

INTERNATIONAL MONETARY FUND AND WORLD BANK

**Managing Volatility in Low-Income Countries:
The Role and Potential for Contingent Financial Instruments¹**

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¹ The term “contingent financial instruments” as used in this paper describes instruments that are pre-arranged to provide either financing or transfers that are contingent on a defined state or event. Because these approaches must be arranged prior to a shock and often require up front financial investment (such as insurance premia), we refer to them as “*ex ante*” financing instruments although not all “*ex ante*” instruments are “contingent.” Contingent financing sources and instruments can be public or market-based.

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ACRONYMS AND ABBREVIATIONS

AFD	Agence Française de Développement
APRM	Agricultural Price Risk Management
BOP	Balance of Payment
CCRIF	Caribbean Catastrophic Risk Insurance Facility
CME	Chicago Mercantile Exchange
CRW	Crisis Response Window
DDOs	Deferred drawdown options
DFID	Department for International Development (U.K.)
DSA	Debt Sustainability Analysis
DSF	Debt Sustainability Framework
EC	European Communities
ECF	Extended Credit Facility
FDI	Foreign Direct Investment
GFRP	Global Food Crisis Response Program
HIPC	Heavily Indebted Poor Countries (Initiative)
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IFC	International Finance Corporation
IFIs	International Financial Institutions
LICs	Low-Income Countries
MDBs	Multilateral Development Banks
MDGs	Millennium Development Goals
MDRI	Multilateral Debt Relief Initiative
OECD-DAC	Organization for Economic Cooperation and Development-Development Assistance Committee
OTC	Over-the-counter
PCDR	Post-Catastrophe Debt Relief
PRGT	Poverty Reduction and Growth Trust
PSI	Policy Support Instrument
PV	Present Value
RCF	Rapid Credit Facility
SAA	Strategic Asset Allocation
SALM	Sovereign Assets and Liabilities Management
SCF	Standby Credit Facility
SSA	Sub-Saharan Africa
USAID	United States Agency for International Development
WEO	World Economic Outlook
WFP	World Food Programme

EXECUTIVE SUMMARY

This paper reflects on the challenges that exogenous shocks pose for low-income countries (LICs) and the role of different classes of financing instruments and arrangements in helping to address these challenges (augmenting *ex ante* efforts to reduce the likelihood and impact of shocks). The focus is on contingent financing instruments (such as market hedging, contingent credit lines and debt instruments, and insurance). The paper contrasts the role these instruments can play with that of more traditional financing. The main points are:

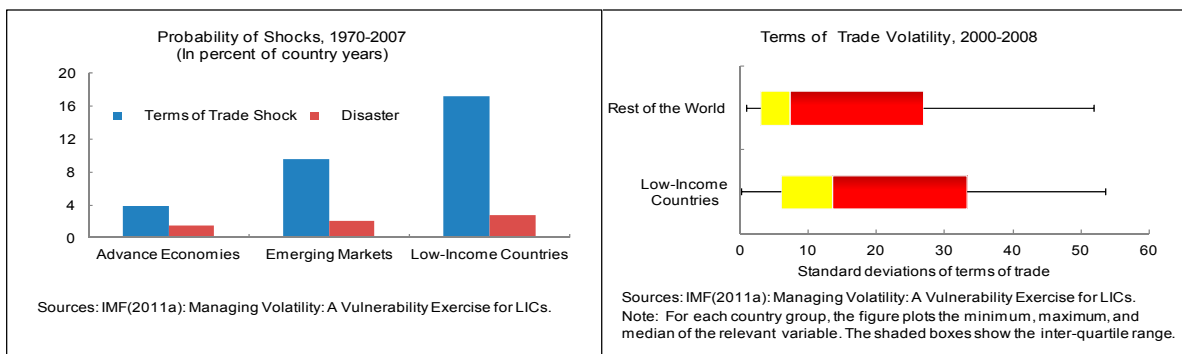
- For LICs, shocks such as natural disasters and adverse terms of trade shifts can translate into lower growth, higher poverty, and fiscal, debt, and balance of payment pressures that complicate macroeconomic management and threaten development spending.
- Many LICs have self-insured by building macroeconomic policy buffers and saving commodity windfalls, but they remain vulnerable to shocks. Public investment and development needs imply a high opportunity cost of holding large reserves, suggesting a key role for external finance when exogenous shocks hit. While much of the financial assistance provided to LICs is targeted to addressing longer-term development needs, it is important that resources are available promptly to respond to sudden, unexpected needs.
- An effective architecture for shock financing should provide predictability while still delivering scarce concessional resources in amounts tailored to countries' needs stemming from a shock. Financing arranged after a shock can be better tailored and can limit moral hazard, but its volume and timing is not assured in advance.
- Reforms and innovations have made IMF and World Bank financing more responsive, with more flexible *ex post* mechanisms better tailored to country needs, and with the adoption of *ex ante* mechanisms such as IDA's grant allocation framework. Potential enhancements are being explored. Complementing such *ex post* finance with greater availability of *ex ante* support could give greater confidence to LIC policymakers that at least part of their needs would be met promptly in the face of shocks.
- Enhancing LICs' risk management tool kit begins with improving their capacity to measure and manage risk. Technical assistance in areas such as risk management could enhance familiarity with, and interest in, market hedging instruments.
- Market hedging of a few key commodity prices could cover substantial fiscal risks; loan contracts that index debt service to repayment capacity could mitigate liquidity needs and long-term debt sustainability concerns; and there may be potential for beneficial risk pooling arrangements.
- Demand and supply factors constrain the development and use of contingent instruments by LICs. Supply is limited by coordination problems, first-mover costs, and difficulties of measuring and verifying contingencies. Where market-based instruments are available, low demand reflects cost considerations, weak technical capacity, and political economy factors. The international community can help address some of these constraints, particularly with respect to capacity building.
- International financial institutions (IFIs) help to analyze risk exposures and to design instruments. They could also support the design and implementation of risk management strategies or risk pooling arrangements, and consider serving as intermediaries for market hedging transactions and helping to coordinate issuance of contingent debt instruments by interested creditors.

I. IMPORTANCE OF MANAGING SHOCKS IN LOW-INCOME COUNTRIES

1. **Adverse external shocks, even when temporary, can have prolonged negative effects on income and poverty in low-income countries (LICs).**² LICs are particularly vulnerable to a variety of exogenous shocks that can lead to output losses and, in some cases, protracted growth slowdowns. Even modest slowdowns in growth can have lasting impacts; this is particularly so for households clustered around the poverty line, many of which are forced to cope with economic distress by selling family assets, switching to less nutritional food, or pulling children from school. Sharp swings in commodity prices or export volumes, terms of trade shocks and natural disasters can seriously affect growth and the fiscal and balance of payments (BOP) positions, potentially threatening core public spending on health, education, and infrastructure and its maintenance.³ In food and agricultural markets, the volatility of world market prices has been unusually high during the past decade, although not unprecedented (FAO et al., 2011). Exogenous reversals in FDI, ODA, or other financing flows can have similar effects, but these need to be distinguished from financing reversals that are prompted by the LIC's own policies.

2. **Exogenous shocks can result in considerable macroeconomic and output volatility, particularly in LICs.** The size, frequency, and economic cost of these shocks tends to be higher in LICs than in advanced and emerging market economies, increasing risk and uncertainty for private agents and governments. Food price shocks, in particular, can set back gains in reducing poverty and in achieving the Millennium Development Goals (MDGs). Given their heavy reliance on commodity exports, LICs, particularly in Sub-Saharan Africa (SSA), experience median terms of trade volatility that is nearly twice as high as in the rest of the world (Figure 1). With improved macroeconomic policies and institutions and growing global integration, the importance of external shocks in driving output volatility has increased, compared to that of idiosyncratic domestic shocks (Raddatz, 2008).

