Meeting the Climate Challenge: Using Public Funds to Leverage Private Investment in Developing Countries

Section 2 - Analytical framework: The case for public sector action

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2.1 Limits to private sector action

It is clear that action against human-induced climate change entails changes in resource flows throughout the global economy, reflecting changes in consumption patterns, the size and composition of public and private capital stocks and the extent of innovation. **A large-scale reallocation of financial capital compared with flows under 'business as usual' will be needed**, **especially in the energy sector**. Policy can steer capital away from high-carbon investments and channel it towards low-carbon development, at the pace required to avoid dangerous climate change. In so doing, it can stimulate a wave of investment and innovation at a time when both are sorely needed, while building the foundations for more resource-efficient and equitable growth over the long term.

Action also requires mechanisms to ensure that the global incidence of costs and benefits is fair and reflects the equity implications of international agreements. The resulting **resource flows need to be matched by corresponding flows of finance; if the financial flows are not forthcoming the necessary actions will be stymied**. It is clear, though, that the private sector alone is unlikely to finance fully such investments, because of uncertainties over their commercial viability arising from various sources.

One reason why the private sector may not expect a commercial return to low-carbon investments is **lack of confidence in the prospects for sustained carbon pricing**, regulations and standards. In other words, the likelihood of the future presence of a deep and durable market. This may stem from doubt over political will, institutional effectiveness or the belief that the climate change challenge is not urgent enough to galvanise long-term policy commitment. Even where credible policies are adopted to create new markets and the technologies become established, there may be some uncertainty over the scope to develop and deploy cost-effective infrastructure that will generate new revenues for private sector investors.

Some **other uncertainties**, such as those around fossil-fuel energy prices and new technology deployment, are likely to be less dependent on new policy initiatives and **more familiar to**

private sector investors. In these cases, investors ought to be more ready to bear the risks, suggesting that public finance should have a subsidiary role, being used to stimulating private finance and to taking on project risks associated with public policy, leaving private investors to take on traditional market risk[1]. Ideally, the element of risk associated with public policy will decrease as an appropriate regulatory framework is put in place, and as carbon markets develop and deliver predictable returns to emission reduction projects. In addition, once early demonstration projects are shown to be successful, the scope for further investment should rise substantially. **The proportion of private financial flows in emission reduction projects should therefore increase over time and levels of public support should diminish, as risk levels decrease**.

In order to develop new markets, Governments need to respond to private investors' desire for instruments to limit risks arising from uncertainties about government actions. Hence **this section will focus on the principles that should underlie government intervention**. Adhering to these principles should also reassure the private sector about the clarity and consistency of policies over time, thereby reducing uncertainty. In broad terms, **government participation in generating the necessary financial flows is warranted by three factors**: **market failures**, the need to establish the long-term **credibility** of climate-change policy and the obligation to achieve an **equitable distribution** of the costs and benefits of action.

This chapter will first explain why government intervention is necessary to promote private investments in emission reduction projects. It will then define a set of criteria that can be used to assess public sector mechanisms. Finally, it will define a set of public instruments that have the potential to stimulate additional private finance and assess their efficiency against the criteria.

[1] There may be instances where risk which is currently priced by markets is not entirely independent of government policy: for instance fossil fuel prices may be influenced by policies that favour renewable energy in the energy mix.

2.2 The economic case for government intervention

2.2.1 Tackling market failures

Action against climate change requires tackling a range of so called '**market failures'**, where, for a variety of reasons, markets are unlikely to generate the appropriate prices and trades without public intervention. The market failures relevant for climate-change policy are present in three key areas: the environment, innovation and finance.

► Market failures and the environment

One well-known source of market failure is the **existence of 'externalities**', which arise when people's actions impose costs on others who do not receive corresponding compensation or generate benefits for others who do not pay for them. The most important and pervasive externality is that imposed by GHG emissions. GHG emissions cause long-term damages and therefore impose costs on others all over the world, including future generations, and these costs are not recouped from the emitters. As a result, the private costs to emitters of investing in low-carbon technologies, plant and equipment, for example, are likely to exceed the private benefits, which may be zero. But the social benefits from avoided climate-change damages are larger than the private benefits to emitters, and, in the absence of strong climate-change mitigation policy, are often much greater than the social costs of the investment required to cut emissions. Hence without public intervention, there will be too little investment to reduce greenhouse gas emissions.

