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Chapter VI

Financing the development response to climate change

INTRODUCTION

There is no way to escape the need for large-scale investments to meet the climate challenge around the world. Developed countries have begun to make adjustments, but the pace has been slow. In 2008 and 2009, expectations were raised by the inclusion of green investments in stimulus packages in response to the global financial crisis, but austerity measures have since put a halt to that trend. Developing countries, meanwhile, have to ensure their climate policies are consistent with long-standing growth and development objectives. The key to this, we have argued, is to adopt an investment-led and integrated approach. In particular, large-scale investments will need to be front-loaded to make a “big push” toward climate change mitigation and adaptation. Yet those investments will involve significant initial costs and a high degree of uncertainty.

The debate about the economic dimension of climate policy has been dominated by assessments of market-based mechanisms such as cap and trade and carbon taxation. There is little doubt that establishing a realistic price for carbon has to be part of any policy agenda, and private investment will, of course, have a major role in any low-emissions economic future. The question, however, is whether market mechanisms alone can induce the required shifts in production and consumption patterns and mobilize the large-scale investments needed. This seems doubtful. Price mechanisms are an unreliable guide in a case like this, where the required investments are very large, economies of scale and learning curve effects are important, and the returns on investment depend both on climate uncertainties, and on a series of complementary investment efforts and policy initiatives. This is even truer today, against the backdrop of systemic financial market failure and volatile carbon markets that are not compatible with long-term investment planning.

While market mechanisms should play a role in a more comprehensive package of measures, the investment path needed to meet the climate

challenge will require heavy reliance on regulation and large-scale public investments in order for the necessary economic transformation to take place.

Public investment, financed by both tax revenues and long-term borrowing, has played a transformative role in shaping development pathways in the past, including in today's most advanced economies. In many cases, external financial support has been critical. Achievement of the transition to a low-emissions, high-growth path in developing countries will also require massive public investment, funded to a large extent through external resources, particularly in the early stages. Along with reducing emissions, the aim of such investments will be to crowd in profitable investment opportunities for the private sector along the new development pathway.

Given the great uncertainties involved, it is not easy to define an appropriate financing framework for climate change. Depending on what target is used for stabilizing greenhouse gas concentrations and other modelling assumptions, estimates of the annual cost of mitigation range up to 2 per cent of world output by 2030—though in all cases, doing nothing would lead to much higher economic losses. Adaptation costs are apparently smaller, but also uncertain, depending on assumptions about anticipated climate impacts. On both fronts, large shares of the required investments must be made in developing countries. Yet while at the global level, the costs seem quite affordable, most models do not consider the challenges of increasing investment to such high levels in developing countries. They also fail to consider the possibility that climate-related investments could trigger a high-growth pathway, allowing countries to meet longstanding development goals.

The key questions are, first, which measures will be most effective in both mobilizing the required resources and steering investments in the desired direction, and second, how should the costs be distributed across nations and population groups? Market-based scenarios, such as one developed by the World Bank, assume a rapidly growing role for funding mechanisms such as cap and trade systems and carbon offsets, complemented by moderate amounts of multilateral, mostly developed-country funding; developing countries' role in financing investment remains small through 2050.¹ The high-growth, low-emissions scenario envisioned in this book starts with much larger upfront investments by developed countries to generate a big push in the desired direction, initially led by public investments; but within a few decades, the rapid rate of growth makes it possible for developing countries to finance most of their own ongoing investment needs. By 2050,

the requirements for multilateral and developed-country funding are much lower than in a predominantly market-based scenario. This happy outcome is only possible, however, if the initial funding for the big push is forthcoming.

This chapter begins by assessing the likely scale of resources needed to achieve low-emissions, high-growth pathways, and to make vulnerable countries and communities more resilient with respect to climate change and shocks. It then considers how those resources could be mobilized and, in particular, both the advantages and the limitations of cap-and-trade mechanisms and carbon taxes as financing vehicles in the initial years. A wide mix of financial mechanisms will likely be required, including domestic resources. The chapter concludes with a consideration of the elements of an alternative global investment regime, initially dependent on significant public sector involvement and a prominent role for a multilateral financing mechanism.

ESTIMATING FINANCING REQUIREMENTS

The parties to the UNFCCC agreed that developed countries would provide financial resources to developing countries to meet “agreed full incremental costs” of implementing mitigation and adaptation activities as well as related activities encompassing, among others, climate research, training and management of sinks. These are not voluntary commitments, but treaty obligations. However, estimates of those global costs vary widely, depending on model assumptions and the required emissions target, among other factors (see chap. I). What is certain is that the longer the response to climate change is delayed, the more damaging will be the threats to lives and livelihoods, and the greater will be the resources required to respond to those threats. It is also important to recognize that appropriate responses to the climate challenge will not be uniform across all countries. In particular, there will likely be sharp differences between developed and developing economies, given the higher mitigation and adaptation costs facing the latter.

Mitigation costs

Figure VI.1 presents a range of estimates of mitigation costs. Given the uncertainties and unknowns in these costing exercises, it is not surprising to find the range varying from as little as 0.2 to about 2 per cent of world GDP, or between \$180 billion and \$1.2 trillion per year (by 2030). The range of estimates depends on methodologies used as well as on whether the

Figure VI.1

Range of estimates of annual additional cost of mitigation strategies,
550 ppm and 450 ppm scenarios, world and developing countries

Sources: Stern, 2009; International Energy Agency, 2008a and 2008b; United Nations Framework Convention on Climate Change, 2008; and McKinsey & Company, 2009.

target of stabilization of greenhouse gas concentrations is set at 450 parts per million (ppm) or 550 ppm. In all cases, the costs to the world economy would be considerably higher under a business-as-usual scenario, with increasing expected losses, and a growing threat of an abrupt, irreversible catastrophe, as time goes on.

