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AID VOLATILITY AND MACRO RISKS IN LOW-INCOME COUNTRIES

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PREFACE

Low-income countries (LICs) are more volatile than richer ones. On top of external shocks due to commodity prices or of those arising from natural disasters, foreign aid is also a volatile component of the resources of the poorest countries. As documented in this Development Centre report, aid does not have a clear counter cyclical pattern, as would be desirable to help smooth economic shocks. The problem is not that aid delivery is intrinsically unpredictable. The report argues that aid delivery is fairly timely and generally in line with promises. The problem has more to do with the fact that it depends on projects whose time horizons for conception and implementation are quite variable.

This Development Centre report argues that a number of policy tools exist that could cope with this situation. Taking the example of IMF instruments, it shows how the Fund's lending instrument to the LICs – the Poverty-Reducing and Growth Facility (PRGF) – could be tailored to help countries absorb the shocks they are facing. The PRGF is a lending instrument with a ten-year maturity and a five-year grace period. Following the example of the Agence Française de Développement (AFD), the report suggests turning it into an instrument with no initial grace period. A five-year floating grace period would be available instead, which the country could use whenever it was hit by a shock. The shock could be defined as an export shock, a GDP growth shock or as an aid shock (or a combination of the three). As in the AFD example, the shock can be defined as an episode where current flows are more than 5 per cent of a five-year moving average of the underlying variable (exports, GDP or aid). In the case of foreign aid, one alternative consists of measuring the shortfall as a deviation from an average of disbursements expected to be forthcoming over the next five years. The report simulates how such a modification would have performed over the life of the PRGF loans or their predecessor, the Enhanced Structural Adjustment Facility (ESAF). It shows that aid shocks would have been the predominant trigger of such a facility. Overall, this change in the repayment schedule would have improved significantly the responsiveness of IMF instruments to the temporary financing needs of the borrowing countries.

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ABSTRACT

The report argues that aid volatility is an important source of volatility for the poorest countries. Following a method already applied by the Agence Française de Développement, the report argues that loans to LICs should incorporate a floating grace period, which the country could draw upon when hit by a shock. The definition of a shock should include aid uncertainty, along with others such as commodity shocks and natural disasters. The idea is calibrated to a key IMF policy instrument towards Low-Income Countries, the Poverty-Reducing and Growth Facility (PRGF).

Key words: Low-Income Countries, volatility, aid, IMF.

RÉSUMÉ

Le rapport montre que l'aide aux pays pauvres contribue à accroître la volatilité de ces pays. Suivant une méthode déjà élaborée par l'Agence Française de Développement, l'article propose d'accorder des crédits aux pays pauvres, qui incorporent un droit de grâce flexible, utilisable par le pays, lorsqu'il est confronté à un choc négatif, quelle qu'en soit la cause : choc d'aide, de prix des matières premières ou catastrophe naturelle. Il montre comment l'instrument utilisé par le FMI à destination des pays pauvres, le PRGF, pourrait être modifié pour ce faire.

JEL Classification F 34 F 35
Mots clés : Pays Pauvres, volatilité, aide, FMI

I. INTRODUCTION

There is a strong economic case for developing insurance instruments for low-income countries (LICs). Economic growth in LICs is more volatile than in richer ones, about twice as much. This has been amply documented in a number of studies, which suggest that volatility results from a variety of sources, including the weak institutional and policy environment that limits the ability to respond to external and domestic shocks and mitigate their economic impact (see the survey by De Plaa *et al.*, 2004). Yet it is remarkable that, as estimated in a recent paper by Koren and Tenreyro (2007), about half of the growth volatility in LICs stems from purely exogenous factors, such as the fact that poor countries are specialised in economic sectors which are intrinsically more volatile. The magnitude of the impact of exogenous shocks underscores the potential value of financial instruments to provide a measure of economic stability for LICs on a sustainable basis.

The three major sources of exogenous volatility in LICs are terms of trade (both export and import prices), natural disasters and – surprisingly – aid flows. Over the past 30 years, LICs have suffered a significant terms-of-trade shock once every 3.3 years on average. These shocks can be quite significant, with a direct effect estimated at close to 7 per cent of GDP, and an indirect effect – largely through income channels – that perhaps doubles the total impact. Although the most dramatic toll of natural disasters is in the loss of lives and population dislocation, the economic impact is also significant. Estimates of direct losses exceed 4 per cent of GDP on average for countries in sub-Saharan Africa (see Becker *et al.*, 2007). But indirect effects can also be sizable in this case. For example, it is estimated that a large decrease in rainfall in a given year increases the probability of a major armed conflict by over 10 per cent one year later, after controlling for country-specific factors (Miguel *et al.*, 2004).

Although precise measurements are difficult, there is more than suggestive evidence that international aid does not contribute to reducing instability in LICs, and may even be a source of additional volatility itself. Global assistance to poor countries in response to exogenous shocks has been primarily *ad hoc* in nature, and displays large volatility (Bulir and Hamann, 2003). More importantly from a macroeconomic vantage point, this volatility does not arise because aid flows are counter cyclical; if anything, evidence suggests that aid flows are mildly pro-cyclical. Finally, we show in this paper that aid flows do not have a clear counter cyclical pattern, as would be desirable to help smooth economic shocks.

From a policy perspective, it is important to distinguish two types of instruments: insurance and credit. Insurance instruments include catastrophe (cat) bonds and other types of disaster insurance coverage, as well as derivatives that hedge commodity price risk. Credit instruments are counter cyclical credit lines that make funds available when negative shocks hit.

Although loosely referred to as "insurance", the latter instruments create debt, and are in fact a form of self-insurance. It is important to understand that market insurance and self-insurance differ in key ways, even if they are two strategies that pursue the same objective. If a country purchases insurance (say by issuing a cat bond or taking a derivatives position that hedges against a drop in the price of a commodity export) it will receive an assured payment that offsets, albeit imperfectly, the loss suffered in the event of a disaster or if the price of the commodity falls. In contrast, by resorting to borrowing the country can spread over time the cost of the shock but it still suffers the full extent of the loss. The optimal choice between buying insurance and borrowing (or self-insurance) depends on many factors. Broadly speaking, disaster insurance is more desirable the larger the possible loss (in terms of GDP, say), the lower the cost of insurance, and the higher interest rate the country pays when it borrows. Even if the insurance premium exceeds expected loss, as it normally does, when the expected loss is large some degree of insurance coverage would be advantageous. This is analogous to the case of a consumer who finds it advantageous to purchase home insurance even though the insurance premium exceeds the expected loss, as is normally the case.

Experience suggests that markets are effective in providing hedging and insurance instruments but are not well suited to supply counter cyclical loans for sovereigns, which are a natural function of the international financial institutions (IFIs) or public donors. However, most of the attempts at developing "country risk" credit instruments – with, so far, limited success – have been focused on emerging market economies, such as the Contingent Credit Lines (CCL) at the Fund and the Deferred Drawdown Option (DDO) at the World Bank. The only instrument of this type tailored to LICs that we are aware of is the recent Agence Française de Development (AFD) loan.

The AFD loan provides the borrowing country with the option to defer payments when a bad shock occurs. The loan defines the bad shock as an export shock, whereby current exports fall below a moving average of past values. AFD loans used to have a ten-year grace period, a length that was not justified by the economics of the loan and that gave governments the implicit sense of receiving a grant. The new loans reduce the initial grace period to five years, and allow countries to postpone payments every year that the export drop criterion is met, up to five times (see Cohen *et al*., 2008, for details).

We explore the possibility of applying the new AFD loan approach to the Fund's and the World Bank's lending instruments for LICs, the Poverty-Reducing and Growth Facility (PRGF) and International Development Association (IDA) loans, respectively. PRGF loans have a ten-year maturity and a five-year grace period. Mimicking the new AFD loan, the five annual grace periods could be made available only in response to the occurrence of an economic shock[1]. IDA loans have repayment terms that can reach 40 years, with a ten-year grace period. Here again, the repayment schedule could include five grace periods, contingent on economic shocks. These

1. Note that, given that PRGF repayments may not be large enough to mitigate the impact of external volatility to a desirable degree, a new instrument could be designed for strong performers, for example PSI-eligible countries. These countries could draw on predetermined lines of credit with access determined automatically by the occurrence of economic shocks.

shocks could be export earnings, import prices of certain goods (food, in particular), the occurrence of natural disasters or aid shortfalls. In the last case, some prequalification may be necessary to avoid cases where the aid shortfall is in fact the response to governance problems in the recipient country (although in practice this is not the primary source of aid volatility). Below, we explore how these terms would have worked in practice for shocks affecting export earnings, GDP growth and aid flows, defined in different ways.