The textbook policy response in such cases is to **price the damage done and force the polluters to pay it, thus internalising the externality**. In this respect, action against human-induced climate change requires pricing of GHG emissions, preferably uniformly, both globally and across all sectors of the economy. The collective action required on the part of public authorities is the setting of the correct incentives. Emitting GHGs is currently free (for most activities in most countries) and subject to no limits. In order to reduce emissions, the Government must set either an emissions tax or quantitative limits on emissions (i.e. introduce scarcity) so that emitting GHGs will come at a price. The necessary financial flows should then be generated by the private sector in response to those incentives, assuming that they are credible and well-designed.

However, setting limits on emissions will not, by itself, incentivise private sector financial flows to developing countries. In this respect, global carbon markets are crucial because they commoditise emissions ($1tCO_2e$ = 1 credit/allowance) and to an extent allow regulated entities to use international emissions credits generated in developing countries for compliance. As a

result, global carbon markets could decrease compliance costs[2] while generating financial flows to developing countries. **Because markets take time to develop and establish credibility, carbon markets are unlikely to be sufficient to catalyse the scale of investment needed to reduce emissions quickly enough to avoid passing risky thresholds**. A number of additional externalities need to be tackled at the same time.

► Market failures, innovation and investment

Many types of knowledge have the characteristics of a public good – one firm using an idea does not stop another firm from doing so. Firms know that, in the absence of enforceable intellectual property rights, they can use knowledge without paying for its creation; in other words, there are spill-over effects. That tends to lead to underinvestment in the creation of knowledge, including R&D in the energy sector. Hence public support for such activities may be warranted. And **there are numerous problems arising from inadequate and unevenly distributed information**, which the public sector may be able to help solve by inducing, collecting and disseminating knowledge that would be under-provided by the private sector. Setting performance standards is an example of possible public participation on this front – for example, in dealing with behavioural barriers such as the weakness of incentives to improve home energy efficiency. According to McKinsey/Project Catalyst, approximately 1GtCO_2e of abatement opportunities in 2030 could generate financial savings in the future in excess of their initial investment costs, even without carbon pricing.

Another source of market failure affecting innovation is the **existence of network externalities**. Someone joining a network does not take into account the benefits that accrue to others from the expansion of network membership. Hence there is a tendency for the social benefits of investing in network expansion to exceed the private benefits considered by potential new members, especially when the network is just being set up to take advantage of a new technology. **Without public intervention, the market response is an underinvestment in expanding the network, as coordination between users and suppliers of the infrastructure can be hard to achieve**. This may apply to energy distribution networks. One current example is underinvestment in the development of a network of retail hydrogen for transport, due to the lack of coordination between users and suppliers. It may be easier for the public sector to set up the network and coordinate early membership, rather than for policy-makers to calibrate and apply the appropriate initial subsidies for joining.

A related source of market failure is the **exercise of monopoly power**. Certain types of energy infrastructure bear the characteristics of natural monopolies, where economies of scale can only be fully realised if industry ownership is concentrated and competition limited. But monopolists tend to under-supply and over-price their products, inhibiting the adoption of innovative products – a phenomenon exacerbated by the lack of competitive pressure to

[2] The Lazarowicz Report on Global Carbon Trading published in 2009 estimated that global emissions trading could reduce abatement costs by up to 70% in 2020.

innovate and the scope for managerial inefficiency. That warrants government regulation, especially where the alternative – breaking up the monopolies – loses important cost savings. The economies of scale may themselves arise from network externalities, so the public sector may need to regulate the behaviour of network members once they have been encouraged to join.

The current reliance on high-carbon technologies is the result of decades of investment in such technologies, during which time extensive learning by doing and other forms of induced technical change have lowered production costs. The relative efficiency of different types of technologies reflects past experience, which tends to lock economies into particular technological choices. There are many low-carbon technologies that are well understood but have not benefited from travelling along a well-trodden development. **The public sector can redirect the development path by supporting scaled-up development and demonstration of old and new low-carbon technologies**. This will generate learning and experience, which should induce future cost reductions for such technologies, eventually making many of them cheaper than current high-carbon technologies (even excluding the social costs from associated climate-change damages). But the initial costs of travelling the low-carbon instead of the high-carbon development path will be higher. That further underlines the need for early public intervention to reduce emissions cost-effectively over time by promoting investment up-front in new technologies.