More than half of the incremental costs of greenhouse gas abatement are expected to fall on developing countries, whose energy investments over the coming decades are projected to grow much faster than those of developed countries (see chap. II). The costs include investments in renewable energy, which at current prices remains more expensive than coal or other fossil-fuel alternatives; more efficient and lower-emitting coal-based power plants, including integrated gasification combined cycles and supercritical coal power plants; carbon capture and storage; and more energy-efficient boilers, furnaces and other industrial equipment. However, from a development perspective, it is difficult to separate these incremental investments from the challenge of meeting growing energy demand in developing countries, as well as interrelated demands on the transportation system and in urban expansion, improved irrigation and water management, and other sectors.

Adaptation costs

Discussion of adaptation costs has focused on the additional investment needed to increase resilience and reduce the impact of anticipated future damages caused by weather events. In practice, adaptation costs may also include disaster relief expenditures when damages actually occur. However, because these costs depend on the uncertain probability and severity of climatic threats, whose local impact is closely linked to other vulnerabilities, it can be hard to determine where traditional development expenditures end and new adaptation expenditures begin. In any case, adaptation measures need to be embedded in broader development strategies, as discussed in chap. III.

A UNFCCC report estimates that annual worldwide adaptation costs will be \$49 billion to \$171 billion by 2030 (see table VI.1).² Its adaptation scenario covers five sectors, with the uncertainty arising from the cost of adapting infrastructure, estimated at between \$8 billion and \$130 billion. The World Bank's Economics of Adaptation to Climate Change (EACC) project, meanwhile, which included a global analysis and seven country studies, estimated that adapting to 2° C of warming would cost developing countries \$70 billion to \$100 billion per year between 2010 and 2050.³

Table VI.1
Additional investment and financial flows needed for adaptation in 2030, by sector

<i>Sector</i>	<i>Areas/adaptation measures considered</i>	<i>Global cost (billions of 2005 United States dollars)</i>	<i>Proportion needed in developing countries (percentage)</i>
Agriculture, forestry and fisheries	Production and processing, research and development, extension activities	14	50
Water supply	Water supply infrastructure	11	80
Human health	Treating increased cases of diarrhoeal disease, malnutrition and malaria	5	100
Coastal zones	Beach nourishment and dikes	11	45
Infrastructure	New infrastructure	8–130	25
Total		49–171	34–57

Source: United Nations Framework Convention on Climate Change, 2008, table 5.

The financing challenge

The estimated additional investments needed for adaptation and mitigation to address climate change are large in absolute terms, but only a small fraction of world output (on the order of 1 to 2 per cent)⁴ and of estimated total global investment (2.5-5.0 per cent) in 2030. There is a growing recognition, however, that many of these investments need to be front-loaded, in order to accelerate the shift to a low-emissions economy and to minimize the damage from unavoidable changes in the climate. Front-loading implies more pressure on the financial system to quickly mobilize resources. Moreover, as discussed in earlier chapters, these investments in adaptation and mitigation are often closely interrelated and will make sense only in combination with complementary investments designed to meet wider development objectives, such as developing infrastructure, raising agricultural productivity and diversifying economic activity.

Despite the recent proliferation of climate-related funds, the amount currently promised and expected to be available for meeting the climate challenge in the near term is woefully inadequate. A United Nations Environment Programme report estimates 2009 climate finance flows at about \$16 billion, including \$13 billion from four bilateral institutions.⁵ Under the Copenhagen Accord, developed countries agreed to jointly mobilize \$100 billion a year by 2020 “from a wide variety of sources” to address the climate mitigation and adaptation needs of developing countries. They also agreed to make \$30 billion a year in “Fast-Start” funding available between 2010 and 2012—though questions have arisen about whether these will truly be new funds or replace existing aid, and whether economic problems would lead some countries to scale back their pledges. Even in the most optimistic view, however, the funds available for adaptation are expected to fall far short of projected needs.⁶

This suggests that global financing for climate change will require a much more determined effort on the part of advanced countries to provide bold leadership on climate and bolster international cooperation. But it will also require an effort on the part of developing countries to mobilize a larger share of their resources for cleaner investments along a new, sustainable growth path.

The purpose of a substantial injection of external financing is to not only give a big push to low-emissions development, but also to accelerate and sustain growth in developing countries. As discussed in earlier chapters, those external investments, combined with domestic policies such as price incentives, regulation and targeted industrial policies, would in turn

spur investment from domestic sources in both the public and the private sectors. The evolving mix of public and private investment will vary, but for many developing countries, and possibly for some developed countries, public investment will have to take the lead, along with stronger regulations, before large-scale private investment begins to materialize.

CROWDING IN PRIVATE SECTOR RESOURCES

A clear objective for climate change policy is to reveal the hidden costs of high-emissions technology by putting a price on carbon. In the case of adaptation, incentives will likely involve the sharing of costs among consumers, the private sector and governments. Insurance markets offer one way to share costs, and other innovative instruments have been introduced in recent years. However, these instruments still operate on a very limited scale, even in more advanced countries, and tend to be particularly expensive in developing countries, where coverage is very limited.

Some consumers are adjusting their consumption patterns to reduce their carbon footprints, and some companies are voluntarily reducing their emissions as well—though given the extra cost, it is not surprising that they remain in the minority. Without more aggressive government intervention, it is unlikely that these trends will make a significant impact on global emissions.

This section reviews a range of mechanisms that fall broadly in the category of market-based measures, as their main focus is on changing the price of carbon to reallocate resources away from emission-intensive forms of energy. Several of these mechanisms are also expected to mobilize resources for financing investments in greater energy efficiency and use of renewable energy.

