69976

Insurance Instruments for Adaptation to Climate Risks: Linking Policy Agendas

Joanne Bayer, Peter Hoeppe, Eugene Gurenko and Lorenz Petersen

This paper springs from a recent expert workshop on *Insurance Instruments for Adaptation to Climate Risks: Linking Policy Agendas*, which took place at the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria, Sept. 24-5, 2007. The workshop was organized jointly by IIASA, Munich Re, the German Agency for Technical Cooperation (GTZ) and the World Bank.[*] It provided a forum for participants from the climate-change, development and donor communities, including the private sector, to share ideas and experiences on supporting insurance-related instruments as a strategy for adapting to climate change. Participants were asked to address three issues, namely (1) the viability of public/private insurance systems that genuinely serve the poor and that contribute to the reduction of vulnerability to losses, often called climate adaptation; (2) the role of private, public and international institutions in providing insurance instruments within and outside the post-Kyoto adaptation regime, and (3) the potential for linking climate-change and development agendas. The meeting identified opportunities and constraints for supporting insurance instruments in the developing world, including risk pooling and transfer, through public/private partnerships. The workshop was organized as part of the activities of the Munich Climate Insurance Initiative (MCII) and the EU integrated project on Adaptation and Mitigation (ADAM).

This document is based on the motivation, discussion and ideas stemming from this workshop. There is no attempt to comprehensively summarize all the participants' views on the issues discussed, and the authors take full responsibility for the content of this discussion. It is hoped that a continued dialogue will contribute to designing options for enhancing insurance as an adaptation strategy within and outside the UN post-Kyoto regime.

[*] Full financial support for the workshop was provided by Munich Re and GTZ.

1. Introduction

Adaptation to climate change, alongside the requisite reduction of atmospheric greenhouse gas emissions, is now recognized as an essential part of the climate-change response. Postponing serious mitigation will exacerbate the need for adaptation, and in many cases make adaptation impossible. At the same time, significant climate change impacts are inevitable, not only if current international commitments on mitigation are realized, but also under more ambitious post-2012 mitigation targets. Adaptation is thus a concern for all countries, and particularly to highly vulnerable countries in the developing world, many of which are already experiencing impacts, particularly from increased climate variability and extremes.

The impacts of weather variability and climate extremes on economic well-being and human suffering have increased alarmingly. Developing countries suffer the most: In the past quarter century over 95% of disaster deaths occurred in developing countries, and direct economic losses (averaging US$54 billion per annum.) as a share of national income were more than double in low-income versus high-income countries. The indirect losses can be equally devastating. Due to limited tax bases, high indebtedness and low uptake of insurance, many highly exposed developing countries cannot fully recover from slow- and sudden-onset disasters by simply relying on limited external donor aid. The prevention of losses, and financial instruments that expedite recovery, are viewed as essential to eradicating poverty and achieving the Millennium Development Goals. Pro-active disaster risk management, what is increasingly viewed as climate adaptation, is thus high on the agendas of governments, international financial institutions, development organizations, NGOs and other stakeholders.

With the advent of novel mechanisms for pricing and transferring catastrophe risks to the global financial markets, insurance instruments have emerged as a promising opportunity for developing countries in their concurrent efforts to reduce poverty and adapt to climate change. Recognizing the critical role that private insurance, as well as public/private social insurance systems, have played in Europe, the US and throughout the developed world, and recognizing the responsibility of developed countries to support climate-change adaptation in the developing world, there is a pressing need to examine climate-risk insurance as an adaptation strategy.

In what follows, we discuss recent initiatives for providing catastrophe insurance to farmers, households and governments in highly exposed developing countries. As an alternative to providing aid after disasters, we show how insurance – by pricing risks – can be a powerful instrument for promoting adaptation. Being careful not to distort price signals, nor to crowd out private insurance initiatives, we argue that public/private partnerships backed by international capital can be instrumental, even essential, in enabling insurance in developing countries. Finally, as a practical way forward, we suggest the creation of *regional insurance and adaptation facilities* (beginning with an African facility). The purpose of these facilities is not to provide insurance to farmers, households or governments, but rather to channel international capital to support private and public/private initiatives by providing, among other services, technical support,

hardware (such as weather stations), facilitation of pooling and accessing reinsurance, and absorbing upper layers of risk.