Investment in low-carbon goods, services and technologies is also held back by market failures resulting from inadequate information flows. At the most basic level, there is widespread ignorance about the environmental consequences of different types of production processes and consumption patterns. That provides a rationale for public provision of the public good of information, whether it be in product labelling or in monitoring, reporting and verification of sectoral GHG emissions. There are also problems of asymmetric information, for example, when potential users of low-carbon technologies and products have less information about their overall characteristics than their providers. In some cases, this problem can be tackled by building the right incentives into contractual arrangements, which might include some role for generating and monitoring information by a third party – a financial intermediary or a public agency, for example.

► Market failures and finance

Financial intermediation, whether through institutions like banks or through markets for financial instruments, is central to the private sector's measurement and control of the risks associated with investment. But it is not immune to market failures either.

Network externalities, mentioned above in the context of energy distribution, are also relevant in financial markets. **The public sector may be best placed to help set up markets in new financial instruments related to a carbon price, enhancing price discovery and liquidity**, not least because that can provide market participants with more information about the public

sector's views about the appropriate trajectory for future carbon prices, helping implicitly reveal its commitment to low carbon policies and regulations.

In other cases, barriers to the effective functioning of financial markets are institutional. Without political stability, regulatory certainty and administrative simplicity, the perceived level of risk can undermine the incentives to invest in projects with large up-front costs. Reducing the perceived level of risk may involve high transactions costs. These institutional and transaction costs can make projects that appear viable according to standard emissions abatement studies unattractive in practice. For example, much of the investment needed to tackle deforestation will have to be deployed in emerging economies that may lack appropriate institutional infrastructure to entice risk-averse investors.

Inadequate information is often a source of significant uncertainties for lenders, who need to be able to monitor the performance of the projects that they are financing. The challenge is greater when the project requires a large amount of capital to be committed at an early stage. Financial intermediaries that specialise in such monitoring have evolved, but where project performance depends on future public policy, the public sector may need to play a direct role. And **when private sector financial intermediation is impaired by reduced risk appetite, heightened doubts about counterparty solvency and increased uncertainty about asset valuations – as it is at present – the public sector may be able to act as a financial intermediary of last resort**, depending on its own ability to monitor borrowers' performance and willingness to underwrite any shortfall. In some cases, Governments may have access to information not readily available to private agents, for example, about the political commitment of other Governments to particular climate-change policy objectives. And they may wish to underwrite risks to demonstrate their own commitment to achieving the goals of the project.

Recent experience also makes clear that market failures can cause severe macroeconomic downturns and financial crises. Inappropriate incentives facing financial institutions and information asymmetries in assessing asset values have conspired to trigger a widespread malfunctioning of financial intermediation. Putting that right and dealing with the consequences for credit and aggregate demand require public action – and in particular public finance. There is a strong case for additional deficit-financed public spending at present, because of the nature of the current global slowdown: it has been caused not by a supply shock like the oil price shocks of the 1970s but by a sharp decline in private sector demand growth that policy-makers did not even anticipate, far less try to consciously engineer.

It is clear that, **aside from the creation of a global carbon market to neutralise the externality created by GHG emissions, an array of policy measures will need to be adopted to tackle the range of market failures involved and to facilitate the necessary private finance flows**. Measures will be needed to deliver energy efficiency gains, to promote the rapid development, demonstration and deployment of low-carbon technologies and to stimulate new markets for low-carbon goods and services. Possible measures include improving and standardising metrics for building emissions; tightening building codes and fuel

efficiency standards; supporting smart grid infrastructure and intelligent urban planning utilising the latest technologies; extensive public procurement commitments; and the development of incentives for innovation, including robust intellectual property protection and new and expanded technology deployment funds.