Market-based incentives in developing countries

The economic policy debate on climate change has been dominated by the search for market-based solutions to acknowledged market failures. The idea is to internalize climate-related costs that are now considered externalities, so that greenhouse gas emitters recognize and pay for their emissions and have an economic incentive to reduce them. If they are efficient, it is assumed that they will seize all investment opportunities for cutting emissions that cost less than the established price for carbon.

In addition to its intended purpose, carbon pricing has important, generally undesirable side effects. It affects the level and distribution of

real household income, both directly through a household's use of fossil fuels and indirectly through the prices of other commodities; several studies have found that low-income groups are disproportionately affected. One way to address this is to introduce differentiated pricing by, for example, increasing prices commensurate with the amount of energy used; alternatively, compensatory mechanisms in the form of subsidies for lower-income groups could be put in place. In the United States, some have proposed returning a large share of carbon revenue to households as a per-capita dividend.

The principal categories of market-based incentives are cap and trade systems, carbon taxes, pricing ecosystem services (as in schemes to reduce deforestation), and other incentives for targeted investments.

Cap and trade

Pricing greenhouse gas emissions as a pillar of mitigation policy emerged in the early 1990s with the UNFCCC and took on greater prominence with the Kyoto Protocol. The Protocol, adopted by the Conference of the Parties to the UNFCCC in 1997, set differentiated, legally binding targets for industrialized countries, while setting up an emissions trading scheme to meet those targets. A financing mechanism for projects in developing countries, the Clean Development Mechanism (CDM), was launched at the same time.

These mechanisms are designed to work with a cap-and-trade programme, where governments set an overall emissions cap and then issue tradable permits (either by auction, or to selected firms or organizations) which allow their holders to emit a specified quantity of greenhouse gases. Firms that can reduce their emissions more cheaply can sell their allowances, or refrain from bidding for them at auction, creating a competitive market which reveals the market-clearing price for allowances. Yet the global carbon market remains small, valued at \$142-144 billion in 2009-2010, driven almost entirely by the European Union's Emissions Trading Scheme (EU ETS).⁷ Both the price of carbon and the volume of trading have been unstable: an assessment of the European Union (EU) experience with emissions trading between September 2005 and March 2008 found that the price of carbon was more volatile than stock market indices—a problem that could discourage long-term investment.⁸

Although trading to date has been largely confined to the EU, developing countries can be pulled in indirectly through CDM funding for emissions-reducing projects. As of June 2010, the CDM Executive Board had registered 2,389 projects, and another 2,595 were under review.⁹ But though

there are now CDM projects in about 70 countries, four countries host the vast majority: China, 41 per cent; India, 22 per cent; Brazil, 7 per cent; and Mexico, 5 per cent.¹⁰ However, problems with the programme, long delays in the approval of credits, and questions about the CDM's post-2012 future, along with the global financial slump, have weakened the market; the value of the primary CDM market peaked in 2007, at \$7.4 billion, and fell to \$1.5 billion in 2010, well below the 2005 level.¹¹ On the evidence to date, there are serious obstacles to scaling up this mechanism to generate the required resources for developing countries. The need for effective regulation and monitoring of innovative financial instruments such as CDM projects may raise administrative costs and deter their use, particularly in developing countries. Major investments in training and education are also likely to be required. The success of the sulphur trading scheme in the United States, often held up as a model for emissions trading, appears to have depended on a number of complementary initiatives and investments (see box VI.1); the same will likely be true for carbon trading.

From a development perspective, cap and trade is problematic because, by allowing richer countries to use credits from projects abroad to help meet their emission reduction targets, it allows those countries to avoid necessary mitigation efforts at home. The cap-and-trade system has been designed to conform to the policy experience, institutional capacity and economic conditions of rich countries. By default, this provides significant advantages to them, as the baseline for allowance allocations is the current emissions of the high-emitting countries.

Carbon markets will doubtless continue to expand, but the pace and scale of that expansion is unlikely to be sufficient to overcome the financial constraint on a low-emissions development pathway for developing countries.

Carbon taxes

By increasing the cost of emissions to private parties in a more predictable manner than cap and trade, carbon taxes provide the opportunity to both raise public revenues and mitigate climate damage. Their possible advantage lies in the more predictable price impact and the ease of design and administration. On the other hand, they can provoke intense political resistance, even in mature economies. Hence, proposals such as, for example, the International Monetary Fund's 2008 call for a global tax on carbon have not yet demonstrated that they are politically feasible options.¹²

The United Nations Development Programme (UNDP) has estimated that a \$20 tax per ton of CO₂ imposed on the member countries of the

Box VI.1: Sulphur trading and why it worked

Market mechanisms do not work in a vacuum: they are shaped by many factors. The United States system of sulphur emissions trading, the inspiration for many cap-and-trade proposals, is often credited with having triggered a dramatic reduction in the costs of pollution control. The Clean Air Act Amendments of 1990 had established the system, setting a cap on sulphur emissions at about half of the 1980 emissions and distributing allowances to businesses, roughly in proportion to past emissions. All large stationary sources of sulphur emissions, primarily coal-burning power plants, were included. The trading system was phased in from 1995 to 2000, with costs of controlling sulphur far below the levels that had been anticipated in advance.

However, this result cannot be attributed to trading alone: the low cost made itself apparent quite early, at a time when the volume of emissions trading was quite small. Several other events also played important parts in driving down the costs. Just before trading began, a sharp reduction in railroad freight rates made it affordable to bring low-sulphur coal from Wyoming to Midwestern power plants, replacing high-sulphur coal from the closer Appalachian coalfields. Some state regulations required even greater sulphur reduction than that stipulated by the national law, so it took no extra effort for power plants in those states to comply with the new national standard. At the same time, prices were declining for scrubbers, the pollution control devices that remove sulphur emissions. In this context, the emissions trading system may have made some contribution to lowering costs, but it operated on a field tilted in its favour. Without all the helpful coincidences, sulphur emissions trading would have looked much less successful.