The use of insurance and hedging instruments by LICs can also play an important role in cases of high vulnerability to commodity prices and natural disasters, with due consideration of cost and other factors affecting the desired mix of insurance and credit instruments. Cost, however, can also be managed along with the desired exposure by following strategies that sell part of the possible upside to cover the cost of insuring against a loss. We provide some illustrative examples in which the development of risk management strategies could be supported by the IFIs through technical assistance and asset management services, and donors could provide grants to help finance the cost of the instruments.

It is important to distinguish between aid volatility and aid predictability, as these concepts are sometimes confused. Aid flows may vary a lot from year to year because projects require lumpy disbursements, or even for macroeconomic reasons, if aid flows are in part motivated by the need to offset the underlying volatility that the recipient countries experience. A different issue is whether aid flows are predictable, in the sense of being delivered as expected. Predictability is thus more important than volatility. The degree of predictability of aid shown by the data, however, depends heavily on which source is used. Donors' data indicate that aid is delivered reliably, in the sense that project completion rates are quite high after a few years. From the point of view of aid recipients, however, data suggest that aid does not arrive in the schedule and amounts that are expected. For example, Celasun and Waliser (2008) find that there exists a wide discrepancy between the volume of aid that is expected by a country and the amounts that are disbursed, by comparing the budget projections that are included in IMF programmes with the amounts of aid that are eventually disbursed. This discrepancy reaches a huge 1.5 per cent of GDP on average.

The case of aid related to the occurrence of natural disasters is an important case in terms of the volume of the resources involved and the frequency of the events. There is broad agreement on the need to provide international relief after natural disasters, regardless of the particular financial and political conditions in the country. Yet the ability of the aid agencies to provide support is often limited by the current-year budgetary resources and by commitments to other ongoing projects. We suggest that the situation could be improved by resort to market insurance instruments such as catastrophe bonds and reinsurance contracts, and supplementary financial assistance by the Fund to cover the residual risk and to advance funds to the aid agencies themselves.

II. MARKET INSTRUMENTS

Financial markets are well placed to provide instruments that could help LICs to manage risks emerging from two of the three sources discussed in this paper: commodity prices and natural disasters. While it is true that coverage may be expensive or not available for the whole range of possible occurrences and maturities, it would seem that markets provide plenty of opportunity to improve risk management compared with a position where the country uses no coverage against macro risks.

A. Hedging Commodity Price Risk

Many countries are heavily exposed to commodity price risk. For example, in countries where export and national income are highly dependent on one commodity export, government revenues – and sometimes fiscal solvency as well – tend to be overwhelmingly determined by the commodity price. Moreover, a drop in the commodity price can affect the economy more broadly, triggering a domestic recession, a deterioration of access to global financial markets, and possible domestic banking distress.

Those downside risks can often be hedged by resorting to financial instruments. For example, the country could enter forward contracts that would guarantee export prices for a future period. From the point of view of the policy maker, however, such hedging may be considered excessive because it implies that the country would not benefit from any price increase in the future, something that may not be popular with voters. Alternatively, the country could seek to insure against a sharp drop in the commodity price by purchasing a put option with an exercise price that is below the current price by some desired margin. But this strategy requires a payment up front of the "insurance premium" (the put option) which again may be politically problematic. A third strategy would be to use part of the upside potential in the commodity price to pay for the coverage of the downside risk. There are many strategies to achieve this, as discussed in detail in Lu and Neftci (2008). The simplest strategy is to create a portfolio of a long put option and a written call option (a "collar"). More generally, it is possible for a commodity exporter to hedge any portion of the range of possible prices and to maintain exposure to the remaining part of the distribution[2].

2. Naturally, an entirely analogous strategy would apply to the case of a commodity importer wishing to hedge its price risk.

Example: An Oil Exporter

Consider the case of an oil exporter with a payment obligation of USD 100 million one year hence, who will receive oil export revenues which, at today's price, are enough just to cover this obligation. If oil revenues fall short, the sovereign will have to resort to distortionary taxation or other costly means to raise revenue. It is then reasonable to assume that the payment involves an increasing cost function, such as:

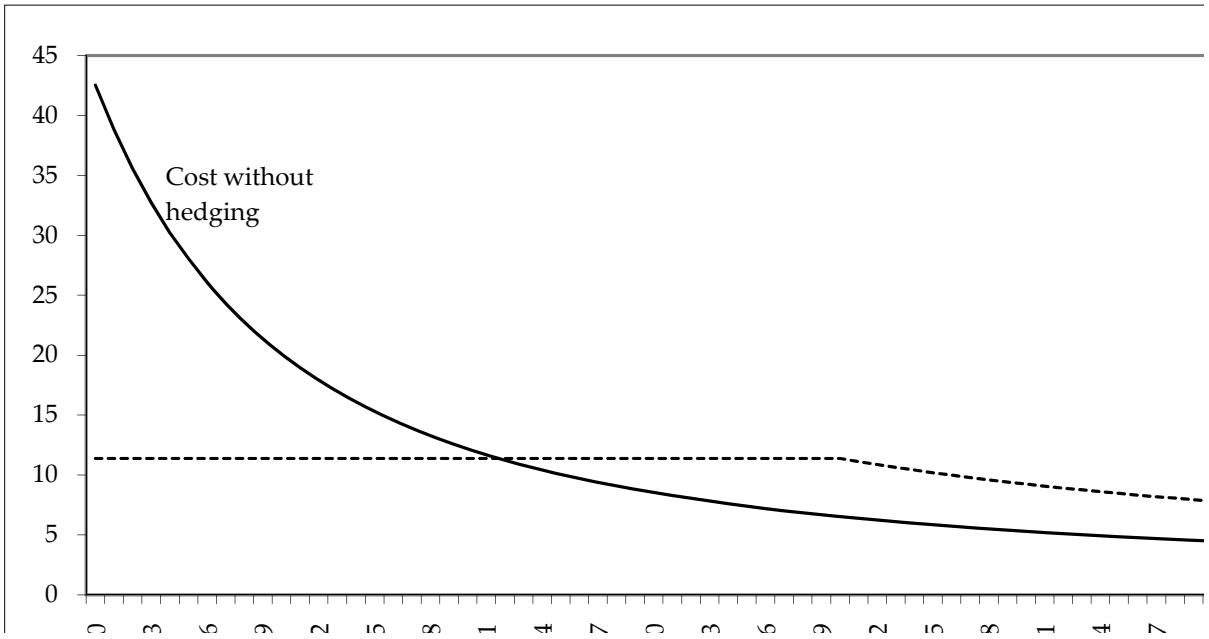
$$F(P) = \exp(\alpha \frac{\$100m}{P})$$

where P is the price of oil one year hence. Let us assume that P = 100 today (an index number)[3]. A one-year put option with an exercise price of 80 will have the following value at maturity:

$$\begin{array}{ll} 80 - P & if \ P < 80 \\ 0 & if \ P > 80 \end{array}$$

such that, if the country purchases this option, it will ensure receiving an oil price of at least 80 one year hence. Figure 1 plots the cost of this hedging strategy as a function of the price of oil at maturity, assuming a value of one for α, and that the option is priced according to the Black-Scholes formula, with a volatility of 16 per cent for the oil price.

Figure 1. **Hedging Oil Price Volatility with a Put Option**



Note that the hedging strategy implies a higher cost for the country at higher oil prices, relative to the case of no hedging. In this case, the country has to bear the cost of a put option

3. Note that, although the specific form of the cost function is arbitrary, it is natural to assume an increasing, convex functional form, either because of increasing economic costs or risk aversion. A linear form would correspond to the case of risk neutrality, in which the risk of deeply negative outcomes does not really matter.