Figure 1. Frequency and Scale of Shocks



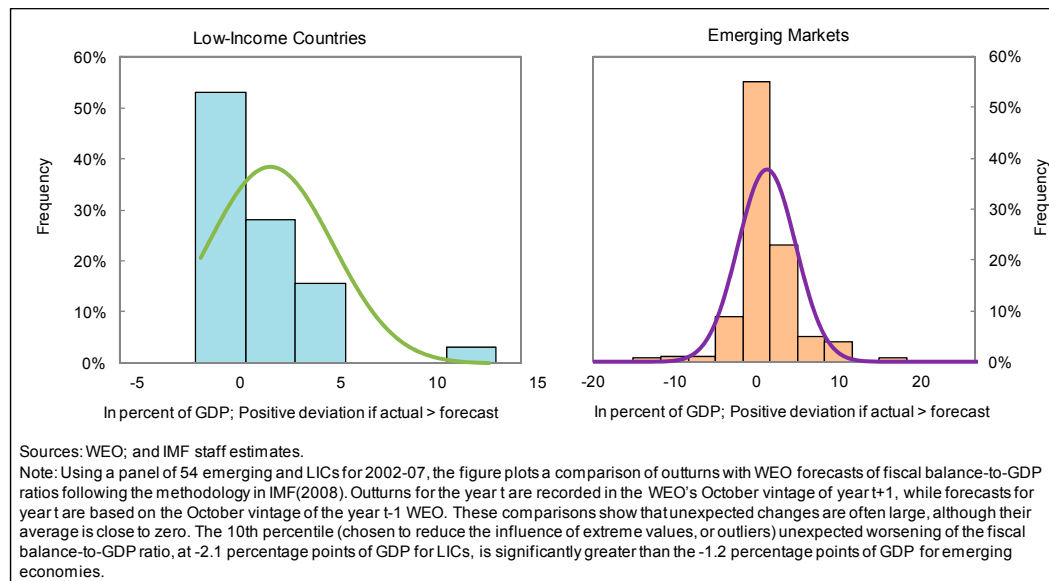
² For evidence and details, see IMF (2011a), World Bank (2009), and Berg et al. (2010).

³ Diverting resources from these needs sets back development objectives. For example, curtailing infrastructure maintenance diminishes the benefits from public investments and generates greater costs in the future.

3. These shocks can threaten core development spending and complicate fiscal and debt management.

- *Budget uncertainty.* Large negative shocks can bring revenue losses and increased spending needs (demand for social safety nets and, with natural disasters, remedial expenditures) that complicate budget planning and execution and exacerbate fiscal risks. This can cause fiscal outcomes to deviate substantially from budgets (Figure 2 and IMF, 2008).

Figure 2. Unexpected Changes in the Fiscal Balance to GDP Ratio



- *Pro-cyclical fiscal policy.* Without adequate and timely external financing, temporary adverse revenue shocks can lead to abrupt expenditure reductions, including to core social and other development spending. Alternatively, spending from positive revenue shocks can be “too much, too quick” unless prudent policies and effective institutional structures are in place to manage revenue windfalls.⁴ This is consistent with the evidence that fiscal policy tends to be more procyclical in developing countries.⁵ Granado et al. (2010) find that health and education spending is also procyclical in developing countries. These findings are of particular concern for LICs, which need predictable health and education spending and well-planned and implemented public investments to produce sustained development benefits.
- *Debt sustainability.* If adequate concessional financing is not available in response to temporary shocks, countries may be forced to accumulate debt and erode fiscal space. This risk is compounded in the case of persistent or repeated shocks. In the past, shocks, combined with poor policies and weak debt and public expenditure management capacity,

⁴ This is an acute concern in countries with very limited financial market access and investment needs that far exceed their own public resources and available official financing.

⁵ Gavin and Perotti (1997); IMF (2010a); Kaminisky et al. (2004); Talvi and Vegh (2000) and Mwase and Wang (2011).

have contributed to increased debt distress—most dramatically illustrated by the build-up of unsustainable debt prior to the Heavily Indebted Poor Countries/Multilateral Debt Relief Initiatives (HIPC/MDRI).^{6 7}

4. This paper examines the potential for LICs to complement the use of *ex post* instruments with greater use of *ex ante* (“contingent”) financing instruments from the market and official sectors. While acknowledging that risk management solutions can encompass a wide range of approaches, this paper focuses on financial instruments, including commodity price hedging instruments, contingent debt instruments (indexed bonds, deferred repayment loans), and natural disaster insurance, as well as shock-financing facilities that include an element of pre-commitment. Providing efficient, well-functioning mechanisms and instruments to assist LICs in dealing with major exogenous shocks, such as food price crises, is of global interest. The issue has been highlighted by the G20 this year in its development discussions on how to improve the management and mitigation of risks from agricultural price volatility. This paper reviews the existing framework of *ex post* and *ex ante* support to LICs, aimed at mitigating the impact of exogenous shocks, and examines the need for, and potential benefits of, greater availability of contingent instruments. It also discusses what more the international community, particularly the IMF and World Bank, might do to help address some of the constraints that limit development and use of these instruments. Section II surveys various approaches to managing shocks and considers the key issues that they raise, concluding that there is some scope to improve the overall responsiveness of financing for LICs. Section III discusses developing countries’ experience with contingent financing instruments, presents the main obstacles to their broader use, and considers practical design issues. Section IV reviews recent experience of the IMF, World Bank, and others in making external financing for LICs more responsive to shocks, and lays out some considerations for the future.

5. The focus is on LIC governments; private sector use of contingent instruments is largely beyond the scope of this paper. The ability of private sector firms to hedge or insure against shocks to export revenues, for example, or of small farmers to insure against weather-related shocks to agricultural production, is important in its own right (and would mitigate fiscal risks). While the paper touches on this aspect, its primary focus is on the ability of the sovereign to mitigate the impact of these and other shocks on fiscal and external positions, by potentially complementing traditional *ex post* shock support with the greater use of contingent financial instruments.

⁶ Terms of trade and growth shocks have been instrumental in large debt accumulation episodes. Hostland et al. (forthcoming) find that in a sample of 114 episodes where the terms of trade worsened by more than 20 percent in one year, the debt-to-GDP ratio also increased in about 60 percent of those episodes, with a median increase of 5 percentage points. In one quarter of such episodes, the increase in debt exceeded 20 percentage points.

⁷ However, LICs have made considerable strides in recent years to improve fiscal and debt management, including by adapting the currency and maturity structure of debt portfolios, often with the support of institutions like the World Bank and IMF.

6. **Both a continued strengthening of the *ex post* shock financing architecture and a new focus on contingent financial instruments could help to improve the responsiveness of shock financing.** On the former, recent innovations and reforms at the World Bank and IMF, as well as in other institutions, allow them to respond to external shocks in LICs with larger, quicker and more flexible financing mechanisms. These changes, and potential further steps that could be considered in the context of future reviews of financing facilities, are discussed in Section IV.⁸

II. APPROACHES TO MANAGING SHOCKS

A. *Ex Post* and *Ex Ante* Approaches

7. **LICs hit by adverse exogenous shocks typically rely on a combination of external financing and macroeconomic adjustment to address the consequent fiscal and external pressures.** By smoothing the adjustment process, external financing limits the need for policies that would compress aggregate demand and aggravate the shock-induced decline in national income. Availability of financing mechanisms that fit a country's circumstances and facilitate prompt and appropriate responses to a particular shock can help minimize development setbacks.

8. **Self-insurance is an important form of protection, but is not enough on its own.** Self-protection through *ex ante* efforts to reduce the likelihood and impact of shocks (e.g., export diversification, disaster preparedness) is needed. Countries can self-insure/protect by strengthening in-built "shock absorbers," building policy buffers, and accumulating reserves or saving commodity windfalls to be used in bad times. Many LICs took advantage of the benign conditions that preceded the global crisis to strengthen their buffers, allowing an unprecedented countercyclical crisis response when the crisis hit. Nonetheless, there are limits to self-insurance by LICs. LICs' huge public investment and development needs imply high opportunity costs to holding large reserves (IMF, 2011b). Experience with stabilization funds has been fraught with difficulties, including those due to governance-related failures. Moreover, "shock absorbers" are under-developed. In many LICs, financial systems are shallow, and limited access to international capital markets complicates risk diversification. Lack of well-developed social safety net systems contributes to high consumption volatility in the face of shocks.

9. **Shock financing can be arranged either *ex post* or *ex ante*.** The existing shock financing mechanisms for LICs are almost universally *ex post*.

- **"*Ex post*" financing.** In the event of a shock, LICs can seek financing from international institutions and donors. This support often requires agreement on macroeconomic and structural policy reforms and may help catalyze private sector financing or reduce its costs.⁹

⁸ A 2012 IMF review will explore ways to refine its concessional financing architecture.

⁹ The policy package may or may not entail adjustment measures, depending on the country's economic situation prior to the shock and on the shock's expected persistence.

Examples include new or expanded financing under various facilities in the IMF's Poverty Reduction and Growth Trust (PRGT), and front-loading or augmentations of support from the World Bank's International Development Association (IDA).