If the United States sulphur emissions trading experience is the model for a carbon market mechanism, then the most important question may be, what other initiatives are needed to complement the market and again tilt the field in favour of success? It is not hard to identify the areas—energy efficiency, and low-carbon and no-carbon energy sources—where investment in research and development are needed. This is not just a matter of costs, but also of opportunities—to create new industries and jobs and to launch a promising new path of technological development.

Source: Ackerman, 2009.

Organization for Economic Cooperation and Development (OECD), at current emission levels, could produce \$265 billion.¹³ Many OECD countries already have carbon taxes, used primarily as general revenue sources, not to finance low-emissions development. The EU also applies differential taxes on energy to products, such as natural gas compared with diesel or petrol, when they are used as motor or heating fuel. These taxes appear to have contributed to energy efficiency, but they have hardly been sufficient to counter the threat of warming temperatures.

Other schemes have been proposed to specifically finance climate change activities. A small per-passenger levy on international flights, for

example, would not only raise revenue, but because air fuel is often tax-exempt, it would reduce the implicit subsidy for air travel relative to other modes of transportation. Reducing subsidies to fossil fuels could help lower emissions and provide incentives for the transition towards a low-emissions economy. Subsidies to petroleum fuels—the difference between the end-user price and the price in a competitive market—have been estimated at \$300 billion per year or 0.7 per cent of world GDP.¹⁴ But particularly in developing countries, raising the price of essential goods such as energy could render them unaffordable by lower income groups, an outcome that would be widely viewed as socially unacceptable.

Any global carbon tax would require multilateral cooperation to harmonise tax systems, jointly set the level and incidence of the tax, and allocate the revenues. Without a robust international framework, differentiated taxes may serve discriminatory political or trade objectives instead of furthering climate change mitigation. Still, carbon taxation could create incentives towards mitigation in advanced countries and revenue for climate programmes, including in developing countries. With a carbon price of \$50 per ton of CO₂, renewable energy such as onshore wind would be roughly competitive with dirty coal, and roughly \$500 billion in resources could be mobilized annually¹⁵—though there would be competing priorities for the use of those funds. The potential revenue is not limitless, and would drop off as greenhouse gas emissions are reduced, but in the initial stages, carbon taxes may play an important role in climate finance.

Pricing ecosystem services

A related mechanism entails imposing fees and levies for activities and services whose benefits are not adequately captured by market prices. Owing to their specificity, ecosystem services cannot be traded as easily as liquid financial assets. As an alternative, several methodologies have been created to assess market value of these services and charge the potential beneficiaries, using shadow prices in a “pay as you use the service” approach. The idea of preserving ecosystems through the use of the services they provide is at the core of the strategies to reduce emissions from deforestation (see box VI.2).

However, setting and administering such a tax may be difficult for many developing countries. Estimates of damages caused by carbon emissions—the basis for the shadow price of carbon—also vary widely, because of the different assumptions made in order to value inter-temporal trade-offs or non-monetary damages, or to account for incomplete information and uncertainty.

Box VI.2: Reduction of emissions from deforestation and forest degradation (REDD)

In addition to providing many other products and services, forests can play a key role in tackling climate change. Deforestation, forest degradation and land-use changes produced 12.2 per cent of global greenhouse gas emissions in 2005, roughly the same as the transportation sector, and slightly more than all the European Union countries combined. Emissions from deforestation alone could increase atmospheric carbon stock by about 30 parts per million (ppm) by 2100. Thus, forest protection will need to form a central part of any global climate change deal.

Nicholas Stern and others have deemed curbing deforestation a cost-effective and relatively quick way of reducing emissions. Emissions from the forest sector could be cut in half by 2030 at an estimated cost of between \$17 billion and \$33 billion per year. This is far below the cost per ton of most emission reduction options in the energy sector.

At present, only a very small share of the existing investment in the forest sector is allocated to addressing climate change, and less than 25 per cent of that share is invested in developing countries and economies in transition. Fortunately, the importance of limiting deforestation and forest degradation has been recognized by climate change negotiators, and several new financing initiatives have been launched. By far the most significant is Norway's commitment to provide \$600 million annually towards efforts to reduce carbon emissions from deforestation and forest degradation in developing countries. Other donors, including Australia, Finland, Spain, Japan, Switzerland, the United Kingdom and the United States, have contributed or have signalled their intent to contribute funds to climate change and forests programmes.

The World Bank has established the Forest Carbon Partnership Facility to help reduce emissions from deforestation and degradation and to help build capacity for REDD activities. Thirty-seven developing countries were participating as of mid-2011, and 16 financial contributors—governments as well as private entities—had pledged about \$450 million for the programme. Just over half these funds are to support readiness reforms and investments identified through national REDD strategies; the rest will provide payments for verified emission reductions from REDD programmes in those countries.

Development of a REDD mechanism must be based on sound methodologies for estimating and monitoring changes in forest cover, associated carbon stocks, and greenhouse gas emissions, along with incremental changes due to sustainable management of forests, and reduction of emissions due to deforestation and forest degradation. The methodological challenge has proved to be more difficult for emissions due to forest degradation than for deforestation. Other policy issues to consider include the rights of forest stakeholders, in particular indigenous peoples, and the opportunity costs of other land uses and forest management systems. Negotiators should also ensure that REDD does not disadvantage countries that have already taken steps to eliminate or reduce deforestation and to manage their forests sustainably, or countries where forests are sustainably managed.

