countries do not allocate too much aid to international environmental public goods—global warming and ozone depletion—to the neglect of more localized and regional environmental concerns.

With the spread of such diseases as HIV/AIDS and Ebola and rising concern about bird flu, foreign support to the health sector (providing healthcare infrastructure, eradicating communicable diseases, treating the ill, vaccinating against diseases, monitoring outbreaks and limiting disease transmission) in developing countries increased as a share of foreign assistance in the 1990s. The rise in support reflects partly the self-interest of donor countries. The health interests of rich and poor countries are not completely aligned, however, since rich countries are more interested in non-communicable diseases such as cancer and heart disease, whereas many of the infectious diseases in developing countries do not pose a risk to developed countries.

The prevalence of weakest link and best shot aggregators in the health sector means that there is a need to provide developing countries with a capacity to address myriad concerns, such as stemming the spread of infectious disease. This requires aid to a sector that is still relatively ignored owing to limited donor country spillovers. New participants—charitable foundations, public-private partnerships, and non-governmental organizations—have a significant role to play by taking up health causes that are not always championed by developed countries. Moreover, many of these organizations have funds whose sources differ from those of the multilateral institutions so that crowding out may not be a concern. And as the need for governance support wanes, funding should be redirected to the health sector. A healthy population is crucial for sustainable development.

Knowledge is also essential for development and is complementary to other sectors. For example, a higher level of education improves governance and allows bureaucrats to use advanced technologies for auditing and other purposes. Without knowledge public goods developing countries cannot take advantage of most international public goods. Thus, knowledge must be bolstered early in any development plan. With knowledge a best shot public good, most breakthroughs are anticipated to take place in developed countries. This raises a concern for regions where required innovations have no benefit spillovers for rich countries and where there is no regional member state that can supply the discovery. Once again, new participants can provide the expertise or offer the funding.

CROWDING-OUT

Anand (2004), te Velde, Morrissey and Hewitt (2002) and others raise the issue that greater assistance given to international public goods will mean less support for traditional forms of aid if foreign assistance amounts do not increase. Some international public goods have donor-specific benefits associated with them, providing an incentive for rich countries to favour goods whose benefit spillovers further their own interests. When combined with aid fatigue, this focus can have dire consequences for the well-being of developing countries.

The irony is that crowding out traditional assistance creates negative externalities for rich countries—for example, an unhealthy population serves as the perfect host for infectious diseases. In addition, poverty inhibits recipient countries from providing the international public goods sought after by rich countries. Multilateral organizations need to build awareness in donor countries that support for international public goods should not be in lieu of standard development support. Also, these organizations must forge links with the new participants since, as already mentioned, their assistance may have no crowding-out implications because their money is not coming from the public sector of donor countries.

CONCLUDING REMARKS

International public goods for development will grow in importance over the coming decades as globalization intensifies. This Report has shown that these goods come in many varieties and affect all sectors of developing countries. Corrective policies hinge on the goods' properties. There is no single prescription; rather, different kinds of international public goods require different kinds of policies and institutional arrangements. The Report addresses the nature of these policies and institutions.

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This publication addresses factors that promote or inhibit successful provision of the four key international public goods: financial stability, international trade regime, international diffusion of technological knowledge and global environment. Each of these public goods presents global challenges and potential remedies to promote economic development. Without these goods, developing countries are unable to compete, prosper or attract capital from abroad. The undersupply of these goods may affect prospects for economic development, threatening global economic stability, peace and prosperity. The need for public goods provision is also recognized by the Millennium Development Goals, internationally agreed goals and targets for knowledge, health, governance and environmental public goods.

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