- ***“Ex ante” financing.*** Pre-arranged financial safety nets can “insure” countries against shocks. These could take the form of market hedging contracts, contingent debt instruments, insurance, or credit lines that pre-commit access to financing when needed.¹⁰ As will be discussed further in Section III, the availability of such instruments for LICs is currently limited, and even when available, demand has been minimal and they have not been widely used.

10. **Under certain circumstances, contingent financial instruments have some potential advantages over conventional approaches in addressing the fiscal and debt challenges resulting from exogenous shocks.** Contingent instruments could:

- Enhance predictability in public finances, to the extent that assistance is automatic. *Ex post* shock financing is, by definition, not automatic.
- Help reduce policy pro-cyclicality, as the pattern of hedging or other costs during normal times is offset by payouts during shock periods. While *ex post* financing is typically intended to be counter-cyclical, this has not always been the case (see below).
- Address liquidity needs more promptly following a shock, as instruments disburse quickly (obviating the need for procyclical policy measures), and help to preserve debt sustainability through contingent transfers.

11. **Despite their potential advantages, contingent financial instruments have been little-used by LICs.** Available market hedging instruments have not been widely used, and only a few contingent financing instruments are available from donors or international financial institutions (IFIs). The limited use of existing market-based instruments could reflect a lack of demand, perhaps stemming from the high costs of the insurance for LICs, limited capacity to develop risk management frameworks or use hedging tools, and an aversion to be seen as “gambling” public money on insurance. On the supply side, market failures such as first-mover costs or coordination problems may have constrained the development of market-based instruments (discussed further in Section III). As regards the limited availability of contingent financial instruments from IFIs and donors, this may reflect in part the difficulties in designing *ex ante* instruments that tailor support to meet actual needs and mitigate moral hazard. Recent reforms and innovations by some IFIs have focused on enhancing the flexibility and responsiveness of their *ex post* facilities, including by streamlining conditionality.

¹⁰ The insurance element in precommitted credit lines varies according to the amount of conditionality associated with the precommitment. It would be maximized in cases where the precommitment is unconditional.

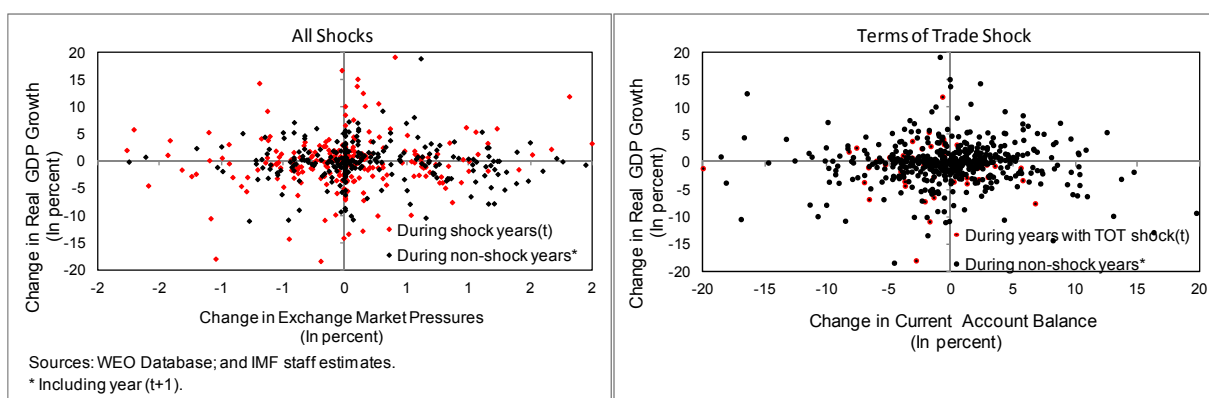
B. Conceptual and Design Issues

Tailoring *ex post* financing needs versus predictability of financing

12. **Particularly when scarce concessional resources are involved, the design of financing for shocks involves several considerations.** A trade-off exists between: (i) making the availability of financing predictable in the face of potential shocks, and (ii) “tailoring” financing efficiently to countries’ needs stemming from a shock.

13. **The initial uncertainty about a shock’s macroeconomic impact and associated financing needs hinders the ability of an *ex ante* instrument to tailor support to shock-related needs.** The financing need arising from a shock cannot be easily predicted: each shock creates different financing needs, and occurs against a particular (and, *ex ante*, unknown) macroeconomic and policy environment. This point is illustrated in Figure 3, which shows how a combined indicator of balance of payments-related shocks (to terms of trade, external demand, foreign direct investment (FDI), and remittances) has effects on real GDP growth and exchange market pressures that are widely dispersed across countries.

Figure 3. Impact of Shocks on Exchange Market Pressure, Current Account Balance, and Real GDP Growth



14. ***Ex post* instruments tailor financing amounts to actual shock-related needs.** The most tailored form of shock financing would aim to take into account all factors affecting net financing needs in the event of a shock. In this respect, *ex post* borrowing would typically be better targeted than *ex ante*.

15. **Insurance, on the other hand, can provide greater predictability if triggers are well specified and easily monitorable.** The most predictable form of shock support would be a contingent financial instrument that provides insurance for specific qualifying and easily monitorable shock events, with the amount of contingent financing fully specified in advance, and provided unconditionally. However, while pre-specified insurance removes uncertainty about the *availability* of financing, the *adequacy* of that financing may not be known until after a shock materializes.

Addressing moral hazard

16. **The design of financing for shocks also needs to address moral hazard.** The availability of *ex ante* or *ex post* shock financing may undermine policymakers’ incentives to

reduce the risk and impact of adverse shocks or help mitigate the fallout from shocks when they occur. Providers of *ex post* or *ex ante* shock financing can mitigate moral hazard through:

- **Conditionality.** Well-designed conditionality limits moral hazard by supporting policies that mitigate the impact of shocks. But it also constrains policy flexibility and could make the availability of financing less predictable.
- **Limiting coverage.** Providing partial support to particular types of shocks can maintain incentives to adopt appropriate policies, including those to contain the cost of some kinds of exogenous shocks (e.g., establishing and enforcing building standards). But disentangling exogenous from endogenous factors is difficult and imprecise, and moral hazard can remain with respect to the policy response to a shock.

III. ENHANCING PREDICTABILITY AND COUNTER-CYCLICALITY THROUGH CONTINGENT FINANCIAL INSTRUMENTS

17. **This section will consider the limited experience of developing countries with contingent financial instruments and lessons learned, and examine the factors constraining development and use of these instruments for LICs.** It will look at whether these instruments could be beneficial and effective in meeting the identified objectives, while addressing the substantial design challenges.

A. Types of Contingent Financial Instruments

18. **Contingent financial instruments can have different intended purposes.** For *liquidity* needs due to temporary shocks, instruments that allow the authorities to transfer resources across different periods can provide more predictable financing. For larger, more long-lasting shocks that raise *long-term debt sustainability* issues, intertemporal resource transfers would not suffice; in these situations, while contingent instruments would likely not be the only (or even principal) device to address financing needs, they could make a contribution to the extent that they generate present value (PV) transfers *ex post* between the country and its insurer or creditor.¹¹

19. **These instruments can be grouped into several broad types:**¹²

- i. **Instruments providing contingent financing but without *ex post* PV transfers.** These instruments do not generate losses, do not involve recurring costs, and limit moral

¹¹ Some instruments may combine both contingent financing and contingent transfers (for instance, subsidized contingent loans have a contingent grant element), but it is useful to analyze them separately.

¹² Contingent financing refers to loan disbursements or debt service deferrals contingent on a defined state or event that generate offsetting liabilities (the operation is PV-neutral, whatever the contingency). Contingent transfers refer to grants or reductions in debt service that do not generate offsetting liabilities; they generate PV transfers to the recipient country. Insurance (a form of contingent transfer) is considered to be “fairly priced” if the premium is equal to the expected value of the contingent transfer.

hazard. However, in the case of deferred repayment loans, the extent of contingent financing is limited to the amount of debt service due.

- ii. **Instruments from official creditors providing contingent transfers.** An example of this type would be a contingent debt instrument that provides transfers when the beneficiary suffers a permanent reduction in repayment capacity. Although this type of instrument would be valuable for the beneficiary, as it would provide long-term insurance against large shocks, donors may be reluctant to offer contingent transfers of uncertain magnitudes, particularly when the moral hazard associated with real resource transfers looms large.
- iii. **Market instruments.** This group includes a broad range of commodity hedge and insurance products provided commercially by the private sector. They can provide contingent transfers as well as financing. However, in practice, the instruments are only available to LIC governments when they have been tailored to ensure that the ‘supply side’ constraints are addressed (sovereign risk, moral hazard, adverse selection, contingent liabilities on the part of the insurer).
- iv. **Market instruments with IFI participation.** This category includes instruments where an IFI acts as an intermediary, guarantees a private sector hedging instrument, or where part of the risk is hedged within the IFI. The IFI participation is targeted to reduce a specific constraint on the use of a market insurance instrument, in particular moral hazard, sovereign risk, and/or the cost of insurance. These instruments can mitigate fiscal and debt risks, but there have been very few examples in practice.