Sources: UN/DESA; United Nations Forum on Forests Secretariat; World Resources Institute, 2010; World Bank, 2011.

Sources of 'green' investment

Equity markets could provide another mechanism for mobilizing private investment in green technologies and low-emissions energy supply and infrastructure. Incentive structures would need to shift to favour such investments; this could be achieved if clear, aggressive reduction targets produced a carbon price that raised the profitability of low-emissions investments, or if fiscal incentives and public investments raised the rate of return on private-sector “green” investments. Foreign direct investment (FDI), portfolio investment, microfinance and public-private partnerships could be promoted to scale up private financing for climate change mitigation and adaptation.

Foreign direct investment (FDI) can be a relatively stable source of financing, with advantages in terms of transferring technology and standards which could allow for leapfrogging into cleaner sectors such as renewable energy. Some of the big emitting sectors, such as road transport, metals, mining, chemicals, timber, and cement are dominated by large international firms. Their investments and practices will likely have a big influence on the timing of alternative development pathways. Moreover, given the advances in clean technologies made by some developing countries in, for example, wind technology, South-South FDI may be an important component of a new development pathway. However, since FDI tends to lag rather than lead economic growth, it is unlikely to play a significant role in the early stages of a shift onto a new development pathway—particularly given the initial high degree of uncertainty and the absence of the domestic inputs and complementary investments that large international firms often expect.

Portfolio investments may be mobilized through venture capital funds as well as “green” funds and stocks and could appeal to investors willing to accept lower returns to support mitigation and socially responsible business practices. However, the funds made available through this channel to developing countries so far have been both limited and skewed in favour of one or two countries. Without a sufficient rise in the price of carbon and government intervention through regulatory measures and fiscal incentives, the private sector will not find these instruments sufficiently attractive—especially when there is price volatility, as seen recently with ethanol.

Nonetheless, some private equity investment firms are beginning to perceive clean infrastructure, primarily renewable energy, as offering viable financing opportunities. Activity is limited by several factors, including a lack of infrastructure to support production and distribution of renewable energy. In China, the largest market for this type of private financial flow,

there are challenges to private investment because of national policies requiring links with domestic firms. Nevertheless, investment banks are increasingly seeing opportunities, most likely because of renewable energy quotas and feed-in tariffs that reward investment in this area, and investors are beginning to act on these prospects. Again, this trend underscores the need for rapid action in policy creation; private investors, particularly in this market, may take significant time to respond to incentives.

Microfinance could be another vehicle for mobilizing local private resources for investments in sustainable development. Over the past three decades, microfinance has grown dramatically around the world, even in some developed countries, with thousands of institutions serving more than 100 million people. In China alone, there were more than 2,600 microcredit companies at the end of 2010, up from 500 in 2008.¹⁶ Microfinance has expanded beyond the original programmes of credit provisioning and now includes schemes of microsavings and microinsurance. Given the close links between poverty reduction and climate vulnerability, scaling up microfinance is a possible source of finance for climate adaptation. The Grameen Bank has already begun to extend loans for clean energy products, such as solar home systems, with spin-offs to microenterprises, while further opportunities exist in cleaner cooking products, biofuels and low-emissions agriculture. However, scaling up microfinance for long-term investment in productive activities and sustainable development will require support through a broader development strategy, including investments in infrastructure and human capital.¹⁷

Public-private partnerships and guarantees can help stimulate private financing in projects for increasing energy efficiency and renewable energy in developing countries. Partnerships have assumed growing importance in recent years as a vehicle for infrastructure projects and delivery of health services. They have also been used to bolster technological development, including in the field of clean energy. However, there are doubts about their cost-effectiveness and whether they represent the best way to deliver at scale.

Guarantees can take various forms. In southern India, for example, a consumer financing programme for photovoltaic systems helped consumers make the necessary upfront investments to use solar energy. The International Finance Corporation (IFC), the private sector arm of the World Bank Group, has been particularly innovative in this area. By establishing partnerships with banks in developing countries, IFC helps local financial institutions identify which of their clients could implement energy efficiency programmes. When a loan is given, training is provided

on how to structure those programmes to further encourage investments, and IFC also issues a partial risk guarantee against default. With default rates actually lower than in other sectors, the guarantees and training have thus made efficient use of IFC resources, helping the private sector overcome its initial reluctance to invest in energy efficiency and renewable energy sectors in developing countries.¹⁸

PUBLIC SECTOR FINANCING

In many developing countries the markets for long-term financing, such as bond markets, are weakly developed. This typically limits what both governments and private investors can do to mobilize long-term capital for large-scale investments in economic and social development. The costs may be too large for governments to finance from yearly tax revenue, and the lack of a bond market limits the capacity for domestic public borrowing for these purposes. Investors, in turn, will anticipate private returns below social returns in the investments concerned.

Economy-wide externalities are particularly prominent in certain key sectors, such as infrastructure, which are characterized by lumpy investments, long gestation lags, higher risks and lower profits. Market signals can result in the avoidance of these sectors by investors, thereby slowing long-term growth and development. In order to overcome this obstacle, policymakers must ensure an adequate flow of credit at favourable costs to frontline technologies and sectors with potentially large social returns. To accelerate private investment in mitigation, policymakers and public authorities will need to apply incentives through regulatory frameworks, subsidies, guarantees, and financing of the incremental costs of switching technology, among other policy instruments.

Domestic resource mobilization

In the logic of a big push, increased public investment creates a matching amount of *new* saving, instead of drawing on *existing* saving. That higher level of saving, in turn, creates demand for new financial instruments, including the funding of public sector investments. However, this does not occur automatically, and financing gaps have to be filled. Governments must consider how their fiscal space can be expanded and refocused in order to meet their climate objectives without jeopardizing other goals. This is true of developed and developing countries alike, but the challenge is particularly significant in the latter.