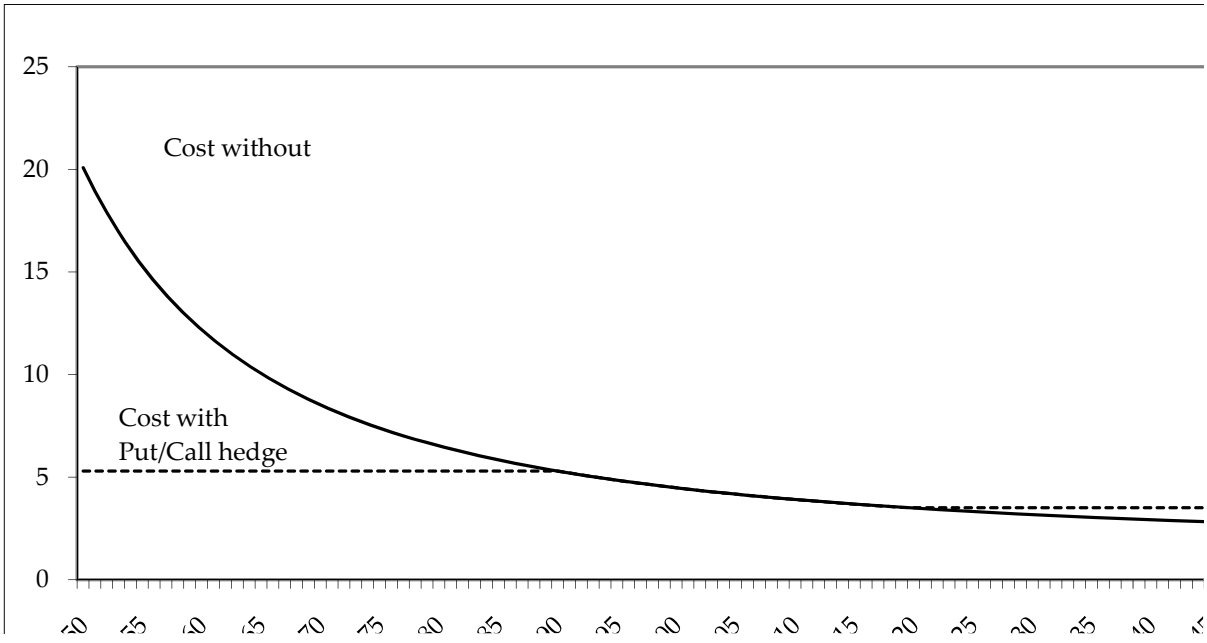
that is out of the money and does not pay off. By contrast, at oil prices lower than the exercise price, the country benefits from the hedge, and the distance between the two lines illustrates the tail risk that is avoided.

Assume now that the country follows a collar strategy, buying a put option with strike price K^P to obtain protection against a large fall in oil prices, and writing a call option with strike price K^C, giving up part of the upside in prices to offset the cost of the put. The value of this portfolio, at maturity, will be equal to:

$$\begin{aligned} & K^P - P && \text{if } P < K^P \\ & 0 && \text{if } K^P < P < K^C, \quad \text{and} \\ & -(P - K^C) && \text{if } P > K^C \end{aligned}$$

Figure 2 plots the cost of this strategy, where the strike prices have been chosen to offset exactly the cost of the put and call options under the assumption that options are priced according to the Black-Scholes formula.

Figure 2. **Hedging Oil Price Volatility with a Put/Call Option**



The country is effectively limiting the range of variability of oil prices to the red segment in the centre. Note that implementing this strategy or other similar ones requires the availability of liquid instruments with exercise prices that may be far from the current spot price of the commodity. This requirement may limit the ability to implement these strategies in some cases, for example when the government would like to obtain coverage only for extreme values of the commodity price or when derivatives on the commodity of interest to the country are not traded in international financial markets as widely as oil derivatives.

B. Insurance Against Natural Disasters

Natural disasters can have a major macroeconomic cost for LICs, especially for smaller countries. Such economies are more exposed to these risks because of lower geographical diversification, a higher percentage of the population living in exposed areas, and high dependence on natural rainfall and benign weather conditions for their agricultural production. Although precise estimates of direct and indirect costs of disasters are not easily available, the palpable effects in terms of property loss are often devastating. According to EM-DAT, a disaster database created by the World Health Organization and the Belgian government, two hurricanes that hit Belize in 2000 and 2001 caused damage equivalent to over 30 per cent of GDP each, and impaired public debt sustainability (Borensztein *et al.*, 2008); the earthquake that hit El Salvador in 2001 had a direct cost of over 10 per cent of GDP. In addition to direct property damage, natural events can cause large losses in agriculture and GDP. The drought that affected Malawi in 1994 caused a drop in agricultural output of almost 30 per cent, and a fall of over 10 per cent in GDP.

Moreover, climate change is likely to increase the frequency and/or the severity of extreme weather events. The Stern Report, for example, anticipates an increase in the frequency of severe floods, droughts and storms. Likewise, the Intergovernmental Panel on Climate Change (IPCC), a scientific body sponsored by the United Nations, expects an increase in the intensity and duration of droughts. The panel also expects tropical cyclones (including hurricanes and typhoons) to become more intense with increases in sea surface temperatures[4].

Natural catastrophes often have devastating effects, particularly in low-income and small countries. Financial markets can help these countries to insure against extreme weather risks. Although relatively unexploited so far, a variety of insurance instruments now provide an opportunity to hedge almost any natural disaster risk. Even less extreme events can involve enormous indirect costs. Drought has been linked to higher incidence of armed conflict in low-income countries, essentially through its effect on economic growth and poverty. (Miguel *et al.*, 2004). It is estimated that a large decrease in rainfall in a given year increases the probability of a major armed conflict by over 10 per cent one year later, after controlling for country-specific factors. No other factor has been found to have an impact of this magnitude on the probability of emergence of civil conflict in LICs, including ethnic diversity, level of income and level of democratic development.

Faced with this catastrophe risk, LICs tend to rely on foreign aid or some form of self-insurance. Aid relief, however, can be unreliable, and may arrive too late. Moreover, the amount of international aid provided seems to depend on the extent of exposure of the disaster in the news media. A recent study concluded that the news exposure of natural disaster in the US media is associated with the probability that the US Office of Foreign Disaster Assistance (OFDA) would issue a declaration of disaster, which triggers the provision of relief (Eisensee and Strömberg, 2007). The situation may be similar in other countries, as a result of the fact that aid agencies operate under fixed annual budgets, and providing more relief funds would require

4. There is some disagreement within the scientific community, however, on whether the total number of tropical cyclones (of various intensity levels) will increase or decrease.

cutting back other ongoing or committed programmes. Only when strong political pressure is brought to bear, for example as a result of extensive coverage in the news media, the agencies may agree to undercut other ongoing projects.

Another option, particularly for countries that have better access to private financial markets, is to resort to borrowing when a disaster occurs or to self-insure by accumulating resources in dedicated funds. These strategies, however, can be problematic. If the macroeconomic impact of the disaster is large, it will affect negatively the economic prospects of the country and increase the cost of external finance or shut off access to international markets. Also, experience with self-insurance funds has generally not been successful, as they tend to be insufficient or, when the resources reach substantial levels, the funds are often appropriated by the government for other uses.

Another option, largely unexploited so far by emerging economies and low-income countries, is to resort to market insurance instruments. Over the past decade, the market for global catastrophe reinsurance has grown strongly in volume and variety of financial structures, although its geographical coverage has expanded only to a limited degree.

The global reinsurance market is the segment of the market where countries can seek coverage for their exposure to natural disasters. Reinsurance companies cover risk assumed by primary insurers, who write policies to households and companies. In addition, securitisations, such as catastrophe (cat) bonds are means to lay off risks on the capital markets. Cat bonds are typically issued by reinsurance companies to lay off certain risks, but sometimes they are issued by primary insurance companies or the insured party itself, such as a government or a public entity. Although still relatively small, cat bonds have been growing fast in the past few years, reaching a total capitalisation of about USD 12 billion as of the third quarter of 2007. Overall reinsurance activity is harder to estimate, but market sources put it at about USD 150 billion.