B. Developing Countries’ Experience with Contingent Financial Instruments

Market instruments

20. **Markets exist for the hedging of prices of many commodities.** Commodity price volatility can be hedged by using financial instruments (financial management) or by incorporating price protection mechanisms into physical contracts (physical price risk management) to eliminate or reduce price risks. Financial instruments are available through established commodity futures exchanges, or as over-the-counter (OTC) contracts between independent counterparties. Annex II reviews considerations in using financial and physical commodity hedging instruments.

21. **Several developing countries have used market instruments to manage commodity price risks, with mixed results** (Annex III). For example, Panama has hedged fuel prices in order to stabilize consumer electricity costs with minimal budget volatility. Mexico, a major exporter, hedges oil prices to moderate the impact of global oil price volatility on government budget revenues. Sri Lanka adopted a hedging strategy for oil prices with a view to stabilizing its import bill. It is difficult to know how many more developing countries have used commodity hedging instruments as no data are produced on the value of commodity hedging by

sovereigns.¹³ But there appears to be little experience among LIC sovereigns in the use of market hedging, other than when IFIs are involved. Ghana’s experience, one of the few examples, illustrates both the potential advantages and some of the challenges for LICs in making use of hedging instruments.

22. Successful experiences of developing countries with market hedging instruments have typically been built on sound institutional frameworks, developed in broad consultation with parliaments and the public. It is important that stakeholders understand that the different exposures should be *consolidated* and that the objective of the hedge is not to profit directly from price movements, but to insure against pre-existing financial risk. In Mexico, the oil price hedging strategy is discussed in parallel with the budget, making clear the objective is to guarantee budgeted oil-related revenues. In Ghana, the decisions on forward sales of cocoa are reached in consultation with farmers and other stakeholders. The Sri Lanka program, by contrast, failed (following heavy costs associated with a put option on oil that led to pressures not to pay on derivative contracts and to legal disputes). Problems were attributed to deficiencies in the institutional framework. The level of involvement of the different stakeholders should also depend on the nature of the risk and the hedging strategy. Strategies that imply contingent liabilities to the government (as in Sri Lanka) require broader consensus.

23. Instruments should also be carefully chosen and the relevant authorities need to have a sufficient understanding of the operations. Ensuring that government officials understand the operations they are undertaking is a challenge in LICs, where pay levels for public servants may make it difficult to retain those with the necessary expertise in contracting operations. “Asian” call and put options—which guarantee the average price over a certain period, can match the horizon of the budget, and do not generate contingent liabilities—are often preferred (as in Mexico and Panama). In Ghana, a dealing team was established at the Ministry of Finance and put through an intensive training program that included training secondments with the commodity trading units of several international banks. In Sri Lanka, the zero-cost collar strategy required buying call options and selling put options. Because the oil importing company wanted to control the maximum import price (the strike of the call option), the characteristics of the put option, and therefore of the contingent liability, were not under the control of the company. Investigations following the failure of the program argued that the strike price accepted for the put had been set unrealistically high.

24. Commodity-indexed bonds have been used infrequently, and almost exclusively in emerging market and advanced economies. Many of the more well-known examples were motivated and designed for purposes other than shock-related financing; these include gold-

¹³ The exchanges and institutions involved in commodity hedging generally do not require public disclosure of commodities positions held by investors. In the United States, the Commodities Futures Trading Commission provides data by trader, decomposed into commercial and non-commercial, but does not distinguish sovereigns. It plans to require investors and index funds to disclose more information about their holdings in agricultural markets. The collection of information in this area is also complicated by the use of OTC derivatives. Many sovereigns do not disclose information on their hedging activities because of market sensitivity concerns.

indexed bonds issued by France in 1973 and “Petrobonds” issued by Mexico in the 1970s. While developing countries’ use has been very limited, Nigeria did use commodity-linked bonds in the context of debt restructuring, which has raised interesting political economy issues on incentives for repayment (Annex III). The Democratic Republic of Congo in 2008 guaranteed private loans (from China to a joint venture mining company), with contingent terms: repayments are contingent on mining profits, but the government is required to repay, with interest, any principal outstanding at end-2034.

25. GDP-indexed bonds have been used in the context of debt restructurings, but never by LICs. Examples are Argentina (2003), Bulgaria (1994), and Bosnia and Herzegovina (1998). In the case of Argentina, the GDP-linked element of the bond was tradable separately from the rest of the package, and was not callable; however, the absence of benchmarks complicated pricing and hampered the liquidity of the instrument.¹⁴ Moreover, few LICs have sufficiently timely data that are credible and of adequate quality to support the use of GDP-indexed bonds.

26. LIC experience with micro-insurance may offer some useful lessons for sovereign instruments. A small but growing number of these schemes for weather and disaster risk are available, initially piloted with donor assistance, such as weather index-based insurance for crop risks.¹⁵ Payout depends not on individual losses, but on the occurrence of a weather event at the regional level, which serves as a proxy for the losses in the region. Weather indexed micro-insurance has gained popularity because it involves low transaction costs and minimal problems of adverse selection and moral hazard. Some of the advantages of index or parametric insurance are also applicable to sovereign instruments, including greater scope for standardization of contracts (thus facilitating risk transfer to capital markets), relative simplicity and transparency (use of an exogenous variable reduces information asymmetries and need for loss verification), and lower administration costs. The index event needs to be highly correlated with loss exposure of the farmer or government. However, spontaneous development by the private sector has been limited, and few programs have demonstrated the capacity to scale up.¹⁶ Similar to constraints at the sovereign level, this seems related to missing public goods and first mover costs—upfront research and development costs, basis risk associated with too few weather stations, and initial problems in getting access to international reinsurance (Hess and Hazell, 2009).

¹⁴ In the case of Bulgaria, the GDP-indexed bond issued was callable and redeemed before the semi-annual interest supplement linked to GDP (GDP above 125 percent of its pre-restructuring level) became effective.

¹⁵ India, Kenya, and Mexico are prominent cases. In India, 3.5 million farmers bought weather index-based insurance in 2010. The World Bank is actively involved in index-based micro-insurance schemes for farmers in a number of LICs.

¹⁶ A review of 37 index insurance cases in 15 countries distilled success factors: a proposition of real value to the insured and capacity/ownership of the implementing stakeholders; a champion or leader to overcome initial set-up problems or barriers; client awareness of index insurance products; efficient delivery channels; access to international risk-transfer markets; good weather monitoring and data systems; and an enabling legal and regulatory framework (Hess and Hazell, 2009).

Instruments provided by official creditors

World Bank

27. **The World Bank provides a range of sovereign risk management products and services some of which are available or have been used by LICs (Annex III).**¹⁷

- Weather derivatives to provide insurance against drought risks. The Bank helped to develop these in Malawi (an option on a rainfall index, linking rainfall with maize production) and Ethiopia.
- The World Bank also developed a call option to help cap the price of maize imports in Malawi, by facilitating access to the South African Futures Exchange.
- A regional risk pooling scheme, the Caribbean Catastrophic Risk Insurance Facility (CCRIF), was established in 2007. The CCRIF acts as a joint reserve mechanism, backed by the international reinsurance markets, that provides coverage at significantly lower costs than Caribbean governments could obtain individually from the market. The Bank provided advisory and intermediation services and mobilized donor funding to capitalize the scheme. The CCRIF has proved its usefulness as a provider of immediate bridge financing for Caribbean governments following disasters.¹⁸
- The Agricultural Price Risk Management (APRM) mechanism, launched in June 2011 by the IFC and a private bank, is a hedging tool to help developing country farmers and agribusinesses deal with food price volatility.

Bilateral agencies

28. **A deferred repayment loan for LICs was introduced by the Agence Francaise de Développement (AFD) in 2008.** Since then, loans supporting ten projects have been approved for five countries (Burkina Faso, Mali, Mozambique, Senegal, and Tanzania). In exchange for a reduced grace period, the loan provides the borrowing country with the option to defer payments when its export earnings fall below a moving-average threshold. Once the export drop criterion is met, countries can defer amortization repayments for that year, up to a total of five times over the life of the loan (“floating grace” periods).¹⁹ Presently, all loans are in the initial five-year grace period and so there has been no experience with the deferred repayment aspect

¹⁷ The various deferred drawdown options (DDOs) available to non-LICs through the IBRD may also provide useful lessons.