In developing countries, on average, the tax revenue collected as a proportion of GDP is only two thirds of the proportion in richer countries, and a larger share is in the form of indirect taxes, as opposed to direct taxes on incomes, profit and capital gains. Tax administration is often weak and subject to evasion and abuse.¹⁹ In identifying the resources needed for low-emissions growth, developing countries should undertake fiscal reforms that enable a shift away from a reliance on trade and other indirect taxes, with a view to increasing progressivity and expanding the fiscal space.

On the expenditure side, many governments are being advised, on climate change-related grounds, to reconsider energy subsidies for low-income households. While removing energy subsidies for low-income households would have a narrowly defined fiscal benefit, both the climate impact and the single-minded focus on this subsidy are questionable. Faced with higher energy prices, low-income households have been known to substitute unpriced energy sources, such as firewood, with a negative impact on the environment and on their own productivity and standard of living.

Low-emissions financing strategies will require an ensemble of subsidies, tariffs and taxes, of which energy subsidies for the poor should be only a part. On the revenue side, equity considerations will also have to play a major role in generating the needed financing for low-emissions energy investment, and progressive approaches to taxation and fees should be key elements in a climate financing strategy.

A number of developing countries have witnessed growth in markets for government bonds in recent years. Issuance of “green bonds” to fund climate change programmes could be an additional financing tool, along the lines of war bonds, in some emerging economies, and they could be an attractive, safer haven for personal savings.²⁰ Government guarantees and tax breaks could also be used to channel savings into investments that reduce carbon use, including infrastructural investment, as is done in some instances in the United States municipal bonds market.

The scale on which “green” debt instruments can be issued depends in part on the sophistication of domestic financial markets and the overall debt burden of the country. Expansion of a market for such funds is ultimately contingent on the national government’s ability to raise tax revenues and to set the rate of return on domestic investment. Equity and development considerations are important on both fronts.

Public sector development banks provide an alternative funding channel for long-term investment in many developing countries. These institutions’ record is uneven, although they have played a particularly important

role in infrastructure development. At their best, they can encourage the development of complementary private financial institutions, and avoid excessive public sector risks and badly targeted interest-rate subsidies. In recent years, these institutions have been neglected in favour of private capital markets and public-private partnerships. However, in the absence of effective regulatory, policy and institutional frameworks, the private sector's record has not been satisfactory, particularly in financing essential utilities and services such as energy. In many cases, reforming and recapitalizing development banks will be important for a successful transition to low-emission development pathways.

International financing

The high-growth, low-emissions pathway described in this book will move developing countries toward self-sufficiency in financing investment, more rapidly than a conventional market-based scenario. In order to launch the developing world on that pathway, however, international support is indispensable for financing a “big push” of public investment in mitigation and adaptation.

International negotiations have agreed to provide such support on a number of occasions, but the reality has fallen far short of what is needed. At the UNFCCC negotiations in Cancún in 2010, the Parties agreed to establish a Green Climate Fund (GCF) that is expected to play a major role in international climate mitigation and adaptation finance, but they left its design, funding levels and governance to future negotiations.²¹ To date, the primary climate financing sources under the UNFCCC have been two grant-based adaptation funds administered by the Global Environment Facility (GEF), which rely on voluntary contributions, and the Adaptation Fund under the Kyoto Protocol, which became operational in 2009 and is primarily funded by a 2 per cent levy on transactions under the CDM. The GEF funds, which had disbursed a combined \$244 million to climate-related projects as of March 2011, have been particularly important because they can fund more risky projects and have demonstrated competence in working in countries that may not attract foreign investors either through the CDM or directly.²²

A second channel encompasses funds and programmes arising from the loans and grants of bilateral agencies, the largest of which is Japan's Hatoyama Initiative, which has pledged \$15 billion over five years, including \$4 billion from private sources.²³ As noted above, bilateral entities have

been the biggest funders of climate initiatives in recent years, with the top four entities providing \$13 billion in 2009 alone.²⁴

The third channel comprises existing multilateral development institutions, which include a variety of mechanisms with a climate-related component, and have set up several specific funds to provide loans, grants and concessional funding. These include the Climate Investment Funds of the World Bank, a \$6 billion multilateral initiative announced at the 2008 G8 meeting.

This emerging climate architecture is as unnecessarily complex as it is woefully underfunded. The array of funds and funding mechanisms lack adequate coordination, leaving many gaps and overlaps, and there is great uncertainty about the total level of funds that developing countries can expect to receive. In any case, the World Bank/UNDP Climate Finance Options platform notes that “current international funding dedicated to climate action in developing countries covers only perhaps 5 per cent of their anticipated needs.”²⁵

Scaling up climate financing will require finding more predictable multilateral sources. These could come, in part, from the sale of emissions permits or increased carbon taxes in donor countries, but more innovative sources will likely be needed. One option would be a joint, wide-ranging initiative to mobilize countries of widely varying situations to achieve internationally agreed development goals, with new, predictable financing mechanisms. A hallmark of this approach is global solidarity, with sources of finance coordinated internationally but implemented at a national level. Unlike traditional development financing approaches, which still depend on the political goodwill of rich countries, this would entail joint design and decision-making by developing and developed countries.

A GLOBAL INVESTMENT REGIME FOR THE CLIMATE CHALLENGE

While market-based approaches will need to be part of the solution, the key focus of a wider approach should be on making major investments to simultaneously address climate change, sustainability and economic development. Without significant financial transfers from wealthy countries, any expectation that poorer countries will move onto a low-emissions growth path is almost certain to be disappointed.