Although most cat bonds and catastrophe reinsurance contracts are concentrated in a handful of major perils, there has been a widening of the covered events over the past two years.

The major perils – US wind, US earthquake, European windstorm, Japanese earthquake and Japanese typhoon – account for about 90 per cent of the total market volume. Recently, a wider set of countries has started to seek disaster coverage, including Australia and New Zealand (wind), and Chinese Taipei (earthquake). A handful of cat bonds have been issued by governments to cover the budgetary expenses arising from the disasters, which include relief operations and infrastructure repair. For example, in 2006, FONDEN, the Mexican government agency charged with providing relief for natural disasters, placed instruments to cover earthquake risks in three at-risk areas for total coverage of USD 450 million. The operation comprised a direct contract with a reinsurance company and two cat bonds. In 2007, the World Bank launched a regional disaster insurance facility to provide coverage against hurricane risk for 16 Caribbean nations, the Caribbean Risk Insurance Facility (CCRIF). The countries purchased disaster insurance from CCRIF for a total of USD 120 million, and CCRIF resorted to global reinsurance and capital markets to hedge the risk. One advantage of putting together those countries is gaining a larger scale. For example, the minimum economically feasible size for a cat bond is estimated to be about USD 100 million.

Many cat bonds and reinsurance contracts, including the FONDEN and CCRIF cases, apply a "parametric" trigger, namely the insurance payment is triggered upon the occurrence of a natural event rather than the verification of damage. The event can be the wind speed measured in a certain location or the intensity and depth of an earthquake in a certain area. The parametric trigger simplifies enormously the monitoring and execution of the insurance contract, and permits an immediate payment upon the occurrence of the event[5]. The event can be monitored by a third party, such as the US National Hurricane Center or the US National Earthquake Information Center. Another advantage of parametric insurance is that it reduces the "moral hazard" associated with insurance. Moral hazard arises, for example, when the insured becomes more risk-taking, given the reassurance provided by the existence of coverage if the event should occur. For example, a driver may stop locking his or her car if he or she has full coverage against theft. Parametric insurance, in principle, would not discourage the country from introducing adaptation measures to reduce the impact of disasters, such as limiting population from settling in at-risk areas, improving building standards, modernising agricultural methods. Since parametric insurance provides a payment that does not depend on the extent of the damage suffered, the country can benefit fully from the implementation of such adaptive measures.

Parametric insurance, however, can leave a fair amount of residual risk uncovered ("basis" risk in insurance language). A natural phenomenon may cause considerable damage without crossing the parametric boundary. In fact, Hurricane Dean, which affected Belize, Jamaica, and several other Caribbean islands in August 2007, did not trigger any payments under the CCRIF because winds measured in the precise spots did not reach the required speed. As with any other insurance arrangement, there is a tradeoff between cost and coverage in parametric insurance. Basis risk can be reduced but only at a higher cost and the insured needs to choose a suitable position along the tradeoff between risk and cost.

It is important to understand that market insurance and self-insurance differ in key ways, even if they are two strategies that pursue the same objective. If a country purchases insurance (say through issuing a cat bond or entering a contract with an insurance or reinsurance company) it will receive an assured payment that offsets, albeit imperfectly, the loss suffered in the event of a disaster. In contrast, by resorting to borrowing the country can spread over time the cost of the disaster but it still suffers the full extent of the loss. The optimal choice between buying insurance and borrowing (or self-insurance) depends on many factors. In broad terms, disaster insurance is more desirable the larger the possible loss (in terms of GDP, say), the lower the cost of insurance, and the higher interest rate at which the country can borrow. Even if the insurance premium exceeds expected loss, as it normally does, when the expected loss is large, some degree of insurance coverage would be advantageous. This is analogous to the case of a consumer who chooses to purchase home insurance even if the premium exceeds the expected loss, as is normally the case.

5. A more common feature in reinsurance is an "indemnity" trigger, namely the damage suffered by the insured. There are also intermediate options such as modelled loss and indices based on a parametric occurrence.

Despite these advantages, few countries have issued cat bonds or sought disaster insurance. One reason may be cost. Cat premiums can be high owing to various factors, including the required technical studies by modelling agencies; monitoring, legal, and administrative costs; and remuneration of the capital requirements for insurance and reinsurance companies and possibly capital market failures. However, these costs could be in part offset by the improvement in risk management and even the credit rating of the country[6].

This suggests the opportunity to combine the contributions from aid agencies, instruments offered by global insurance markets under the umbrella of the international financial institutions to hedge the risk of economic losses from natural disasters in low-income countries. LICs could purchase disaster insurance in some form, which would ensure them of the immediate availability of funds if an event occurred. The residual, basis risk could be covered by Fund assistance (perhaps through a revamping of the Exogenous Shocks Facility) and other international organisations and bilateral aid. Market instruments such as cat bonds and reinsurance contracts could also be an option for aid agencies to deal with budget limitations in years where several large disasters occur. For example, agencies could purchase parametric insurance related to some of the higher risks where they would be required to provide aid if the disaster occurred.

To some extent, catastrophe insurance instruments have started being used by international financial institutions seeking to provide support for insurance programmes, as in the case of CCRIF mentioned above. The World Bank has other projects under way to provide insurance to farmers in various countries, including India and Mongolia, and has the capability to hedge these risks in global markets through a variety of instruments. In addition, the World Food Programme of the United Nations (WFP), in collaboration with the World Bank, ran a pilot programme of drought insurance in Ethiopia in 2006, which offered coverage to farmers if they were affected by insufficient rainfall. The WFP laid off the risk in the global reinsurance market[7].

While helping the provision of insurance to farmers and households falls under the purview of the World Bank and other development institutions, natural disasters also have a large macroeconomic impact that falls within the area of competence – and expertise – of the IMF (see Freeman *et al.*, 2003; and Hofman and Brukoff, 2006). Natural disasters create the need to increase government spending for human relief and reconstruction of public infrastructure, and tend to disrupt sources of tax revenue, possibly to an extent such that it requires appropriate macroeconomic management. Debt sustainability can be impaired, both through the large increase in budget deficits and through a deterioration of credit rating and market access. Disasters also have a negative effect on the balance of payments, as they may affect export production, for example in agriculture, and increase the demand for imports, at a time when foreign investment may be more cautious.

6. The cost of insurance for LICs and emerging markets, however, is tempered by the diversification value of these perils within the global market. The coverage in the Mexican and CCRIF cases mentioned above, for example, has been considered to be very favourably priced.
7. In the event, no payment was triggered as rains were sufficient in all the covered areas.

III. MULTILATERAL AND BILATERAL CREDIT FACILITIES

As argued above, a well-designed risk management strategy should make use of both insurance instruments and credit facilities. Because many LICs do not have access to credit from private financial markets and can draw on multilateral credit on concessional terms, it is incumbent upon international financial institutions to design credit instruments that could help borrowing countries cope better with risk from external sources. In this section, we review a new instrument designed by the Agence Française de Development (AFD), and then explore the possibility of adapting facilities provided by the IMF and the World Bank in similar ways.

A. The AFD Loan

In an attempt to draw lessons from debt servicing difficulties of LICs that gave rise to the Highly-Indebted Poor Countries (HIPC) initiative in 1996 and the Multilateral Debt Relief Initiative (MDRI) in 2005, the AFD designed a counter cyclical loan, which incorporates automatic mechanisms triggered when the borrowing country is hit by a bad shock.

Concessional loans to the poorest countries usually involve very long maturities, very long grace periods and low interest rates. For example, the IDA's typical loan stretches over 40 years, has a ten-year grace period, and carries a 0.75 per cent interest rate. The logic of having low interest rates is straightforward: poor countries cannot afford higher interest costs. The logic of having a long grace period, however, is less obvious. It might encourage governments to take loans that they may not need, as the service of the debt only starts in the distant future. A policy maker with a relatively short time horizon may not make a clear distinction between a loan on these terms and an outright grant.