2. Insurance instruments

In addition to the well-known risk financing instruments of insurance and reinsurance, Many additional instruments have recently emerged making use of rural, domestic and international financial markets. There are important examples of securitizing disaster risk in the financial markets by issuing catastrophe bonds, issuing weather derivatives for flood and drought exposure and using contingent credit arrangements for financing a government's post-disaster liabilities.

Financial arrangements that spread disaster losses among those most at risk, and including support from those not at risk, can make a difference in the lives of vulnerable people in developing and emerging-economy countries. For example, many Mexican farmers face double exposure to fluctuations in crop prices and natural catastrophes that in a very bad year or consecutive years can force them to migrate to the slums of Mexico City, where they face even higher risks. Pre-disaster or ex ante financial arrangements that spread crop losses, temporally and spatially, have the potential to smooth and secure their livelihoods. Likewise, financial arrangements that transfer and spread catastrophe risks facing governments can make a huge difference in the economic development of vulnerable countries. If governments do not have the necessary infusion of capital after a disaster to rebuild critical infrastructure and assist households and businesses with their recovery, the indirect costs can greatly exceed the direct losses from the disaster. Such delays can also lead to secondary economic and social effects, such as deterioration in trade, budget imbalances and increased incidence of poverty.

While market instruments for financing risks have great potential for developing countries, there are also associated costs. Keeping in mind the huge burden in terms of lives, livelihoods and asset losses that disasters impose on developing country victims, the return on preventive investments must be weighed against the return on investing in financial instruments. This point cannot be overemphasized. In low-income countries, the opportunity costs of risk-financing instruments can be prohibitively high in terms of meeting other human needs, and there may be less costly informal alternatives, like relying on kinship networks. Moreover, it is important to examine the incentive effects that any financing approach has on preventing disaster losses.

In sum, insurance and other financial instruments have great potential for reducing the burdens of weather and other disasters in developing countries, but the benefits and costs – and their distribution - must be weighed against those accruing from preventive and other risk-management measures. In other words, it is important to view insurance instruments as part of the portfolio of risk-management measures that reduce vulnerability to weather and other shocks.

3. Emerging insurance schemes in developing countries

Insurance plays an increasing role in developing countries. Novel and imaginative programs are already demonstrating their potential to pool economic losses and smooth

incomes of the poor facing weather variability and climate extremes. These schemes provide insurance to farmers, property owners and small businesses (micro scale), as well as transfer the risks facing governments to the global capital markets (macro scale). A few examples serve to illustrate:

- In *Malawi*, smallholder farmers can now purchase affordable weather derivatives based on a rainfall index. By making farmers more creditworthy, this pilot loan/insurance scheme enables farmers to purchase hybrid seeds, and thus greatly increase their productivity, even lifting them out of the poverty trap;
- Similarly, herders in *Mongolia* can purchase an index-based insurance policy to protect them against livestock loss due to winter *dzuds and other causes*. A recent pilot program combines self-insurance, market-based insurance and social insurance. Herders retain small losses that do not affect the viability of their business, while larger losses are transferred to the private insurance industry and only the final layer of catastrophic losses is borne by the government with backing from the World Bank.
- In the past, the World Bank has also financed layers of *Turkey's* earthquake risk to enable the TCIP – a specialized catastrophe insurer – accumulate reserves and ensure stability of premium rates. This is the first time ever that the international development community has provided pro-active risk-financing support to a developing country.