This investment-led approach seeks to change countries' development trajectory so they can meet their goals while reducing their carbon dependence. At the national level, and as part of a long-term industrial development strategy, public investment in mitigation and adaptation

activities needs to be scaled up. Energy provision is a central component of this strategy, but it is interlinked with transportation, water security and economic diversification (chaps. II and III). Industrial policy—understood not only as targeting and coordinating specific sectoral support measures, but also socializing investment risks, removing barriers to adopting otherwise profitable technologies, and supporting technological learning and upgrading—has a key role to play both domestically (chap. IV) and internationally (chap. V). A successful investment push along these lines would in turn increase productivity and reduce the costs of using new technologies, opening up further investment opportunities.

In comparison with conventional market-based mechanisms, which would likely be accompanied by structural adjustments, a globally funded public investment programme would promote equity by enabling the developing world to sustain catch-up growth through the mobilization of domestic resources, while making significant cuts in emissions (chap. I). Such an investment programme would utilise market mechanisms insofar as government policy provided clear signals to private enterprises about the next wave of investment opportunities, without relying on a single price-based intervention.

Efforts to develop an investment programme that combines development and environmental goals on such a large scale have been few and far between. One recent example of the success of such efforts, even more telling since it has been achieved by a developing country, is the establishment by Brazil of a sugar cane-based ethanol energy and transport system (see chap. IV, box IV.3). A historical example concerns an underappreciated component of New Deal policies in the United States of the 1930s, the Tennessee Valley Authority (TVA; see chap. IV, box IV.1). With support from the Rural Electrification Administration and the Reconstruction Finance Corporation, the TVA transformed the Southern states by lowering transport costs, reducing the risk of flooding and creating a low-cost source of clean energy (hydroelectric power) that not only directly raised living standards but also helped the region crowd in substantial private investment and create new jobs. What is needed this time around is a global TVA: the investment programme that can meet the climate challenge must be a truly worldwide project.

Elements of a global programme

Estimates of mitigation and adaptation costs suggest that up to \$1 trillion per year in new investments could be needed in developing countries to

be mobilized from domestic and international resources. The breakdown between the public and private sector will no doubt vary considerably across time and among countries. However, the initial push will depend heavily on the public sector, reflecting the need to front-load much of the required investment.

In this context, it is clear that there needs to be a radical shift in the existing system of funding for mitigation and adaptation efforts, including an expanded public investment component. A global approach to a publicly funded investment programme should be based on three elements:

- A development accord that recognizes equity as an integral part of a global response to climate change.
- Additional and substantially scaled-up financing to allow for climate action with greater urgency.
- Independent and participatory governance structures along the lines of the Marshall Plan.

A development accord

Equity is an essential ingredient of an effective global climate change policy, as reflected in the principle of “common but differentiated responsibilities and respective capabilities” in the UNFCCC. Not only have today’s high-income economies generated about 80 per cent of past fossil fuel-based emissions, but those same emissions have helped carry them to high levels of social and economic well-being. These countries carry the responsibility for the bulk of climate damage, but they also have the capacity to repair it. However, from a long-term perspective, limiting further damage also requires that developing countries shift their energy and land use and their consumption needs towards low-emissions options.

Compelling developing countries to cut their emissions at this stage, relying only on their own resources, would be inappropriate and unworkable; it would almost certainly freeze a pattern of income inequality that already exhibits intolerably wide gaps within and across countries. Catch-up growth and convergence remain fundamental policy priorities. Reconciling this with climate objectives is only possible if the investments that drive future growth assume a technological profile different from the one that drove the past growth of today’s advanced economies.

Some developing countries are already taking significant steps towards energy efficiency and cleaner energy sources, and are building multilateral support to finance further emissions reductions at an accelerated pace.

However, much greater investments are needed for global progress at the right pace and scale to meet both climate and development goals.

This will require additional multilateral financing, on an adequate and predictable scale, comprising grants, concessional loans and compensatory payments. In UNFCCC negotiations, developing countries have insisted that Annex II (high-income) countries have a clear-cut responsibility to provide additional financial resources to meet the full costs incurred by developing-country parties in complying with their obligations. Translating such responsibilities into tangible resources has been a major stumbling block, but the need will only grow over time.

Additional and substantially scaled-up financing

The existing model of official development assistance (ODA) is not up to the task of funding the climate challenge. More substantial and more predictable forms of financing will have to be found, and new mechanisms of resource mobilization will have to be considered.

An obvious starting point would be to insist that advanced countries meet their longstanding commitment to a target 0.7 per cent of GNP for ODA.²⁶ Developing countries have rightly expressed concerns both about treating climate commitments simply as aid and about the potential for climate-related funds to “crowd out” assistance for development goals. However, given the links between climate vulnerability and other development challenges, there is extensive scope for synergies if developed countries remain faithful to their ODA commitments. There is no shortage of institutions available to channel such funding, but new funding mechanisms may still be needed, for example, in the area of disaster management. The bigger challenge is likely to be one of coordinating the required expansion of ODA, ensuring consistency across funding sources, and reducing duplication and waste. This may require the establishment of a central agency to coordinate international adaptation funding and to provide some degree of coherence across programmes.

Problems with aid governance will also need to be addressed. The lack of transparency in the donor-dependent approach to the design of specific-purpose funds needs to be corrected; international cooperation should help integrate mitigation and adaptation in the national policies of developing countries under the “country-led and country-owned” principle. There is also a need to rationalise and minimize the proliferation of funding mechanisms. There are numerous specific funds administered by bilateral

agencies, which differ widely in purposes, size, time horizons and funding mechanisms. The “bilateralization” of multilateral aid should be minimized by coordination and integration of resources; for example, funding for reducing emissions from deforestation and forest degradation could expand by combining resources and approaches from different institutions.