Based upon these ideas, AFD has created a new concessional loan with the following features: a 30-year maturity and an initial grace period of only five years. The loan also provides for an additional five-year "floating grace" period, which can be drawn upon only in the event that the country suffers adverse shocks. External shocks are defined as episodes during which a country's export earnings fall below a moving threshold, which is defined as 95 per cent of the average export value over the past five years. Once this threshold is crossed, the country may skip amortisation payments for that year, up to a total of five times over the life of the loan.

Moreover, the borrowing country also benefits from a debt discount if it does not experience a negative shock that would qualify it for taking advantage of the floating grace feature. If the country does not use the floating grace period, the AFD invests amortisation payments on behalf of the country and applies the proceeds to an early retirement of the debt. This allows the country to expand its right to suspend the payment of the principal, as time passes. If the country never draws on its floating grace (or doesn't use up all its suspensions),

then it can shorten the length of its loan, up to a maximum of approximately seven years. This means that the loan will be paid off in 23 years instead of the original 30 years if the country does not make use of any floating grace deferral.

The trigger for the floating grace period is a moving average export shortfall, which is highly correlated with macroeconomic volatility in LICs. Taking the moving average of exports as a reference avoids the common pitfalls of stabilisation schemes with a fixed target. The underlying measure of "normal" exports is variable over time, and can accommodate the presence of random trends in export growth, when they exist. This has the desirable property of benefiting a country facing an occasional export shock, without penalising countries which make appropriate adjustments to permanent and recurrent shocks. Indexing the financial instrument on this kind of measure also minimises the opportunities for moral hazard. There is no incentive to influence purposely the exports variable, given that the cumulative effect on the moving average would require that such an action be continued over several periods before debt service would actually be lowered. As debt service lies typically in the range of 10 to 30 per cent of export earnings, a country would not gain much from manipulating its exports.

Moreover, the loan uses partner country statistics in order to avoid the possibility of misreporting on the part of the borrowing country. The data are taken from the Global Trade Atlas database (GTIS) which provides comprehensive data on trade flows between 68 countries and the rest of the world based on customs data and other official statistics on a monthly basis. The data are available with a lag of at most six months. In order to make the floating grace option more timely, the underlying partner country data were restricted to 62 countries, allowing reduction of the lag to at most four months.

Cohen *et al*. (2008) examine econometrically the link between export shocks defined in this way and debt crises. They show that an export shock has occurred at least once in the three years preceding a debt crisis in more than half of the cases. For countries which are likely to have experienced the most severe debt distress episodes (leading to the HIPC Initiative), export shocks have preceded debt crises in 60 per cent of the cases. Based on econometric analysis, which allows controlling for other covariates, they show that the likelihood of experiencing a debt crisis increases significantly when the country has been hit by an export shock during the three preceding years. Therefore the contingent debt instrument proposed by AFD would have helped to defuse a possible build-up of debt difficulties which arose on top of an exports shortfall in most of these countries.

B. An Application to PRGF and IDA Loans

The credit facilities for low-income countries of the Fund and the World Bank have financial terms similar to those of the old ADF loans. The IMF's Poverty Reduction and Growth Facility (PRGF), established in September 1999, has ten-year maturity terms, five grace years and ten semi-annual repayments. The World Bank concessional loans (IDA loans) have repayment terms that can reach 40 years, with a ten-year grace period. Eligibility for these loans, which carry annual interest rates between 0.5 and 0.75 per cent, is based principally on the country's per capita income, which is currently a per capita gross national income of USD 1 025 in 2005.

Applying this cutoff, 78 low-income countries are eligible for PRGF assistance, while 80 countries are eligible for IDA loans (the 78 PRGF-eligible countries plus Indonesia and Bosnia).

Repayment terms for PRGF and IDA loans could be restructured along lines similar to the new AFD counter cyclical loans, including a five-year floating grace period, with the repayment suspension being triggered by the occurrence of a shock. In the case of IDA loans, this still allows for an initial, fixed five-year grace period, while for the PRGF, given its shorter maturity, there would be no fixed grace period, only a floating grace period.

We simulated the application of the floating grace period for loans granted over the past 20 years to get a sense of the frequency with which the counter cyclical feature would have been triggered. We considered both exports and GDP shocks, with the triggers defined as a shortfall of at least 5 per cent from the five-year moving average of past values. Both types of shocks occur with similar frequency, and sometimes at the same time. On average, from 1984 to 2005, a deviation of 5 per cent of current exports from their five-year moving average represents 1.5 per cent of the country's GDP, ranging from 0.4 per cent for Sudan to 4.2 per cent for Guyana.

To extend the sample back to span a 20-year experience period, we considered the PRGF predecessor, the Enhanced Structural Adjustment Facility (ESAF), which was implemented in 1987. ESAF loans had the same repayment terms as PRGF loans. Table 1 computes the likelihood of the flexible repayment terms being triggered during the fixed five-year grace period of the loan, and during the subsequent five repayment years. Given that ESAF/PRGF loans are granted at times of balance-of-payments difficulties, we would expect shocks to occur more frequently during the first years of the loan. In fact, both GDP and export shocks occurred slightly more frequently during the repayment years, at the tail end of the loans. Table 10 in the Appendix shows the results country by country.

Table 1. **Average Number of Shocks during the Life of an ESAF Loan**

	During the grace period (first 5 years)	During the last 5 years of the loan	Average total number of shocks
Export Shocks	1.3	1.6	2.9
GDP Shocks	1.4	1.7	3.1
		Per cent	
Export Shocks	45	55	100
GDP Shocks	45	55	100

We performed a similar exercise for IDA loans, computing the number of exports and GDP shocks that borrowing countries experienced during the first IDA loan that they received, or as early as data were available, in view of the long maturity of IDA loans. Then, we calculated the likelihood that these shocks took place during the ten-year grace period or during the remaining years. Because of data limitations, our sample is reduced to 43 countries for which we can observe the number of shocks throughout the years. Table 2 summarises the results. In contrast to the PRGF, shocks are much more likely to occur during the repayment years than during the grace period. Table 11 in the Appendix shows the results country by country.

Table 2. **Average Number of Shocks during the Life of an IDA Loan**

	During the grace period (first ten years)	During the remaining years of the loan	Average total number of shocks
Export Shocks	2.3	8.7	11
GDP Shocks	2.1	8.9	11
		Per cent	
Export Shocks	24	76	100
GDP Shocks	21	79	100

To some extent, this result could be due to the fact that we are comparing ten years of grace period with 30 years of repayment. As a robustness check, we compared periods of similar magnitude by computing only the number of shocks that took place during the initial 20 years of the loan, ten years of grace period and ten years of repayment period. The results, detailed in the Appendix (Table 12), show that in fact the frequency of shocks was higher during the period when countries were reimbursing the loans, even considering periods of equal length. As a further robustness check, we repeated the exercise but computing the number of shocks that fell during the second ten-year period of repayment, rather than the first ten years of repayment. The sample becomes smaller in this case, comprising 26 countries. The results were broadly similar, with a similar proportion of shocks falling during the initial ten years and subsequent ten years of repayment for both export and GDP shocks.

Overall, these results underscore the potential gains from flexible grace periods to make loan repayments more counter cyclical for low-income countries.

IV. HOW TO COPE WITH AID VOLATILITY

In this section, we start by analysing the extent of aid volatility. As we argued above, it is useful to distinguish between aid predictability and aid variability, namely between the extent to which aid flows are disbursed as planned (or expected by the recipient) and how much aid varies (perhaps exactly as anticipated) from year to year.

In an attempt to identify shortfalls relative to expected receipts, we define aid shortfalls in two ways. Aid Shock 1 is a 5 per cent deviation of disbursed aid from a five-year moving average of its past values (both for gross ODA flows and gross ODA flows net of debt relief). Aid Shock 2 is defined as a 5 per cent deviation of disbursed aid from a five-year moving average of past *committed* values. This measure is intended to capture deviations of current aid from promised aid.