¹⁸ The World Bank is exploring the development of facilities similar to CCRIF in the Pacific islands and South-East Europe. The Inter-American Development Bank has developed an insurance mechanism for countries in Central America and the Dominican Republic. This facility (the Central America Natural Disaster Insurance Facility) works in a similar way as the CCRIF but offers additional coverage for hurricane-induced landslides and also reflects a more customized approach suited for nations of all sizes.

¹⁹ If the adverse shock does not occur, the floating grace period is redeemed to the country at the end of the loan as a repayment in advance without penalties (Cohen et al., 2008). Any repayments in years 6-10 are invested and returned to the borrower in the form of principal payment cancellation at the end of life of the loan.

of the loan. The need to track the usage of floating grace periods could increase the administrative burden of deferred repayment loans compared to conventional loans.

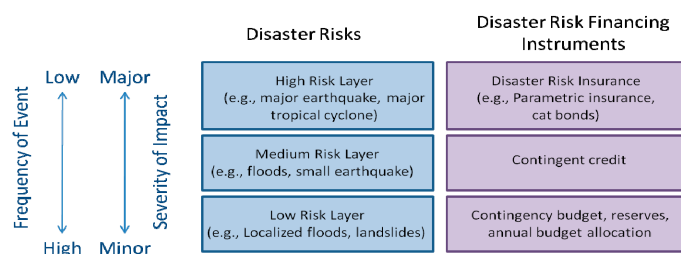
Box 1. Development of a Risk Management Framework

With the types of shocks and degree of risk specific to each economy, countries require appropriate risk management frameworks. The first step toward a risk management framework is to assess the country's principal fiscal risks, possibly by extending the debt sustainability analysis (DSAs) to include a greater focus on vulnerabilities and risks. This includes inventorying main risks by analyzing fiscal flows, the government balance sheet, and contingent liabilities. The complexity and importance of the task can be illustrated with a closer look at frameworks developed by the World Bank for application to two types of shocks common for LICs: natural disasters and extreme commodity price volatility.

Natural Disaster Risk Financing Framework

The World Bank's Natural Disaster Risk Financing Framework (NDRFF) is a "bottom-up approach" that reflects experience gained by supporting countries in the design and implementation of sovereign catastrophe risk financing strategies and property catastrophe risk insurance programs. The framework recommends the design of a national disaster risk financing strategy based on a risk layering approach to provide an optimal mix of risk retention (through reserves/contingency budget and contingent credit) and risk transfer (such as insurance):

- Low Risk Layer: Budget allocations for recurrent disasters (e.g., localized floods, landslides, minor earthquakes).
- Medium Risk Layer: Contingent credit mechanisms to finance less frequent, more severe disasters, and allowing a government to draw down funds quickly after a natural disaster.
- High Risk Layer: Disaster risk transfer instruments (e.g., disaster insurance) to finance major disasters like earthquakes, tropical cyclones and droughts. Parametric triggers such as earthquake magnitude or tropical cyclone intensity provide a transparent mechanism and rapid claims settlement.



Development of a Commodity Hedging Strategy

Six key steps underlie a commodity hedging strategy (World Bank, 2010a):

- Risk assessment to identify the risks and evaluate the base case against market scenarios;
- Documenting objectives by realistically establishing the limits of the approach, getting buy-in from stakeholders, and communicating the purpose and expectations of the strategy;
- Evaluating the enabling environment, including the governance and legal framework, links with other policies, staff capacity, information systems, public disclosure, and audit processes;
- Technical analysis, including simulations and/or scenario analysis of prototype hedging strategies;
- Building capacity of staff and minimizing key person risk; and
- Establishing robust institutional arrangements at every stage in the process.

Implementation also requires analyzing the role of various entities in decision making, payments, and auditing. Careful risk assessment is critical when using hedging tools to manage commodity price risk. For example, an oil price hedging strategy should be guided by the degree to which consumers, government, and energy companies are affected by price volatility, and by the financial relationship between public and private stakeholders, including price-setting mechanisms. The impact will depend on whether tariffs are subsidized and on ownership structure of the utilities, since in countries with large subsidies and government ownership price volatility may impact heavily on government finances, while in an environment of large subsidies and private ownership utilities will mainly bear the cost and under private ownership and low subsidies the impact of volatility is mainly felt by consumers. LICs often lack the capacity to fully evaluate the impacts of volatility of a given commodity, which is critical to designing and implementing a hedging strategy.

C. Constraints on the Use of Contingent Financial Instruments by LICs

29. **Several factors constrain the development and use of market and official instruments.** Supply is limited by coordination problems, first mover costs, and difficulties of measuring and verifying contingencies and in identifying and properly pricing high credit risks. In addition, moral hazard and adverse selection can make the provision of insurance unprofitable at any price. Where market-based instruments are available, most LICs see their cost as prohibitive. Weak demand may also reflect limited technical capacity, concerns over the opportunity cost of diverting resources from more immediate needs to pay for contingent financing, as well as political economy factors.

First mover and coordination failures

30. **First-mover costs and coordination failure inhibit market creation.** In the presence of fixed costs (e.g., overcoming unfamiliarity with the hedging instrument, market advertising), markets may never start, even though a market would be viable with enough participants (Allen and Gale, 1988, 1991). Markets for commodity price, terms of trade, and GDP-linked bonds would benefit from international risk-pooling, including by lowering costs of these bonds by bundling across countries where economic activity is not strongly correlated. Therefore, although the demand for instruments could be high if the markets were already developed, coordination failure may hamper pricing and the initial demand for these instruments. First-mover and coordination issues also apply to natural disaster insurance, where overcoming supply-side challenges requires diverse investments and complex risk modeling, often in environments where data are not readily available.

Market familiarity with LIC sovereigns

31. **Financial service providers' involvement with LICs is limited.** Many private sector providers have portfolio constraints on their exposure to LICs that limit their ability to serve as LICs' counterparties. This applies both to currency and interest rate risk derivatives, as well as to more innovative instruments for hedging commodity price and disaster risks. Although in recent years there has been a rapid increase in private sector interest in sovereign risk management for LICs, in some cases providers are not able to provide risk management solutions to countries where they have not yet operated or because legal and regulatory frameworks do not support the use of risk management tools.

32. **LIC sovereign risk may also be an issue for instruments that imply contingent liabilities.** Depending on the instrument, the investors or lenders incur sovereign risk on top of the commodity risk they are hedging. This can be perceived as high in the case of many LICs, making such instruments prohibitively expensive. For instance, issuers may fear that a country would decide to repudiate a forward contract if the price of oil is too far from the contractual price. In derivative markets, margins are designed to prevent default, but not all contingent contracts are protected by collateral, and this can result in difficult negotiations when the incentive for repudiation is strong.

Weak technical capacity

33. **Limited technical capacity also constrains LICs' use of market-based tools.**

Institutional requirements for hedging strategies, like for public debt management capacity, are often weak in LICs (Prasad and Pollock, 2011). LIC governments typically lack the capacity to assess and quantify risk profiles, structure prototype contracts, evaluate the costs and benefits of different products and strategies, negotiate with market providers, establish internal control procedures, and supervise transactions (Dana et al., 2006).

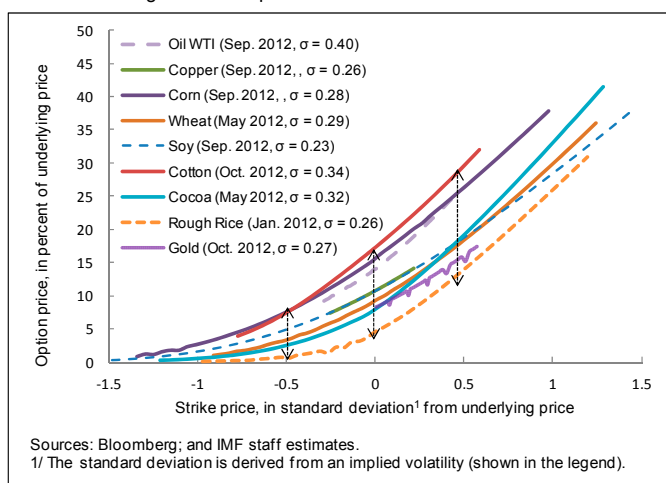
Cost of insurance

34. **The cost of providing insurance (including high administrative costs) constrains its use by LICs.** Insurance prices reflect expected losses, capital costs (moderated by the extent the risk can be diversified), and administrative costs (Annex IV). For insurance against natural disaster, high volatility requires that suppliers hold large amounts of capital; hence, the price of catastrophe insurance is typically more than double the expected indemnity (Cummins and Mahul, 2008). The actual amount of capital that must be held against a particular risk also depends on the diversification of the risk portfolio. Even when insurance is 'cheap' based solely on expected losses, administrative costs can be high, particularly in LICs. Finally, weak risk measurement capacity locally may require additional investments, such as constructing weather stations or verifying data, and administrative costs can amount to a third of the price of insurance.