Similarly, at the macro scale:

- The World Food Programme has issued a novel parametric weather derivative to assure sufficient funds to the *Ethiopian government* to protect the livelihoods of Ethiopia's vulnerable populations who are at risk to severe and catastrophic drought. This insurance instrument holds large promise for supporting institutions that have traditionally provided humanitarian assistance;
- The *Mexican government* is the first to issue a catastrophe bond to partly insure its catastrophe fund and thus reduce its risk of large fiscal deficits following disasters. This is another novel instrument making it possible to transfer sovereign catastrophe risk directly to the world's capital markets;
- The *Caribbean island states* have recently formed the world's first ever multi-country catastrophe insurance pool**,** to provide governments with immediate liquidity in the aftermath of hurricanes or earthquakes. There is a largely untapped potential for pooling uncorrelated country risks of country governments ill prepared to respond to disasters with their own means.

For the most part, these risk-pooling and risk-transfer programs directly or indirectly target the poor and vulnerable, and without exception they have received technical and/or financial support from international development and donor organizations, making them a viable alternative to post-event aid.

In many cases it is also valuable to support systems serving mainly the middle class, like the Turkish Catastrophe Insurance Pool (TCIP) that target property owners and the Caribbean insurance pool that provides capital to governments to finance immediate

liquidity needs. The provision of start-up expertise and capital can greatly facilitate the launch of these programs.

Experience is too short to determine if these internationally backed public/private systems are viable in the long haul, but as pioneering "test balloons" (and some are beyond the testing phase) they may radically change the way the "North" provides disaster aid and supports adaptation to climate change. Despite their promise, insurance reaches only a small fraction of vulnerable communities and governments; for instance, over 40% of farmers in the developing world face weather-related food scarcity, and yet those benefiting directly from micro-insurance systems number in the thousands. Similarly, many highly exposed developing country governments do not have the means to finance the recovery costs of catastrophic disasters, and could greatly benefit from transactions, like those in Ethiopia and Mexico. Least-developed countries can hardly afford the technical analyses and other start-up costs for insurance systems. Scaling up will prove costly, especially since disaster risks, unlike health or accident, affect whole regions at the same time and thus require spatial diversification, reinsurance and/or large capital reserves.

International reinsurers are absorbing the low-probability/high-consequence layers of many recent public/private programs, for example, in Turkey, Ethiopia and Mexico. They have been reluctant, however, to commit significant capital and underwriting expertise to developing micro-insurance programs, but this is changing. For instance, Swiss Re in partnership with an NGO and academic research institute, has insured about 150,000 smallholder farmers in Kenya, Mali and Ethiopia against drought through a parametric product. The indices are based on a mix of satellite and weather data. The insurance is purchased by the internationally backed NGO, and other partners are being solicited to provide further financial support.

There are scattered examples of micro-nsurance schemes that offer catastrophe cover without outside support. These schemes are viable due mainly to very low cover. For example, a large MFI, Proshika, offers compulsory group-based disaster insurance to its clients in Bangladesh. Under this program 2% of the savings balance is annually transferred to a fund that will pay twice the amount of the savings deposit in the case of property damage due to disasters, while savings stay intact. The scheme operates without reinsurance or donor support. With more than two million clients in 20,000 villages and 2,000 slums, this insurance fund has wide geographic diversification. As another example, the WINCROP (Windward Islands Crop Insurance) program offers insurance against windstorms affecting banana crops for 13,000 smallholder banana growers in four Caribbean countries. For a premium payment of 5% of sales, cover amounts to 20% of deliveries. his program, however, is operating with a large deficit and has unsuccessfully requested government support.

4. Insurance and adaptation

Insurance can be a powerful instrument for promoting adaptation to climate-related risks, but only with well- designed products and systems.

In the context of weather variability and extremes, adaptation can be thought of as reducing vulnerability of households, businesses, farms and governments. This can take many forms, including:

- physical interventions, e.g., flood defenses;
- lifestyle changes, e.g., relocating or changing livelihoods; or
- strategies for recovery, e.g., formal and informal pooling or hedging arrangements.