A. Measuring Aid Volatility

We use two different sources of data, both provided by the OECD and based on donor-reported commitments and disbursements. The first is the more frequently used Development Assistance Committee (DAC) database, which is a database on annual aggregates, with comprehensive data on the volume, origin, and types of aid and resource flows to more than 180 aid recipients. The second is the Creditor Reporting System (CRS) database, which is a database on aid activities, with detailed information on sectors and countries, and descriptions of these activities. Both databases have their strengths and weaknesses. The DAC has a very extensive coverage but the data are aggregated. By contrast, the CRS database provides very disaggregated data, but its coverage is still limited because the database is currently under construction.

An obvious way to measure aid predictability based on the DAC database is to use the absolute deviation of committed aid from actually disbursed aid, as a percentage of GDP (see, for example, Celasun and Waliser, 2008). There is a problem, however, with this measure in that DAC dates commitments but not promised disbursed dates: *"commitments are considered to be made at the date a loan or grant agreement is signed"*. So if a grant is committed at time *t* and disbursed at time *t+1*, one would measure a one-year lag between commitments and disbursement while, in fact, disbursement may come exactly as originally scheduled.

To get around this problem, we use the implementation rates of the aid projects reported by the donors in the CRS database as the basic measure of aid delivery. Implementation rate of an aid activity is defined as the percentage of the amount committed for this activity in year *t* that has effectively been disbursed between year *t* and 2005 (the most recent observation). We present here only a few examples of these implementation rates; the database is currently not

comprehensive enough to provide all the data necessary for calculating these rates for all donors and recipient countries. The examples we chose are aid activities from Austria, Germany and Japan, as these countries have filed the most comprehensive reports with the CRS and are those for which we have the best coverage. For the same reason, we chose only a few years because the data are not available for less recent periods, donor countries having reported to the CRS only in recent years.

The interesting observation here is that, whatever the duration of implementation, which ranges in the examples we chose from two years for Japan to about ten years in Germany (many German aid projects relate to infrastructure, so the longer duration is natural), these examples show high implementation rates (see Table 7 in the Appendix). For example, considering the aid activities undertaken by Japan in Ethiopia or in Zambia between 1996 and 2002, the annual mean of the implementation rates of the projects varies from 98.1 per cent to 101.1 per cent. In other words, donors have effectively disbursed all the aid they committed to disburse. In that limited sense, at least, aid is predictable.

We confirm this preliminary result by showing that averages of past commitments are a good predictor of the average of future disbursements. In order to do so, we calculate the correlations between the moving average of past commitments and the moving average of future disbursements between 1980 and 2005 for each PRGF-eligible country, using the DAC database. We test different moving averages (five, four, three and two-year moving averages) in order to find the duration that best fits the data. We find that for 57 countries out of the 78 PRGF-eligible, this correlation is high. For the majority of the countries, the moving average that best fits the data is the five-year moving average, as shown in Table 3.

Table 3. **Coefficients of Correlation for Five-Year Moving Averages**

Albania	0.60	Bolivia	0.78	Djibouti	0.91
Tonga	0.65	Angola	0.83	Viet Nam	0.92
Vanuatu	0.66	Sudan	0.83	Azerbaijan	0.93
Kyrgyz Republic	0.71	India	0.86	Comoros	0.94
Kiribati	0.73	Mongolia	0.86	Lesotho	0.95
Eritrea	0.74	Bangladesh	0.87	Uzbekistan	0.96
Nicaragua	0.76	Myanmar	0.88	Georgia	0.96
Sri Lanka	0.77	Guinea	0.88	Tajikistan	0.97
Cambodia	0.77	Laos	0.91		
Mean	**0.82**				

The table shows that the coefficients are very high, with a mean of 0.82, which reflects the fact that past commitments are a very good predictor of future disbursements. For the other moving averages (four,, three and two-year), we obtain high coefficients too, with a mean superior to 0.7, as shown in Table 4.

Table 4. **Coefficients of Correlation for Four, Three and Two-Year Moving Averages**

	2 years		3 years		4 years
Sierra Leone	0.52	Côte d'Ivoire	0.51	Mauritania	0.58
Tanzania	0.56	Nepal	0.68	Mozambique	0.64
Ghana	0.60	Gambia	0.77	Papua New Guinea	0.68
Benin	0.64	Samoa	0.77	Niger	0.76
Guyana	0.65	Malawi	0.78	Senegal	0.77
Chad	0.70	Uganda	0.81	Sao Tome & Principe	0.84
Zimbabwe	0.70				
Kenya	0.73				
Timor-Leste	0.73				
Bhutan	0.80				
Burundi	0.83				
Afghanistan	0.87				
Yemen	0.90				
Mean	**0.71**	**Mean**	**0.72**	**Mean**	**0.71**

It would be interesting to try to understand why the duration of implementation seems to be higher for some countries (the five-year moving average fits the data best) than for others. Without delving further into the details, it is possible to form three initial hypotheses: the results may depend on the characteristics of the recipient (the duration for some recipients might be longer than for others because of the need to comply with specific conditions imposed by the donors); they may depend on the main donors of the recipient country (as we saw that some donors seem to need more time than others in order to implement their project); or they may depend on the type of aid activities that are mainly implemented in the recipient country (if most aid projects are for infrastructure, implementation times will typically be long).

Note that Celasun and Walliser (2008) also used an alternative measure of predictability based on IMF programme data. They studied in detail aid projections and outturns reported in IMF Staff Reports from 1992 to 2007 for a set of 13 countries – a limitation of their database being that the data are available only for countries with long-term IMF programme commitments. In the dataset they constructed, aid numbers reflect commitments made by donors as well as the judgement of the recipient governments regarding the likelihood of disbursements. They focus primarily on budget aid and find large negative and positive errors in projecting budget aid disbursements, even in their set of countries with long-term IMF commitments. They find that, on average, the mean absolute error in projecting budget aid is approximately 1 per cent of GDP during 1993-2005, indicating that on average disbursed aid differed from projections by 1 per cent of GDP. They also find that project aid disbursements can vary substantially from projections: in their data, on average, project aid deviated by 1.4 per cent from projected values.

B. Aid Variability and Procyclicality

The analysis of implementation rates as well as of correlations between past commitments and future disbursements suggests that aid is predictable. But while predictable, aid fluctuates quite a bit. In order to measure this variability, we look at two different dimensions: first, we compare present disbursed aid with past disbursed values (which corresponds to what we call

Aid Shock 1); and second, we present disbursed aid with past committed values (Aid Shock 2). We choose to compare present disbursements with past commitments because we have seen that past commitments are a good predictor of future disbursements. So when the aid disbursed differs significantly from its past committed values, that is to say from what is "expected", it can be said that the country experiences an "aid shock".

More precisely, we measure the likelihood that aid disbursed is outside a band corresponding to plus *x* per cent or minus *y* per cent of past values, or plus *x* per cent or minus *y* per cent of committed values. *x* and *y*, symmetric relative to 100 per cent, correspond to the value of the band we choose, varying between plus 105 per cent and minus 95 per cent, and plus 130 per cent and minus 70 per cent (thus we define four different bands: the wider the band, the narrower the definition of volatility that we are taking). What we call "past values" (of disbursed or committed aid) correspond to the past five years' moving average of these values: for each year *t*, we compare the value of the aid disbursed in *t* with the average of the aid disbursed (Aid Shock 1) or committed (Aid Shock 2) between the year *t-5* and the year *t-1*.

We say that there is an aid shock in year *t* when the value of disbursed aid in year *t* is superior to *x* per cent (positive shock) or inferior to *y* per cent (negative shock) of the average of the past five years disbursed (Aid Shock 1) or committed (Aid Shock 2) aid values. Summary data are presented in the Appendix (Tables 8 and 9).

As can be seen, the volatility of aid is quite similar whatever the definition of aid shocks we choose. This volatility is considerable as aid shocks occur in the majority of cases: in the narrowest band, there are shocks in nearly nine cases out of ten – that is to say each year, on average, recipient countries have a 90 per cent probability of being hit by a shock. Moreover, even if we consider a larger band, for example plus 130 per cent or minus 70 per cent, we see that there are still a lot of shocks: the likelihood of being outside the band is nearly one-third. So aid appears to be very volatile. But we have to note that we consider here positive as well as negative shocks and that, whatever the definition of aid shock or the width of the band we choose, there are always more positive than negative shocks.