35. **The price of financial hedging instruments increases significantly for higher levels of coverage (Figure 4).**

For an exporter hedging its downward risk with a put option, insuring against a price drop a half-standard-deviation below current prices typically costs less than 5 percent of the price of the underlying commodity. However, the price of insurance increases exponentially with the level of insurance—that is, with the minimum guaranteed ("strike") price. Put options are also more expensive for more volatile commodities, such as cotton and oil, because the price has to cover expected losses for the seller of

Figure 4. Put Option Prices for Different Strike Prices



the option. Futures contracts have no cost *ex ante*, but *ex post* premia (the difference between the *ex post* price and the price that has been guaranteed in the contract) have varied between -10 and 15 percent in the last ten years for 12 month futures contracts.²⁰

Opportunity cost

36. **The purchase of market hedging instruments can have a high opportunity cost, particularly given scarcity of LIC resources.** Given significant development needs, LIC governments may reasonably decide to allocate scarce resources to spending on more immediate needs, including on basic health, education and infrastructure.

Political economy constraints

37. **Decision-makers are often under pressure to address immediate needs and may be reluctant to provision for contingencies.** This is particularly problematic in LICs, where resources are especially scarce, and in countries where risk management is not embedded into policy making frameworks. Governments are often reluctant to make the investment since such decisions are vulnerable to *ex post* criticism (and associated political risk).

D. Is there a Case for Greater Use of *Ex Ante* Instruments by LICs?

38. **This section considers the potential for greater use of *ex ante* instruments and aspects of design that could reduce budget uncertainty, policy pro-cyclicality, and debt risks.** It examines the following questions: (i) Are preconditions for commodity price hedging met to offer benefits for fiscal management? (ii) How effective could contingent debt instruments be in addressing liquidity or long-term debt sustainability objectives? (iii) Can innovative contingent instruments be designed that are attractive for LICs and creditors?, and (iv) Is there an insurance-like role for reserve and debt management through “indirect hedging” of external shocks?

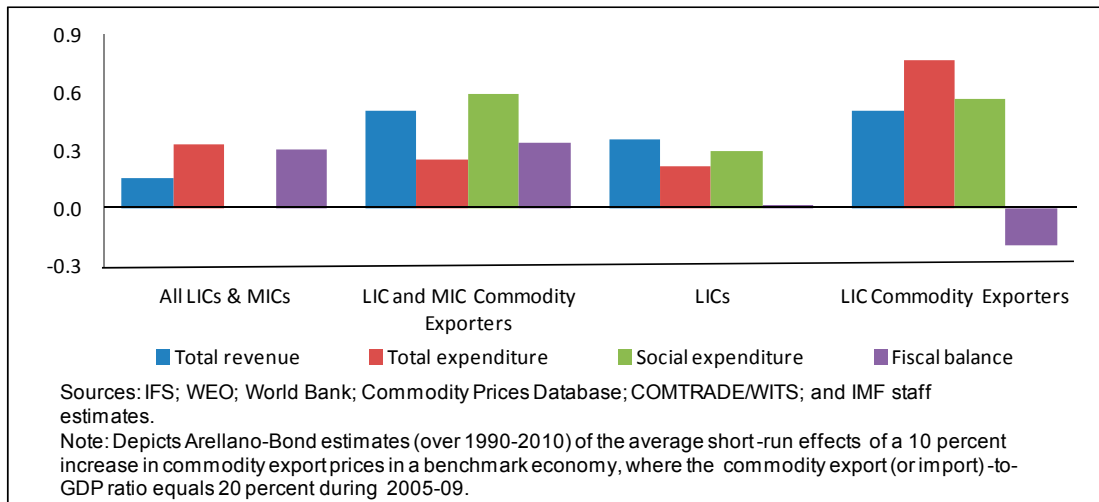
Commodity hedging instruments

39. **Commodity price shocks can have sizeable fiscal impacts.** This is especially so for those LICs for which commodity trade is large relative to GDP. Estimates for 1990-2010 from a panel of LICs indicate that commodity price increases (measured by country-specific commodity export and commodity import indices) tend to raise both tax revenues and (social and other) expenditures (Figure 5). This is consistent with the view that LIC commodity exporters tend to respond as if a commodity price increase were permanent, and increase spending accordingly. The spending channel may be slightly different in commodity importers, where import price increases create pressures to increase spending on social safety nets, or food and fuel subsidies. The net tendency is for fiscal balances to deteriorate in response to

²⁰ For futures or swaps, however, the cost of margins (which are borrowed, and thus equal to the spread between borrowing costs and the rate of return on the margin deposits) also needs to be taken into account.

commodity price increases (even, perhaps surprisingly, in LIC commodity exporters after an increase in commodity export prices), and for public debt to increase (Samake and Spatafora, 2011).

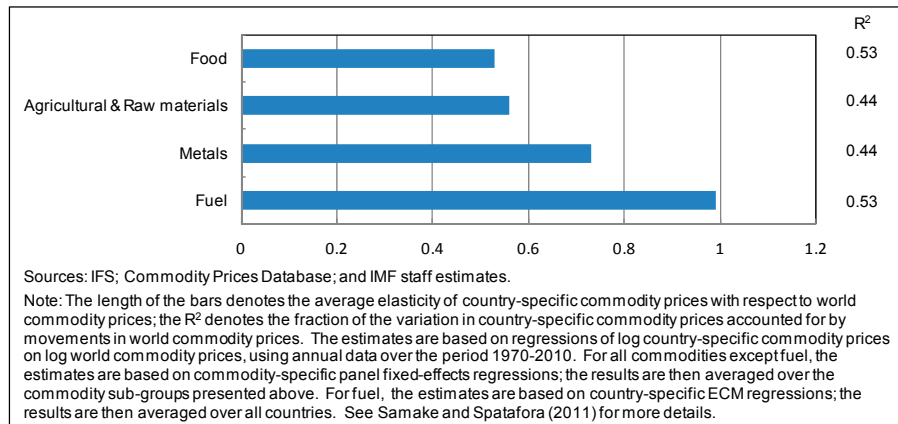
Figure 5. Fiscal Effects of Commodity Export Price Shocks
(Percentage points of GDP)



40. Commodity price hedging for key commodities could reduce some of the revenue volatility, but “basis risk” can create limitations for hedging instruments, particularly for food commodities.^{21 22}

The main fiscal impacts occur through the prices of a few of the most important commodities, suggesting that commodity price hedging for a few products could cover substantial

Figure 6. Local and World Prices: Coefficient Estimates from Cross-Country Panel Regression Analysis
(Period average)



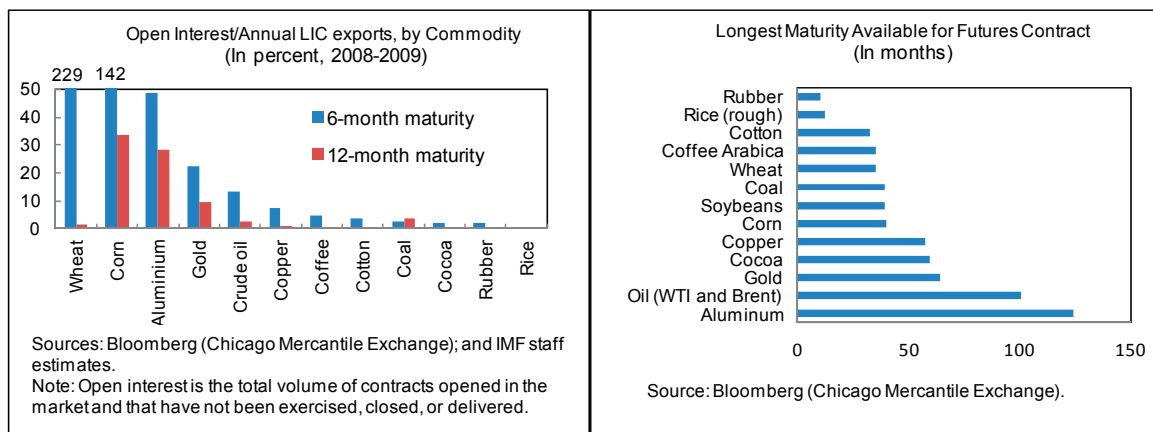
²¹ In financial terms, “basis risk” refers to movements in the index being used to measure or hedge a shock (such as the price of a commodity traded on an exchange) differing from the movement of the commodity price locally.