Insurance has the potential to promote each of these adaptation measures. Most directly, insurance actually reduces long-term losses from disasters by providing *ex post* liquidity that enables governments and households to invest in reconstruction and recovery. This indirect effect – which ultimately can save livelihoods and lives - can be as significant as physical measures in reducing losses and vulnerability. More indirectly, but importantly, insurers provide information – and build local capacity - on the risks necessary for each of the above adaptation strategies.

The verdict is still out whether insurance leads to cost-effective physical interventions or lifestyle changes that reduce vulnerability. However, there is no doubt that if an insurance contract incorporates incentives to reduce risks, then it is an improvement over the current ad hoc model of financial post-disaster assistance, which discourages investments in adaptation: governments and individuals, expecting support, have little incentive to invest in precautionary measures. In comparison, insurance products impose a "price" on their clients, which if designed properly (i.e. flexibly to account for preventive actions) can create incentives to engage in loss-reduction activities, or adaptation.

Critics rightly point out that insurance can also discourage investments in loss prevention or adaptation. Poorly designed insurance contracts (for example, not risk based and without deductibles) can weaken (rather than strengthen) the price signal, and the insured may take less preventive measures or even negligent actions (moral hazard). Moreover, the strength of the insurance price signal will depend on the extent of outside aid or subsidies. Finally, many insurers are reluctant to adjust premiums to reflect loss-reduction measures. Thus, moral hazard, external assistance and insurer behavior may weaken the incentive effect of insurance.

Many examples both pro and con can serve to illustrate: Many insurance systems do not reward preventive behavior at all. The Proshika scheme, as a case in point, provides incentives to increase savings, but disincentives to reduce risk. Such schemes may perpetuate vulnerability because they make it possible to remain in high-risk occupations or locations. Alternatively, apartment owners in Istanbul, who choose to disaster-proof their properties pay (in principle) less insurance premium, although the system is not fully risk based. Mongolian farmers can only gain by taking measures to protect their herds against adverse winter weather since insurance claims are based on average livestock loss in designated regions. In Thailand, designers of the parametric flood insurance system anticipate that middle-class property owners will relocate out of the high-risk areas (Alex, is this right?). As these examples show, moral hazard is absent altogether with parametric, index-based systems that do not base claims on actual losses.

While index insurance discourages "bad risks", it can paradoxically encourage "good risks". In Malawi, for example, the insurance contract has enabled farmers to plant riskier but higher yield crop varieties. Not only does insurance smooth the incomes of farmers facing weather variability, but it actually provides them the safety net necessary for riskier and more productive activities - ultimately reducing vulnerability to weather shocks and thus contributing to adaptation. This point cannot be overemphasized. One participant at the Laxenburg meeting has this to say about the Malawi index insurance project:

> We want farmers to adopt high return technologies that allow them finally to make the leap and accumulate earnings over time. Systemic risk is **the** factor impeding this and so far banks cannot handle the risk and the high transaction costs in rural areas. The Malawi transaction shows that there is a sustainable way to take the big rocks out of the way—drought risk—and clear the path to development.

This same "investment effect" operates at the national level. Insured governments can reassure outside investors that disasters will only temporarily disrupt critical infrastructure, thus creating a more secure environment for attracting international capital.

In sum, insurance internalizes the risk of taking risky behavior and, in relation to ex post disaster aid, it encourages more preventive behavior. However, moral hazard, external assistance and insurer behavior may reduce this incentive effect. Because of the absence of moral hazard, index-based systems are particularly promising as instruments for adaptation. Moreover, by providing *ex post* liquidity that enables governments and households to invest in reconstruction and recovery, insurance directly contributes to vulnerability reduction, or adaptation.

5. Public/private partnerships

There is a large potential for private insurance for climate-related risks in developing countries; yet, the private market alone cannot fulfill the needs of many of the poor and vulnerable in highly exposed regions.

In Malawi, for example, the premium for the loan/insurance package can easily be paid by the five-fold foreseen productivity increase; however, extending cover to provide security against drought-induced food scarcity (livelihood insurance) would be largely unaffordable for Malawi's smallholder farmers. This risk cannot be covered by the private market acting alone, and is currently absorbed by post-disaster emergency food programs on the part of the World Food Programme, FAO and other donors. Emergency food assistance, while currently indispensable for humanitarian reasons, not only disrupts local food markets, but gives farmers little incentive to diversify crops or even their livelihoods, activities that render them less vulnerable to droughts.