C. Aid is not Counter Cyclical

Aid could vary for a good reason, such as if aid were timed to help the countries smooth income shocks, or aid flows were high at times when GDP was low and vice versa. We find, however, that this is not the case. This result is consistent with several papers in the literature that find that aid flows to developing countries seem to follow the recipients' business cycle rather than being counter cyclical (see, among others, Pallage and Robe, 2001; Gemmel and McGivillray, 1998; Bulir and Hamman, 2003).

We complement this evidence computing two statistics for the PRGF-eligible countries between 1985 and 2004. One is simply the correlation between aid and income shocks, each defined by the deviation with respect to the moving average of the past five years. The other is the correlation of the dummy variables signalling if either of such shocks took place (positive aid shock with negative income shock, negative aid shock with positive income shock).

As shown in Tables 5 and 6, whatever the statistics we choose, the coefficients we find are nearly equal to zero (we calculated these coefficients for each PRGF-eligible country, and present here the average coefficients we found).

Table 5. **Correlation between Aid and GDP Shocks**

Coefficients of correlation	(Gross ODA$_t$ – 5-year moving average of Gross ODA)
(GDPt – 5-year moving average of GDP)	0.02

Table 6. **Correlation of the Timing of Aid and GDP Shocks**

Coefficients of correlation	Positive aid shocks	Negative aid shocks
Negative GDP shocks	0.02	
Positive GDP shocks		-0.03

We find that the same results apply if we focus on export shocks rather than on GDP shocks, with coefficients of correlation nearly equal to zero. So these correlations between aid and GDP shocks do not follow any pattern suggesting that aid is disbursed when the country experiences a shortfall in GDP or withdrawn when the country is in a better situation. In other words, aid does not seem to vary for a good reason.

V. CONCLUSIONS

LICs need to develop an approach to manage their macro risks. While it is true that countries and donors could – and should – take measures to reduce the economic impact of these shocks, including removing obstacles to economic diversification, taking mitigation measures against the impact of climate events, and improving planning and co-ordination of aid, it cannot be expected that these measures alone will make volatility go away. Managing these risks will require using a combination of financial instruments, including market instruments and facilities made available by international financial institutions (IFIs). Regarding the latter instruments, in particular, the currently available configuration of facilities may not be well suited to supporting a risk management framework.

APPENDIX

Table 7. Implementation Rates, a Few Examples

Donor: Japan. Recipient: Zambia.	Projects committed in 1996	Projects committed in 1997	Projects committed in 1998	Projects committed in 1999	Projects committed in 2000	Projects committed in 2001	Projects committed in 2002
Mean of the implementa- tion rates of the projects in 2005.	99.78%	100.21%	101.09%	99.58%	100.80%	100.91%	99.03%
Mean of the number of years necessary to implement a project at more than 90%.	2	2.33	2.33	2,17	2	2.6	2
Donor: Japan. Recipient: Ethiopia.	Projects committed in 1996	Projects committed in 1997	Projects committed in 1998	Projects committed in 1999	Projects committed in 2000	Projects committed in 2001	Projects committed in 2002
Mean of the implementation rates of the projects in 2005.	99.75%	100.59%	100.42%	99.32%	98.08%	100.67%	100.64%
Mean of the number of years necessary to implement a project at more than 90%.	2	2.2	2.8	2	1.5	1.75	2
Donor: Austria. Recipient: Ethiopia.	Projects committed in 1996	Projects committed in 1997		Projects committed in 1999	Projects committed in 2000	Projects committed in 2001	Projects committed in 2002
Mean of the implementation rates of the projects in 2005.	97.83%	83%		108.49%	90%	102.41%	89.40%
Mean of the number of years necessary to implement a project at more than 90%.	1.5	1.7		2.6	1.5	1.5	1.5
Donor: Germany. Recipient: Mozambique.	Projects committed in 1993	Projects committed in 1994	Projects committed in 1995	Projects committed in 1996	Projects committed in 1997	Projects committed in 1998	Projects committed in 1999
Mean of the implementation rates of the projects in 2005.	80.97%	97.13%	97.13%	99.51%	50%	89%	23.16%
Mean of the number of years necessary to implement a project at more than 90%.	8.25	9	10.33	4	4	6.7	5
Donor: Germany. Recipient: Zambia.	Projects committed in 1993	Projects committed in 1994	Projects committed in 1995		Projects committed in 1997	Projects committed in 1998	Projects committed in 1999
Mean of the implementation rates of the projects in 2005.	101.10%	92.05%	99.40%		29%	38%	30.03%
Mean of the number of years necessary to implement a project at more than 90%.	6	6.33	5.5		5	8	4.3

Table 8. **Summary statistics on Aid Shock 1**
(Deviation of Current Aid from Moving Average of past Aid)

	% negative	% positive	% Total
Likelihood that aid disbursed is outside a band corresponding to +105% (positive shock) or -95% (negative shock) of past values	**41.8%**	**45.3%**	**87.1%**
Likelihood that aid disbursed is outside a band corresponding to +110% (positive shock) or -90% (negative shock) of past values	**33.7%**	**39.3%**	**73.0%**
Likelihood that aid disbursed is outside a band corresponding to +120% (positive shock) or -80% (negative shock) of past values	**21.7%**	**30.0%**	**51.7%**
Likelihood that aid disbursed is outside a band corresponding to +130% (positive shock) or -70% (negative shock) of past values	**11.1%**	**22.3%**	**33.3%**

Table 9. **Summary Statistics on Aid Shock 2**
(Deviation of Current Aid from Moving Average of Past Commitments)

	% negative	% positive	% total
Likelihood that aid disbursed is outside a band corresponding to +105% (positive shock) or -95% (negative shock) of committed values	**38.5%**	**48%**	**86.5%**
Likelihood that aid disbursed is outside a band corresponding to +110% (positive shock) or -90% (negative shock) of committed values	**32.3%**	**41.2%**	**73.5%**
Likelihood that aid disbursed is outside a band corresponding to +120% (positive shock) or -80% (negative shock) of committed values	**18%**	**29.3%**	**47.3%**
Likelihood that aid disbursed is outside a band corresponding to -130% (positive shock) or -70% (negative shock) of committed values	**9.2%**	**21.8%**	**31%**

Table 10. **Number of Shocks During the Life of an ESAF Loan (by Country)**

		Number of shocks during the grace period of the loan			Number of shocks during the last five years of the loan		
Country	Year	GDP	Exports	ODA disbursements (net of debt relief)	GDP	Exports	ODA disbursements (net of debt relief)
Albania	1993	1	3	4	0	0	0
Armenia	1996	0	4	1	0	0	1
Azerbaijan	1996	1	4	0	0	0	2
Bangladesh	1990	0	0	4	0	0	4
Benin	1993	1	0	3	1	2	1
Benin	1996	1	1	2	0	1	0
Bolivia	1988	0	0	0	0	1	1
Bolivia	1994	0	0	1	3	3	2
Burkina Faso	1993	3	2	2	1	4	0
Burkina Faso	1996	1	2	2	0	2	0
Burundi	1991	5	4	2	5	4	5
Cambodia	1994	1	0	1	0	0	1
Central African Rep.	1987	0	1	1	4	3	5
Chad	1987	0	0	1	4	3	4
Chad	1995	3	1	3	1	3	1
Congo, Republic of	1996	2	0	3	0	0	2
Côte d'Ivoire	1994	1	1	3	3	2	4
Equatorial Guinea	1988		1			1	
Ethiopia	1992	1	3	2	0	0	3
Ethiopia	1996	2	0	4	3	1	0
Gambia, The	1986	1	1	1	0	2	5
Gambia, The	1988	0	0	3	0	4	5
Georgia	1996	3	4	1	1	0	1
Ghana	1987	0	0	0	3	1	3
Ghana	1988	1	0	1	2	0	2
Ghana	1995	1	0	0	2	0	1
Guinea	1987		1	0		2	3
Guinea	1991	0	3	2	3	2	3
Guinea-Bissau	1987	0	0	1	1	2	4
Guinea-Bissau	1995	2	1	4	3	0	2
Guyana	1990	3	1	2	0	1	2
Guyana	1994	0	0	3	2	5	1
Haiti	1986	0	0	2	3	4	3
Haiti	1996	0	0	4	4	1	3
Honduras	1992	3	2	3	0	0	1
Kenya	1988	2	0	2	2	2	5
Kenya	1989	0	2	3	2	0	5
Kenya	1993	2	0	5	2	0	2