2.2.2 Establishing policy credibility

A further reason for public participation is to demonstrate the commitment of policy-makers to announced policies, thus building credibility and strengthening the impact of incentives to alter private sector behaviour. As market failures are central to the problem of climate change, firms and households depend on collective action to correct them, primarily through political mechanisms. But national and local policy-makers' incentives are not necessarily aligned with the overall interest of the community – especially when the community in question is global and encompasses generations as yet unborn. Hence policy commitments that include financial or reputational incentives for Governments to achieve announced outcomes can enhance the credibility of the policies. Such commitment aligns the interests of policy-makers more closely with the interests of private agents and generates confidence in the stability of policy.

In the context of climate change, carbon pricing provides a good example. Private agents may be sceptical of policy-makers' commitment to pervasive and steadily rising carbon prices to tackle emissions, despite the widespread agreement that these should be an integral part of cost-effective policy against climate change. After all, carbon pricing hurts current domestic consumers (and voters) in the near term, while the benefits largely accrue well into the future and are spread across the world. But if public bodies enter into financial contracts that entail financial (and reputational) penalties to them if announced emissions reduction commitments are not met (e.g. by making coupon payments on a bond issue inversely related to the achievement of such targets), that would tend to reassure private investors that there was a genuine political commitment to act.

The key is to lower the risk associated with low-carbon investments and increase the expected payoff. The carbon pricing regime's longevity would be more credible, thus strengthening incentives to firms and households to make carbon-saving investments in long-lived assets, confident that such investments would generate a competitive private return. Their actions, in turn, would trigger higher investment in low-carbon technologies, larger and more liquid carbon markets, lower emissions and therefore higher likelihood for countries to meet their targets and increase ambitions on further emission reductions. **Ultimately, demonstrating that expectations for private returns are successfully met will generate further investments**. Public commitment and funding is crucial to kick off such virtuous investment cycles. The less uncertain the expectations of future private returns, the faster the cycles and, therefore, the shorter the period while public funding is required.

The worldwide nature of the externalities related to climate change implies that some form of policy action needs to be applied globally, be it at the national or international level. The stability of the regulatory framework or of the carbon price will depend on policies and behaviour across the world. This means that Governments' actions will work best if they are coordinated across countries to increase the credibility of the policy[3].

As policy makers around the world endeavour to build trust in this new market, it is of utmost importance that all market actors have full confidence in the market's ability to do what it has been created for: reduce emissions. **Public support will be required to develop the standards and deploy the technologies and institutions necessary for credible measurements, reporting and verification (MRV) of GHG emissions**. Market credibility depends on measuring compliance with national action plans and progress against the objectives of an effective international climate agreement. Credible MRV will ultimately require international data management and comprehensive verification facilities. Otherwise, markets will likely fail as projects and programmes lack the credibility required both to attract investment from the private sector and to politically justify the commitment of public funds by developed countries.

2.2.3 Equity

A third reason for public participation is that global climate change policy entails some redistribution of resources. In particular, **large flows of resources to developing countries are called for, given the historical responsibilities of industrial countries for most of the existing stock of GHGs in the atmosphere**. Without the prospect of such support, developing countries are unlikely to start reducing GHG emissions, severely limiting the scope for reducing global emissions to the required levels and at minimum cost. Much of the necessary flow may be generated between private-sector agents, for example, through carbon trading in cap-and-trade systems and the Clean Development Mechanism created within the Kyoto Protocol. However, consideration should also be given to ensuring that developing countries have the capacity to benefit and share in the gains from these investments.

Experience of past mistakes in the natural resources sector, which have given rise to the fear of a 'natural resource curse', can be helpful in identifying mechanisms that can be put in place to

[3] The development of durable and profitable markets will be difficult in the absence of business expectations of secure and credible policy frameworks. This requires a common understanding of the climate change challenge and the likely drivers of a large-scale transition to a carbon constrained world. Public resources invested in furthering such an understanding of the climate change challenge are key to establishing the necessary political will to make carbon finance work. For example, the relatively small sums invested in the work of the IPCC, analyses such as the Stern Review (2007) and the Garnaut Report (2008) may well ultimately stimulate billions of dollars of private investment through their role in increasing business awareness and garnering the political will to design appropriate regulatory and policy frameworks. Without a robust evidence-based analytical foundation for understanding the science, economics and ethics involved, it will be hard to win the necessary political, financial or commercial commitment to a cost-effective transition to a low-carbon economy.

ensure that wealth and opportunities are created locally. **Potential solutions include working with local businesses, institutions and expertise to develop joint ventures by building local skills and supply chains, and transferring technological know-how in order to stimulate local absorptive capacity.** Public funds may therefore be necessary in this context to assist with projects and activities in developing countries that are likely to generate a social return well above the private return, given the limited fiscal capacity and thin capital markets of many developing economies. Several proposals for funds to finance the preservation of rainforests in the tropics are in this category.