²² More broadly, “basis risk” can refer to the potential mismatch between the actual losses resulting from a shock and the benefit received from an instrument. This concept is similar to that of “tailoring” to shock related needs, discussed in Section II. For contingent debt instruments discussed below, the concept is expressed as the need for the instrument to be closely linked to the government’s repayment capacity.

risks. Because price variability accounts for the bulk (around 2/3) of the variation in commodity trade values, these instruments have potential for stabilizing export receipts and therefore fiscal revenues. But as local commodity prices in LICs are often imperfectly correlated with the prices of exchange-traded commodities, this basis risk reduces the efficacy of a financial hedge (proxied in Figure 6 by the relationship between local commodity prices and world prices).

41. **Limited liquidity and available maturities mean that commodity hedging is most relevant for managing the risk of shocks in the short to medium term (i.e., 6-24 months forward).** Figure 7 shows the average open interest in futures contracts at the Chicago Mercantile Exchange (CME) in percent of LICs' annual commodity exports. As indicated here, hedging of a significant share of metals, oil, and U.S. corn exports is feasible, but for other U.S. agricultural products the markets are thin. In addition, the supply of hedging contracts for some commodities vanishes at horizons longer than a year.

Figure 7. Liquidity of Futures Markets for Commodities



42. **The existence of “natural hedges” appears somewhat limited.**²³ The world prices of different commodities are positively (and increasingly) correlated. Country-specific commodity export and import price indices also tend to be positively correlated in LICs, which reduces the impact of commodity price shocks on the external accounts (as evidenced in the 2009 crisis). However, because increases in prices of commodity imports and in prices of commodity exportables (some of which are also consumed domestically) are both found to worsen fiscal positions, these positive co-movements can amplify the impact of commodity price shocks on fiscal outcomes.

Indirect hedging through asset and liability management

43. **Country authorities can structure their holdings of conventional assets and liabilities in ways that can mitigate their exposure to commodity price shocks.** Commodity exporters can invest in a basket of assets that exhibit low or negative correlations with the prices

²³ If, say, the world price of oil and food were strongly negatively correlated, then a net oil importing/food exporting country may not have as much need for market instruments to hedge the fiscal impacts of oil price shocks, as the combination of higher oil and lower food prices would have less of a net fiscal impact.

of their commodities, while import-dependent countries can invest in assets that are positively correlated with their imports (IMF, 2007). Welfare gains from such a strategy are potentially considerable (Claessens et al., 2009). These considerations could influence the asset composition of large reserve holdings, and the strategic asset allocation (SAA) of stabilization or sovereign wealth funds, as part of a broader approach to managing a range of risk exposures. Brown, Papaioannou, and Petrova (2010) illustrate possible asset allocations for commodity exporters, showing, for example, that the U.S. dollar effective exchange rate has the largest negative correlation with the price of oil (expressed in dollars), followed by the Japanese yen and the Swiss franc (Annex V).

44. **However, the SAA of reserves (importantly, the currency composition) also needs to take into account other factors.** The SAA of reserves in most LICs is likely to give more prominence to the objective of covering overall imports and external liabilities than is typical in more developed economies, in which case the currency composition of reserves should be chosen to match the currency composition of imports and (for LICs where this may be particularly important) short-term debt. This could imply some indirect hedging if a large part of imports is in commodities (a portion of reserves could then be invested in ‘commodity currencies’).

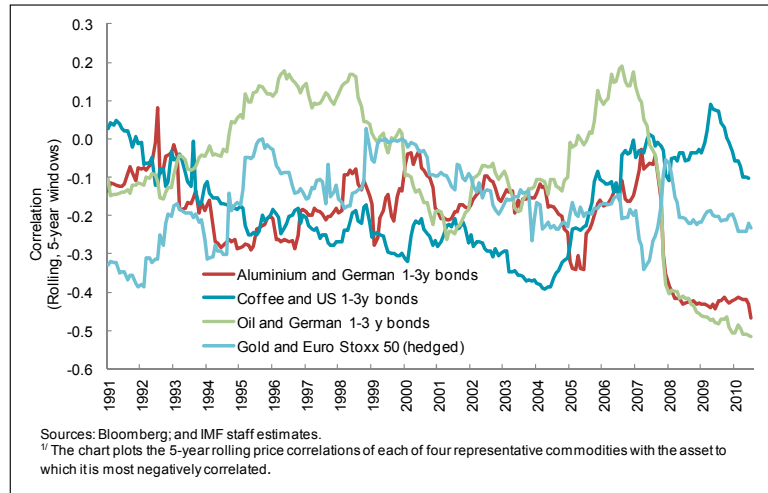
45. **The asset composition of stabilization funds and sovereign wealth funds in LICs could give more consideration to indirect hedging.** However, other factors, such as interest, credit and liquidity risks also matter for SAA of these funds (Kunzel et al., 2011). In practice, there is little evidence of countries explicitly taking the commodity price risks into account in deriving their SAAs, except for some oil-producing countries that disallow investments in oil-related entities (Pihlman, 2011).

46. **The currency and interest rate composition of debt can also provide a partial hedge against commodity price shocks.** Debt denominated in domestic currency generally offers some protection (relative to an equivalent stock of foreign exchange-denominated debt) against terms of trade shocks. When such financing is not available, which is frequently the case in LICs, debt denominated in a basket of currencies that are inversely correlated with commodity export prices can offer a form of natural hedging (e.g., Claessens, 2005). For example, to the extent that commodity prices expressed in dollars are inversely related to the dollar exchange rate, a natural hedge against shocks would be created for commodity exporters borrowing in non-dollars, and commodity importers borrowing in dollars. The interest rate structure of debt also matters. Variable-rate debt results in lower interest payments when a country is hit by a global demand shock, as interest rates tend to decline. Conversely, fixed-rate debt partially insures against negative supply shocks (e.g., the case of a commodity importer faced by higher price of imports) as the resulting inflation erodes the real value of debt.

47. Indirect hedging can, at best, provide imperfect protection against commodity price movements, however, given the difficulty of finding assets with stable correlations.

Correlations between commodity prices and a number of asset classes appear to be weak, and importantly, the magnitude of the correlations varies over time (Figure 8). This makes it difficult to assess the efficacy of a particular indirect hedging strategy, *ex ante*. More fundamentally, few LICs possess the technical expertise needed to implement complex hedging operations.

Figure 8. Rolling Correlations with the Asset with the Strongest Negative Correlation^{1/} (Selected Commodities)



48. In practice, opportunities for indirect hedging through debt management in LICs are limited. Indirect hedging becomes particularly difficult when several commodities are important for revenues and hedge ratios are not stable over time. In practice, a LIC's scope for determining the currency and interest rate composition of its debt is highly circumscribed. The terms of new external debt for countries borrowing concessionally are largely determined by donors and other official creditors. Domestic debt issuance decisions are influenced by a range of debt management objectives, as well as debt market development considerations (such as establishing a market presence or building a yield curve). For the few LICs issuing debt in international capital markets, access has been mostly in U.S. dollars, even for commodity exporters (which should prefer, for indirect hedging, liabilities in currencies that depreciate when commodity prices go down).

Contingent debt instruments: market and official

Design issues

49. The design of contingent debt instruments depends on their purposes. To address *liquidity* needs relating to temporary shocks, the indexation mechanism should allow intertemporal resource transfers. Addressing *long-term debt sustainability* needs from long-lasting shocks, by contrast, requires mechanisms that can generate transfers from the creditor to the LIC to reduce the risk of debt distress. In either case, the aim should be to link debt service payments closely to the government's repayment capacity. In that regard, instruments that are symmetric (cutting debt service in bad times, increasing it in good times) and provide relief proportional to the shock may have some advantages compared to asymmetric instruments with discrete triggering mechanisms.