		Number of shocks during the grace period of the loan			Number of shocks during the last five years of the loan		
Country	Year	GDP	Exports	ODA disbursements (net of debt relief)	GDP	Exports	ODA disbursements (net of debt relief)
Kenya	1996	3	0	4	2	0	0
Kyrgyz Republic	1994		3			3	
Lao People's Dem.Rep.	1989	3	0	0	1	0	0
Lao People's Dem. Rep.	1993	0	0	0	2	0	0
Lesotho	1988	0	0	2	3	1	4
Lesotho	1991	0	0	3	0	0	5
Madagascar	1987	4	1	1	1	0	4
Madagascar	1989	0	0	2	1	1	3
Madagascar	1996	2	0	3	1	0	2
Malawi	1988	0	1	0	2	3	5
Malawi	1995	3	1	3	4	4	2
Mali	1988	0	0	3	3	1	1
Mali	1992	2	1	2	2	0	2
Mali	1996	2	0	2	0	0	0
Mauritania	1986	0	1	4	3	4	3
Mauritania	1989	1	4	4	3	3	3
Mauritania	1992	3	3	3	3	5	2
Mauritania	1995	2	3	3	3	4	2
Mongolia	1993		0	0		3	0
Mozambique	1987	5	1	0	4	0	2
Mozambique	1990	5	0	0	1	0	5
Mozambique	1996	0	0	4	0	0	0
Nepal	1987	0	1	0	2	0	5
Nepal	1992	2	0	3	0	0	1
Nicaragua	1994	0	0	3	0	0	0
Niger	1986	0	3	2	5	5	4
Niger	1988	2	4	4	5	4	3
Niger	1996	3	3	4	1	2	0
Pakistan	1988	0	0	2	0	2	4
Pakistan	1994	0	0	3	0	0	3
Rwanda	1991	5	5	0	1	1	5
Senegal	1986	0	0	0	3	3	5
Senegal	1988	0	1	2	5	4	5
Senegal	1994	4	3	4	2	2	3
Sierra Leone	1986	3	2	4	3	4	0
Sierra Leone	1994	2	4	3	2	2	1
Sri Lanka	1988	0	0	1	0	0	5
Sri Lanka	1991	0	0	4	0	0	4
Tanzania	1987			1			4
Tanzania	1991			4			2
Tanzania	1996	0	0	2	0	0	0

		Number of shocks during the grace period of the loan			Number of shocks during the last five years of the loan		
Country	Year	GDP	Exports	ODA disbursements (net of debt relief)	GDP	Exports	ODA disbursements (net of debt relief)
Togo	1988	0	2	3	3	3	5
Togo	1989	1	3	4	2	2	4
Togo	1994	2	2	4	3	2	5
Uganda	1987	2	3	0	3	2	1
Uganda	1989	4	5	0	1	5	1
Uganda	1994	1	5	1	3	3	1
Viet Nam	1994	0	0	0	0	0	0
Zambia	1995	3	4	4	1	2	2
Zimbabwe	1992	4	2	2	3	4	5
Average number		**1.4**	**1.3**	**2.1**	**1.7**	**1.6**	**2.4**

Table 11. **Number of Shocks During the Life of an IDA Loan (by Country)**

		Number of shocks during the grace period of the loan		Number of shocks during the remaining years of the loan	
Country	First IDA Loan	GDP	Exports	GDP	Exports
Afghanistan	1966	2	0	7	7
Bangladesh	1973	6	5	2	3
Benin	1969	2	0	7	6
Bhutan	1984	3	2	0	1
Burkina Faso	1969	5	2	8	11
Burundi	1966	2	5	10	18
Cameroon	1967	4	0	19	11
Cape Verde	1983	0	4	11	2
Central African Republic	1969	0	1	12	18
Chad	1969	1	1	12	12
Comoros	1978	8	1	10	8
Congo, Dem. Rep.	1979	0	5	8	10
Congo, Rep.	1969	2	0	9	6
Côte d'Ivoire	1973	0	2	3	10
Dominica	1982	0	0	9	5
Gambia, The	1970	5	1	11	10
Ghana	1968	0	5	0	7
Grenada	1985	5	0	6	4
Guinea-Bissau	1979	1	5	17	3
Guyana	1969	0	3	10	15
Lesotho	1966	0	3	9	6
Liberia	1972	1	1	16	11
Madagascar	1966	0	2	12	8
Malawi	1967	0	0	14	12
Mali	1966	0	0	11	6
Mauritania	1964	8	1	1	13
Mozambique	1985	3	3	3	0
Nepal	1970	4	2	14	5
Niger	1965	2	3	10	17
Nigeria	1966	0	1	12	9
Papua New Guinea	1969	0	0	9	14
Rwanda	1970	9	0	4	14
Sao Tome and Principe	1985	3	7	12	2
Senegal	1966	2	1	14	14

		Number of shocks during the grace period of the loan		Number of shocks during the remaining years of the loan	
Country	First IDA Loan	GDP	Exports	GDP	Exports
Sierra Leone	1969	2	5	7	10
Somalia	1966	0	2	12	12
Sri Lanka	1968	0	5	5	7
St. Vincent and the Grenadines	1985	0	3	0	1
Togo	1969	0	0	11	12
Uganda	1967	0	4	14	12
Vanuatu	1983	2	2	3	6
Zambia	1979	6	7	7	8
Zimbabwe	1981	4	4	10	10
Average number		**2.1**	**2.3**	**8.9**	**8.7**

Table 12. **Number of Shocks During the First Twenty Years of an IDA Loan (by Country)**

		Number of shocks during the grace period of the loan		Number of shocks during the ten first years of repayment	
Country	First IDA Loan	GDP	Exports	GDP	Exports
Afghanistan	1966	2	0	6	5
Bangladesh	1973	6	5	2	2
Benin	1969	2	0	4	2
Bhutan	1984	3	2	0	1
Burkina Faso	1969	5	2	5	4
Burundi	1966	2	5	5	4
Cameroon	1967	4	0	1	0
Cape Verde	1983	0	4	1	0
Central African Republic	1969	0	1	4	5
Chad	1969	1	1	6	5
Comoros	1978	8	1	7	3
Congo, Dem. Rep.	1979	0	5	3	6
Congo, Rep.	1969	2	0	4	4
Cote d'Ivoire	1973	0	2	1	6
Dominica	1982	0	0	5	1
Gambia, The	1970	5	1	5	3
Ghana	1968	0	5	0	6
Grenada	1985	5	0	2	3
Guinea-Bissau	1979	1	5	10	3
Guyana	1969	0	3	3	7
Lesotho	1966	0	3	3	4
Liberia	1972	1	1	9	10
Madagascar	1966	0	2	5	5
Malawi	1967	0	0	5	4
Mali	1966	0	0	4	5
Mauritania	1964	8	1	1	3
Mozambique	1985	3	3	1	0
Nepal	1970	4	2	4	2
Niger	1965	2	3	3	3
Nigeria	1966	0	1	5	4
Papua New Guinea	1969	0	0	0	5
Rwanda	1970	9	0	4	6
Sao Tome and Principe	1985	3	7	5	2
Senegal	1966	2	1	6	7
Sierra Leone	1969	2	5	3	8
Somalia	1966	0	2	6	4
Sri Lanka	1968	0	5	4	7

		Number of shocks during the grace period of the loan		Number of shocks during the ten first years of repayment	
Country	First IDA Loan	GDP	Exports	GDP	Exports
St. Vincent an the Grenadines	1985	0	3	0	1
Togo	1969	0	0	5	5
Uganda	1967	0	4	6	4
Vanuatu	1983	2	2	3	4
Zambia	1979	6	7	5	5
Zimbabwe	1981	4	4	7	5

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