Another aspect of equity relevant to climate change is **fairness towards future generations**. It can be argued that market interest rates are a poor guide to the discount rates that society would like to apply to climate-change damages suffered by future generations (see Stern 2008, AER and Pindyck 2009, NBER WP 15259). That raises the question of whether public subsidy of long-lived investments in climate-change mitigation is warranted.

2.3 What Governments should not do

This section has built the case for public sector intervention to support the changes necessary around the world to fight climate change. But it is important to recognise that **each intervention needs to be considered carefully to ensure that it is commensurate with the problem at hand and does not have undesirable side effects through changing incentives or introducing unnecessary market distortions.** For example, establishing a credible, long-term framework for pricing GHG emissions should in itself be sufficient to generate a lot of profitable opportunities for emissions abatement investments by the private sector. Governments need to be careful not to crowd out these opportunities. People in the private sector are likely to have more information about technologies and other aspects of investment projects, and be in a better position to manage them; public sector actions should not muffle the incentives for the private sector to do well what it can in principle do better than the public sector.

Governments should also refrain from undertaking financing commitments or other policy actions that undermine public support for the overall policy goal, for example, because their benefits are opaque, or perceived to be unfairly distributed, or achieved at the cost of fiscal discipline. And to build credibility, government actions need to avoid behaving inconsistently over time – which is not easy given that a government cannot bind its successors. Criteria for assessing proposed public sector financing mechanisms in the light of these strictures are discussed further below.

2.4 Criteria for public sector mechanisms: ensuring efficiency and public accountability

Earlier in this section we made a case for public sector finance as a component of the financial flows necessary to support action against climate change. However, efficiency and public accountability should not be neglected: they are important in their own right but they also underpin public support for climate-change policy and the long-term credibility of the policy framework. Resources need to be used in a cost-effective way and not wasted as a result of poor policy design or rent-seeking behaviour. Hence specific proposals for public financing flows need to be guided by the motivating principles set out above, but also judged against criteria of efficiency and accountability.

2.4.1 Appropriate risk allocation

As in any commercial decision, **the private sector should be prepared to pay where it expects to reap a competitive risk-adjusted return**. However, when the risk is related to whether the policy environment will be altered, the public sector may need to bear it, or at least demonstrate that it will suffer some cost if policy-makers renege on their commitments. **The role of the public sector should be limited to risks associated with market failures, the credibility of the policy and the equity concerns**. Once these risks are removed through public intervention (for instance through debt guarantees, or public-private risk sharing arrangements), it is the role of the private sector to judge whether the expected risk-adjusted rate of return on a project is sufficient to warrant an investment. **To go beyond this would be inefficient: the financing capacity of Governments is limited and raising debt or taxes incurs deadweight losses.** These are likely to become very important constraints on the Governments of industrial countries in the next few years, because of the rapid increase in fiscal deficits and contingent liabilities as a result of the recession and the near-collapse of the global banking system. Given that many of the regulatory challenges are likely to disappear as a functioning carbon market becomes established and other market failures are addressed, mechanisms for public intervention should be temporary and Governments should be in a position to withdraw them gradually without creating winners and losers.

That points towards the desirability of generating complementary private financing flows where possible – for example, where at least some of the returns to action can be captured by the private sector (e.g. where patents can be used to internalise the returns to investment in new ideas). UNEP estimate that **almost 90% of the capital investment to decarbonise the global economy between now and 2050 will come from the private sector**[4]. It is important to notice, as was mentioned earlier, that the challenge in climate change policy is complicated by the fact that many of the risks associate with the regulatory framework are international: it is harder for one Government to commit credibly to a stable policy framework in isolation: wider

[4] UNEP Finance Initiative Climate Change Working Group, *UNEP Green Paper on Financing a Global Deal on Climate Change*, 2009.

cooperation across Governments, for instance through bodies such as the G20, or commitments and risk-bearing by supranational agencies, may be necessary.