The reluctance of the private market to commit its capital and expertise to serve the poor and vulnerable (those who cannot pay for the unavoidable risks to which they are exposed) can be overcome by forming internationally backed public/private partnerships (partnerships with insurers, governments and NGOs, with support from bi-lateral and multi-lateral development/donor organizations).

In Mongolia, the under-developed insurance industry is protected against extreme losses by a syndicate pooling arrangement backed by the government, which, in turn, can call upon the World Bank contingent debt to pay for really catastrophic losses. In other words, the government and World Bank absorb a portion of the risk, protecting insurers and ultimately reducing premiums to affordable levels. As other examples, international experts have provided valuable technical assistance for estimating risks and setting up micro-insurance programs in Malawi and Thailand. The new initiative by Swiss Re (Climate Adaptation Development Programme) relies on a partnership with an internationally funded NGOs and academic institutions. The reinsurance and catastrophe bonds that transfer risks from Mexico and Ethiopia to the international capital and reinsurance markets were made possible by outside technical support from IFIs and other types of start-up assistance. The same is true for the largely self-financing Caribbean Catastrophe Risk Insurance Facility (CCRIF), although, here too, donors have pledged significant capital to the reserve fund.

Advantages of public/private insurance systems

There are many advantages to reorienting from providing post-disaster aid to enabling public/private insurance systems. As a start, by sharing responsibility with individuals and the state, donors leverage their limited budgets and substitute a calculable annual commitment to a risk-transfer system for the unpredictable granting of post-disaster aid. With donor-supported risk-transfer programs, developing country governments will rely less on debt financing and international donations, and assured funds for repairing critical infrastructure will attract foreign investment. For many, an insurance contract is a more dignified and secure means of coping with disasters than dependency on the *ad hoc* generosity of donors. According to a participant at the Laxenburg meeting:

Most importantly, by making this assistance contingent on requirements or incentives for prevention as part of a comprehensive risk management program, pre-disaster assistance can ultimately reduce the human and economic toll disasters take on the poor. This means that switching to pre-disaster donor aid, even at extra cost, can be an efficient long-term strategy because of its potential to reduce the need for humanitarian assistance.

Challenges of public/private insurance systems

Despite compelling arguments for public/private partnerships, there are legitimate concerns that excessive public and international support can distort market prices and greatly jeopardize the incentive effects of insurance, crowd out private initiatives, and create unstable systems due to the inability of donor institutions to make long-term commitments.

Critics rightly point out that subsidized premiums in the US farm insurance program have weakened incentives to plant more robust crop varieties, or to move away from farming in high drought or flood risk areas. If the intent is to provide transfers to the poor, it is argued, it is far better to compensate them directly rather than subsidize insurance premium.

Tempering this argument, however, is the fact that even donor-supported insurance has a greater incentive effect than the current practice of free public assistance to disaster victims. While there is a great deal of concern about distorting prices and thus giving the wrong signals for adaptation, it is also important to keep in mind that risk markets may not be operating optimally and thus prices may already have distortions. Donors can compensate for price distortions by linking their support with vulnerability reducing measures (note, however, that DFID and other donor agencies are moving away from contingent aid). The challenge is thus to design incentive compatible public/private programs.

Incentive compatible subsidies

Subsidies (in a broad sense) can take many forms, including assistance for developing the insurance products, absorbing layers of risk, and directly paying or reducing premiums. One creative idea is to provide support for public/private systems only to the point that premiums do not fall below the "real risk" price, or expected loss. Insurance premiums are often significantly higher than expected loss for many reasons, including high administrative and capital costs incurred by insurers to provide the cover. These "frictional costs" can be several multiples of the actuarially fair value or real risk price. Donors could subsidize premiums and provide other means of support to eliminate the frictional costs but maintain the real risk price, which arguably is the proper signal for the insured to reduce their vulnerability or adapt. This idea, however, will not address the issue that many poor households are exposed to unavoidable risks to which they cannot pay even the real-risk price.