Independent and participatory governance structures

At a time when international unity and coordination are needed, donor governments seem to have opted for a disjointed approach to climate change, at the expense of effectiveness, efficiency and equity. A global investment programme aimed at effectuating the shift to low-emissions, high-growth development pathways requires a governance structure that is able to pursue a focused and coherent agenda, prevents dominance by donor countries and provides for participatory decision-making on financial contributions and disbursements. Nicholas Stern has argued, on these grounds, that the climate challenge needs a new institutional architecture.²⁷

One major question concerns the management and allocation of financial resources. It is often argued that the World Bank and other multilateral development banks might be better positioned to scale up financing than a fund under the authority of the UNFCCC. However, these institutions have major limitations in the context of global environmental finance. For instance, the Climate Investment Funds administered by the World Bank have been criticised not only for their governance structure, which replicates the existing asymmetries of the Executive Board of the World Bank, but also for undermining the UNFCCC and for not being truly additional to existing ODA commitments.²⁸ Indeed, on their own assessment, multilateral development banks still are not systematically factoring climate change into their investment choices, and need to do more to ensure that all of their investments and lending operations take climate change into account.

Developing countries have also pointed out the injustice of having to borrow additional funds to switch to cleaner energy sources to address climate change, even though they have relatively little responsibility for the problem. This raises long-standing concerns for many developing countries about the role of development finance, including the privileged position of creditors in international financial negotiations, and the use of adjustment lending, through attached conditionalities, to constrain their policy options across a broad range of economic and social issues. They are concerned that housing any new financing mechanisms in the international financial

institutions would subject them to the same governance arrangements and conditionalities as have been imposed on previous loans from these institutions.

The creation of the Green Climate Fund only partly addresses these issues: on one hand, it is to be “accountable to and under the guidance of the Conference of the Parties,” with a 24-member board with equal representation for developing and developed countries. However, the World Bank has been chosen as the interim trustee, with a review after three years—a contentious decision opposed by several developing countries.²⁹ The establishment of the Green Climate Fund could still be an important first step towards the development of a broader institutional structure on global climate change financing. However, it also runs the risk of locking new financing into a donor-dominated, project-based approach, which would run counter to the arguments presented in this chapter.

Living up to the challenge: lessons from the Marshall Plan

Whatever the institutional details finally agreed to, the right model for meeting shared global challenges is still the Marshall Plan, as noted by Al Gore in his Nobel Lecture in 2007. The scale and urgency of the climate and development challenges warrant that kind of integrated emergency response. Moreover, part of the success of the Marshall Plan was that it bypassed the fledgling Bretton Woods institutions, which did not appear to be up to the job of fashioning policies and supporting institutional reforms attuned to local conditions. However, the Marshall Plan is not a blueprint which can simply be rolled out to meet contemporary challenges. Rather, it encompasses a set of broad principles which can be tailored to new circumstances and sensitivities. Despite the demonstrated success of the broad Marshall Plan framework in Europe in the 1940s, “aid” has developed over the years into a narrower mixture of assistance for specific projects and ad hoc responses to unexpected shocks, with little apparent coherence. Donor conferences are driven more by what donors want to promote than by the desire to support specific multi-year national programmes. It is difficult to see how aid can ever be really effective without an articulation of macroeconomic objectives and detailed programmes for infrastructure investment, a coherent account of priorities, and a sense of the necessary complementarities among different investments and projects.

National development programmes along the lines of the Marshall Plan would make it easier to provide general, non-project assistance to

governments or for financing the balance of payments. This was crucial for a number of European countries under the Marshall Plan. The need for assistance to deal with long-term imbalances is usually seen by international financial institutions as evidence of a weak commitment to reform. This was not the view of the Marshall Plan authors, who regarded such assistance as an investment in structural change and as providing governments with the breathing space required to ensure the success of difficult and often painful policies. Today, the structural changes implied by the shift to a low-emissions development pathway will likewise cause fiscal and current-account pressures even as long-run adjustments are realized. The same wisdom that informed the Marshall Plan should apply to climate and development.

Another major attraction of a Marshall Plan framework is that it can serve an important political function. A multi-year programme for achieving economic and environmental objectives, setting out their interrelationships, the means to achieve them and their dependence on outside assistance, effectively embodies a government's vision of the kind of societal structure at which it is aiming. Highly political in nature, a proposed programme would provide the basis for democratic discussion and negotiations. The task is not an easy one, but obtaining popular support for such a programme can be a major stimulus for change. This will not always result in what the international financial institutions regard as the "best" policies, but the advantage of democratic processes is that they generate pressures to correct mistakes.

The creation of a "new Marshall Plan" could thus be the means of providing a concrete operational basis for such ideas as "ownership" and "partnership", which otherwise risk degenerating into empty slogans. Moreover, a coherent national programme bolstered by popular support, indicating where outside assistance could be most effective, becomes a powerful vehicle for persuading potential donors to respond to national priorities instead of imposing other agendas.

CONCLUSION

In terms of the need to secure international cooperation, the climate financing challenge is substantial and daunting. It is clear that, while market-based and voluntary approaches will have an important role to play over time, they are inadequate for meeting the immediate financing requirements. The shift to a low-emissions, high-growth development pathway in the developing world is unlikely to be led by private sector investment and risk-

taking. Thus, more binding modalities of international cooperation must be pursued. The same limitations that hamper international cooperation in financing development apply to the response to climate change. In the face of this predicament, it is important to realize that the international community can overcome the two sets of limitations simultaneously by recognizing that a global investment programme directed towards climate change objectives also represents a key intervention in favour of development.

NOTES

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