2.4.2 Alignment of incentives

The incentives of Governments and private investors may not be aligned. The virtuous cycles, where the private and public sector generate rapid change and investment at scale, are only possible if Governments and private investors face similar incentives. If, on one hand, Governments face tough political monitoring or financial penalties for not delivering a stable regulatory framework and, on the other hand, private sectors actors face market or shareholder pressure to deliver returns on their investments in emission reduction projects, then they will be in the best position to work together. This is ultimately going to be determined by how contractual arrangements affect the distribution of risk and return to the various parties involved. Do they provide the right incentives for the different parties involved?

Related to this test, how is the use of the public funding flow to be monitored? Policy-makers have to be subject to monitoring by those on whose behalf they are supposed to be acting, to reduce rent-seeking and increase the likelihood of commitments about future policy actions being fulfilled. Monitoring requires clarity of policy objectives and transparency about the actions taken to achieve them. It is often argued that government bodies are neither the best qualified nor the best incentivised to monitor the performance of funding recipients. That points towards the desirability of some degree of private-sector co-funding, so that private agents better positioned to monitor the relevant projects are provided with a financial incentive to do so, thus reducing the risks of underperformance – one of the arguments for public-private finance initiatives. Credibility can be further enhanced through the establishment of an officially mandated institution with powers of independent and objective oversight, and against whose findings Governments can be held to account. An example of such an institution is the Climate Change Committee in the UK, which was established under the Climate Change Act, and reports to the UK parliament.

2.4.3 Scale, scope and usability

Given the scale of the challenge, it is important that tools to use public finance are able to generate the large scale of change required. This should not be limited to generating sufficient private finance flows and investment, but should entail generating the policy developments and the capacity on the ground necessary to deliver complex projects at scale. A key element of concern here is **the administrative simplicity of the proposed mechanisms: financial instruments need to be simple and administratively nimble, so that investors or private sector agents can understand them quickly and use them easily within their organisations**.

2.4.4 Political acceptability

Political acceptability demands that these tools or instruments be regarded as an acceptable use of public money given the political conditions. They must also be acceptable in the context of a global deal on climate change. This criterion therefore relates both to the public budget liabilities related to the additional spending and to the conditionality and MRV requirements for developing countries which may be associated with some of the project finance instruments – particularly the ones related to offsetting.

In terms of the additional public spending, an important consideration is should the public component of flows be financed by issuing debt or raising current taxes? **The current prospect of fiscal retrenchment is a salutary reminder of the need to consider whether public funding is better financed by raising taxes or by issuing debt**. The standard argument is that debt is to be preferred when the social returns accrue over the longer term rather than just to the current generation of tax-payers. The costs are shared with the future generations who have to pay the debt interest and amortisation of the borrowing through higher taxes in the future. When market failures are being corrected, the benefits normally accrue over the longer term, so debt finance is appropriate. The same is true for investment in long-lived capital. But if the finance flow is designed to facilitate income redistribution or payments for goods and services for current consumption, tax finance is more appropriate. A further consideration is that, if capital markets participants start to doubt the willingness or ability of Governments to repay their debts at par, the cost of capital to Governments will rise, making debt finance less attractive relative to taxation. Of course, the incidence and incentive effects of increased taxes also have to be considered.

It will be crucial to ensure that whatever instruments are used, they are designed in the wider context of the economic policy of Governments. **Regardless of source, the most effective finance mechanisms must aim to complement national policy instruments such as laws and regulations, taxes, subsidies and market mechanisms and work with the collaboration of existing institutions**. The overarching role of public finance tools will be to help commercial financiers act within a national policy framework, sharing risks where the private sector is initially unwilling or unable to act on its own. Many of the market failures and barriers limiting international investment in developing countries – for example a lack of access to long-term capital, high transactions costs or a lack of experience with new technologies – are common to a range of infrastructure development projects (water, drainage, sanitation, transport) and are not limited to low-carbon investments. Low-carbon development schemes and financial instruments will need to build upon and work in partnership with existing non-carbon development financing designed to open new markets to private and institutional investors.