A related concern is that public or international involvement in the provision of insurance will impede the development of the private market. Although private insurers and re-insurers are constrained in their ability to offer world-wide catastrophe risk coverage, there is still concern that public assistance will crowd out private operations. In the words of a participant at the Laxenburg meeting:

> Providing support for the high layers of risk, like in the case of the TCIP or Mongolian insurance systems, can greatly jeopardize markets. Pouring aid in at the top has a "sausage effect": it will come out at the bottom with strong distortions of market prices. Although my business stands to gain by climate-related aid, I'm terrified of it! (Richard, I'm sure I put words in your mouth. Please change in any way to reflect what you meant)

Of more immediate concern is public/private partnerships that unfairly advantage some private companies over others, or crowd out competing private companies altogether. While partnerships, like the TCIP, actually create an opportunity for the private market to carry out business, there is danger that by offering deep premium subsidies ill-conceived public-private partnerships may prevent private companies from entering the market. This issue underlines the importance of recognizing three distinctly different market opportunities: (i) targeting those who can afford sufficient cover for the risks to which they are exposed, (ii) targeting those who can afford a small contribution (in some cases, very small) but cannot pay the full risk-based market price (pure risk premium plus frictional costs), and are unable to "move out of harms way" or otherwise reduce their risks to an affordable level. A third category, namely (iii) those with no assets or

livelihoods, or who cannot pay even a small premium. It is clear that this last category is not eligible for insurance and will remain fully dependent on post-disaster humanitarian assistance.

Insuring those who can and cannot afford the full cost of cover

The Malawi loan/insurance package, the Turkish Catastrophe Insurance Pool and the Caribbean Catastrophe Risk Insurance Facility are good examples of insurance systems that target those who can afford the risk-based premium. In all cases, the product is kept affordable partly by limiting cover: in Malawi, the insurer will reimburse only the cost of the seeds; in Turkey, the TCIP will cover up to $60,000 of damage that accrues to mainly middle-income property owners; and expected cover in the Caribbean is sufficient to address the liquidity needs of the government in the first few months following a natural catastrophe. International organizations have a role to play in this market, but it should be limited to providing access and ensuring competition, for example, by providing assistance for establishing the product (the most difficult aspect of setting up the CCRIF.. was negotiating an agreement among governments), enabling access and setting up regulatory structures. In other words, internationally backed public/private partnerships should take utmost care to ensure unimpeded competitive market conditions.

Examples of insuring those who can afford a small premium but cannot pay the full risk-based market price include the Mongolian Index-Based Livestock Insurance Program and the Indian weather risk derivatives crop insurance program.. Herders in Mongolia can afford only very limited premium (or interest) payments, insufficient to attract private insurance capital. Only outside support (donors or others "buying" part of the product) can create an attractive market for private insurers in the first several years of the program.

In sum, we can identify two principles to guide the formation of public/private partnerships that provide weather and other hazard insurance in developing countries:

- Targeting those who can afford the price of insurance, internationally supported partnerships should be limited to ensuring conditions for private insurance provision through competitive markets;
- Targeting those who cannot afford sufficient insurance cover, internationally supported partnerships can legitimately intervene with financial and other support, but care should be taken not to significantly distort prices or competition. This can be achieved by designing highly socially targeted insurance products that serve only the designated segments of the population.

6. Linking insurance and climate-change agendas

The above discussion suggests a qualified case for internationally backed public/private partnerships that enable the provision of catastrophe insurance in the developing world. The case may be strengthened by climate change, which is now recognized as a potentially significant driver of weather variability and extremes.

With the emergence of climate change on political agendas, the discourse on disaster assistance and food security has also changed. In addition to land-use and other local practices, weather disasters are increasingly viewed as intensified by the emissions of greenhouse gases on the part of northern-hemisphere countries. The Intergovernmental Panel on Climate Change (IPCC) has predicted that climate change will increase weather variability as well as the intensity and frequency of climate-related extremes. There is even some evidence of a current "climate signal" with the IPCC (2007) reporting observations of long-term and widespread changes in wind patterns and aspects of extreme weather including droughts, heavy precipitation, heat waves and the intensity of tropical cyclones.

In accordance with the climate convention's principle of *common but differentiated responsibilities*, there is a legitimate, and growing, claim for Northern support of risk management practices, including insurance, aimed at reducing vulnerability to climate variability and extremes in the developing world. According to a participant at the Laxenburg meeting:

> Northern-hemisphere countries have a moral obligation to support climate-related insurance systems in the "South". By analogy, consider a downstream community that faces higher insurance premiums because an upstream community is cutting trees and thus increasing the intensity of floods. Would it not be fair for the upstream community to bear some portion of the increased premiums?

The question is not so much the apportionment of responsibility, but how to compensate those who bear the burdens? From a market perspective, it is more efficient (less price distorting) to compensate the victims via direct financial transfers. However, in the climate debate there is little political will for compensatory mechanisms, which means that providing financial and other forms of support for insurance systems may be the only approach receiving consensus from the convention delegates. Article 4.8 of the United Nations Framework Convention on Climate Change (UNFCCC) requires Parties to consider actions, *including insurance*, to meet the specific needs and concerns of developing countries arising from the adverse impacts of climate change (United Nations, 1992, emphasis added).

An issue (among many) hampering implementation of Article 4.8 is the unresolved issue linking climate change to weather risks in the developing world.

Climate change: loading the odds

Scientists cannot attribute any particular storm or other event to a changing climate, but they can present evidence on the contribution of climate change to the risk of climate variability and extremes. By way of analogy, if we throw a "loaded" die and "six" appears, we cannot ascertain whether the "six" is due to loading, or not. We can only say that the probability of throwing a "six" is increased. If we throw the die a thousand times, we can estimate with great confidence how much the load is changing the odds. We don't have a thousand years to make this same estimate for climate change. Scenario models can help, but until we can attach probabilities to scenarios, we cannot make good

estimates. Some evidence is emerging, however. Recent analyses show that the effects of human-induced climate change could account for up to 30% of the expected future increase in cyclone losses, but this estimate is based on many assumptions behind scenario modeling (Pielke, 2007). I think he is from some US University

> How much human-induced climate change increases losses from weather variability and extremes, today and in the future, remains highly inexact. While this scientific impasse can daunt efforts at compensating for climate-change losses, it should not discourage efforts at supporting insurance and other risk management efforts. More important than the exact estimation of "additionality" is the growing consensus that greenhouse gas emissions will contribute, and possibly significantly, to weather-related risks in the developing world. Because adaptation to "normal" climate is, at the same time, adaptation to climate change, the current dialogue on adaptation increasingly refers to climate risks as opposed to climate-change risks.

7. Moving ahead

With the advent of novel mechanisms for pricing and transferring the risks of floods, droughts, typhoons and other weather extremes to the global financial markets, insurance instruments are emerging as a promising opportunity for developing countries in their concurrent efforts to reduce poverty and adapt to climate change. Yet, they will serve the poorest and most vulnerable only with an infusion of outside expertise and capital. This is both an opportunity and challenge for the post-2012 adaptation regime, and outside the UN convention process.

Parties to the climate convention, as well as many other stakeholders, should address this opportunity and challenge with a global strategy for making affordable insurance instruments available to farmers, small businesses, households and governments of highly exposed developing countries. This strategy would be developed and implemented collaboratively with governments, the private insurance industry, international development institutions, NGOs and other partners. There are convincing reasons for putting such a strategy into place, and quickly.

To begin, in light of Northern countries' contribution to climate risks in the South, supporting insurance instruments may be a practical way to apply the climate convention's principle of *common but differentiated responsibilities*. Providing ex post liquidity that enables governments, households and businesses to invest in reconstruction and recovery – and quickly get back on their feet - insurance reduces long-term losses from disasters. It also smoothes income streams thus enabling poor farmers, herders and others to invest in higher productive, but riskier, activities. In some poor countries, insurance is often the only way to ensure that the payments are made to the real victims of natural disasters. These are just a few of the ways that insurance reduces poverty, vulnerability and, at the same time, contributes to adaptation. Insurance instruments can also provide incentives to actually reduce immediate and direct losses with physical interventions and lifestyle changes, but only if they do not themselves encourage negligent behavior.

Many difficulties, however, confront the development of a global strategy for insurance in the developing world. There are legitimate concerns that excessive public and international support will distort market prices and greatly jeopardize the incentive effects of insurance, crowd out private initiatives, and create unstable systems due to the inability of donor institutions to make long-term commitments. The challenge is thus to design sustainable, incentive-compatible programs that provide products to clients who cannot be served by the private market, and to support the private sector in providing affordable products.

Another difficulty within the climate adaptation debate, is determining the contribution of climate change to risks of weather variability and extremes, today and in the future. Although some evidence is emerging, estimates remain highly inexact. This scientific impasse can daunt efforts at compensating for climate-change losses, but it should not discourage efforts at supporting insurance and other risk management efforts.

As one concrete proposal, regional climate insurance and adaptation facilities could be created to meet these challenges. Regional facilities would *not* directly provide insurance to households, farmers or governments, but as multi-donor operations they would offer capacity building and financial support to nascent micro- and macro- disaster insurance systems, like those now operating in Malawi, Mongolia and the Caribbean. Other proposals include a global facility to insure public infrastructure losses of highly exposed, least-developed countries. This insurance would be contingent on the government implementing a risk management program. Still another proposal would pool country risks at the global level, and claims would be settled through debt forgiveness.

There are many pros and cons to these proposals; yet, it is important to move ahead with concrete ideas, and these ideas should be fully aired in a dialogue among stakeholders. It is hoped that this document, based on discussions in Laxenburg, September, 2007, will contribute to this dialogue and to tackling the challenges of providing security against severe weather in the developing world. Linking the agendas of development and climate adaptation for this purpose has the potential to bring the needed capital and expertise to this challenge. It is hoped that a continued dialogue will contribute to designing options for enhancing insurance as an adaptation strategy within and outside the UN post-Kyoto regime.

Selected literature (incomplete, participants please add relevant publications to this list)

Bals, C., S. Butzengeiger and K. Werner, forthcoming, “Insuring the Uninsurable: Design Options for a Climate Change Funding Mechanism”, in *Climate Policy*, E. Gurenko, ed. Special Issue on Insurance and Climate Change.

Gurenko, E., 2004, *Catastrophe Risk and Reinsurance: A Country Risk Management Perspective*, London, Risk Books.

Hess, U. and J. Syroka, 2005. *Weather-based Insurance in Southern Africa: The Case of Malawi*, Agriculture and Rural Development Discussion Paper 13, Washington DC, The World Bank.

Höppe, P. and E. Gurenko, forthcoming, “Scientific and Economic Rationales for Innovative Climate Insurance Solutions”, in *Climate Policy*, E. Gurenko, Ed. Special Issue on Insurance and Climate Change.

Linnerooth-Bayer, J., M. J. Mace, and R. Verheyen, "Insurance-Related Actions and Risk Assessment in the Context of the UNFCCC," Bonn: UNFCCC Secretariat (2003).

Linnerooth-Bayer, J. and R. Mechler. "Insurance for Assisting Adaptation to Climate Change in Developing Countries: A Proposed Strategy." in *Climate Policy*, E. Gurenko, Ed. Special Issue on Insurance and Climate Change (forthcoming).

Pielke, Roger

World Food Programme, 2005, *Pilot Development Project – Ethiopia Drought Insurance 10486.0*, Projects for Executive Board approval, WFP/EB.2/2005/8-A, Rome.