50. **Choosing a reference variable for indexation involves a tradeoff between limiting moral hazard and ensuring the variable is a good proxy for government repayment capacity.** For example, commodity prices may not be susceptible to moral hazard, but could be a weak proxy for repayment capacity. Conversely, fiscal revenue could be the best measure of repayment capacity, but indexing debt to it could create perverse incentives for tax policy, revenue collection, or reporting. Some of the key considerations in the choice of reference variables are (Table 1):

Table 1. Comparison of Potential Reference Variables

Variable	Advantages	Disadvantages
Commodity Prices	<ul style="list-style-type: none"> • Low potential for moral hazard. • High quality and high frequency data. 	<ul style="list-style-type: none"> • Limited relationship between commodity prices and capacity to repay. • Investors may want to separate country risk from commodity price risk.
GDP	<ul style="list-style-type: none"> • Broad measure of capacity to repay. 	<ul style="list-style-type: none"> • Moral hazard, misreporting risk. • Data usually infrequent, untimely, and of low quality.
Value of Exports	<ul style="list-style-type: none"> • Captures price and quantity shocks. • Mirror statistics available as “check.” • High quality, frequent data. 	<ul style="list-style-type: none"> • Moral hazard, including potential disincentive to promote trade openness or to formalize trade. • Weak link to capacity to repay if export base is narrow or export levels are low.

- **Commodity price indexation** has little risk of moral hazard, as world prices are usually beyond LIC government influence. The borrower would benefit most if the local commodity price is highly correlated with the price index used and strongly affects government revenues and repayment capacity (Box 2). On the other hand, commodity price indexation does not allow creditors to separate country risk from commodity price risk, each of which can typically be priced separately in other types of bonds. Because commodity prices tend to be non-stationary and highly persistent (Cashin et al., 1999), linking debt service directly to a price index would likely lead to a sustained PV transfer, and would therefore be best suited for potential long-term debt sustainability problems. Alternatives such as linking to a moving average of prices would be less likely to generate a PV transfer and hence more appropriate when the objective is to provide liquidity support.
- **GDP indexation** can proxy for government repayment capacity, since revenues and GDP are often highly correlated, and may be preferred when commodity exports are not a key factor in government revenue. Links to alternative GDP measures (e.g., real, nominal, foreign-currency) can carry their own advantages and disadvantages and, as with commodity prices, indexing to a trend measure of GDP may be preferred when liquidity is the main concern.²⁴ Constraints to GDP indexation include data timeliness, quality, and frequency.

²⁴ Real GDP may best measure economic activity, but is not necessarily the closest match to a government’s repayment capacity. Nominal GDP in foreign currency may provide a close match to repayment capacity, especially as LIC debt service is largely denominated in foreign currency, but can also create perverse incentives (e.g., for exchange rate manipulation).

- **Indexing to aggregate exports** can be particularly appealing if the export base is broad or expected to evolve away from commodities. Indexing to the value of exports insures against both price and quantity shocks, and export data are frequent, timely, and partner data allow for some cross-checking. Because weak policies reduce exports, however, indexing to aggregate exports can introduce moral hazard concerns

Box 2. Fiscal Risk Exposure to Food and Fuel Commodity Price Shocks

Assessing the need for commodity-price related instruments requires understanding countries' fiscal exposure to commodity price shocks. Careful risk assessment is often the missing link in discussions of potential benefits from contingent instruments. While this needs to be a country-specific, sectoral exercise, some insights can be garnered from aggregate, cross-country fiscal information. A topical illustration comes from studying the fiscal vulnerabilities of LICs to a spike in food and fuel prices, a current policy concern for LICs (IMF, 2011c). Here, we focus on the distribution of impacts across countries to gain insights into the differences in risk exposures.

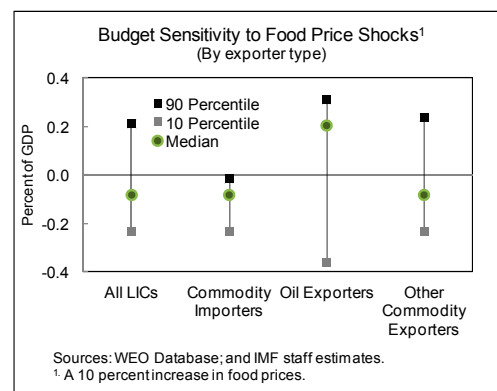
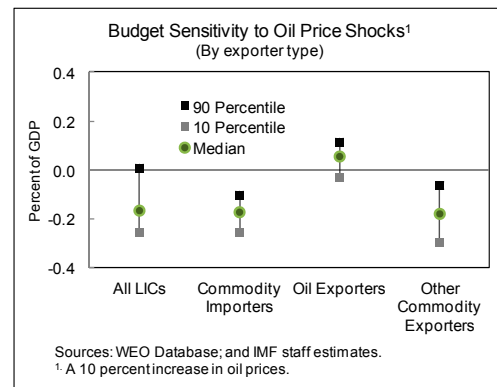
The exercise uses country-specific elasticities of fiscal outcomes to food and fuel price shocks. Budget sensitivity to a 10 percent increase in food or fuel prices is measured as the change in the overall balance relative to the change in food or fuel prices. The change in the overall balance reflects both the impact under existing fiscal policies (such as maintenance of fuel subsidies) and assumptions on estimated costs of the possible adoption of new measures (such as new tax breaks, transfers, or subsidies), based on countries' policy responses during the 2007-08 food and fuel shock.

While oil price shocks have a larger negative median impact on fiscal balances for LICs overall, the range of impacts is wider for food price shocks. Some LICs are estimated to benefit strongly from higher food prices. On average, overall balances in LICs are estimated to deteriorate by close to 0.1 percent of GDP and close to 0.2 percent of GDP for every 10 percent increase in food and oil prices.

For oil price shocks, the range of fiscal impacts is narrowest for oil exporters and widest for other commodity exporters (perhaps reflecting more variation in likely policy responses such as fuel price subsidies).

While food price hikes have a positive fiscal impact for the median oil exporter, the dispersion of impacts is wide. The dispersion also varies widely across regions.

The next step is to examine factors accounting for differences in the distribution of impacts, such as fuel subsidies/oil price pass through, food subsidies, tax structures, existence of stabilization funds and interactions between governments and state-owned enterprises. This knowledge would allow further progress in understanding countries *ex ante* fiscal exposure to commodity price shocks.



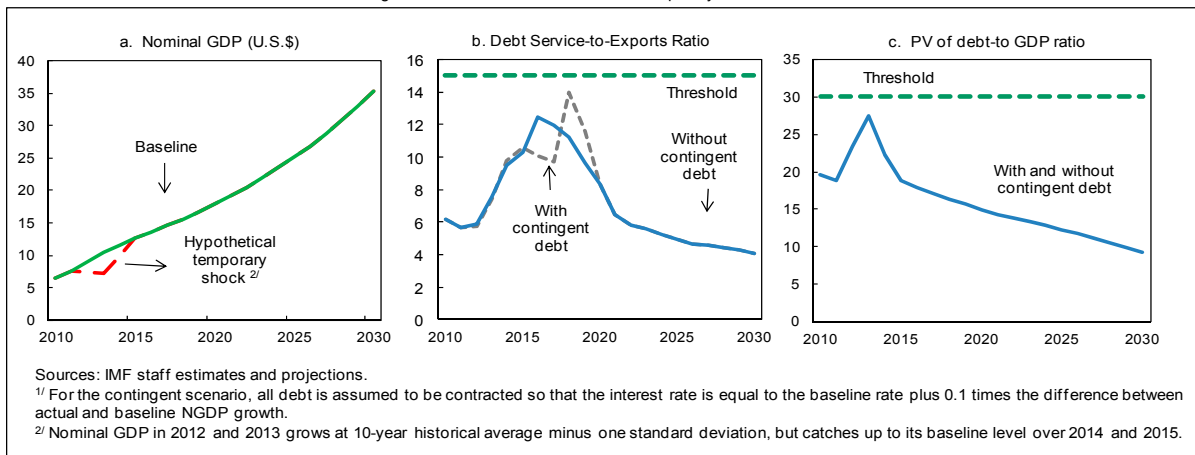
Performance of instruments in the face of shocks to repayment capacity

51. **The joint IMF-World Bank Debt Sustainability Framework (DSF) can be used to demonstrate the potential benefits of contingent debt instruments.** Using a DSA for an actual country that faces a high risk of debt distress, the simulations here illustrate the extent to which contingent debt instruments would help to address financing gaps and preserve debt

sustainability in the face of simulated (hypothetical) temporary and persistent shocks, and also highlight some design challenges.

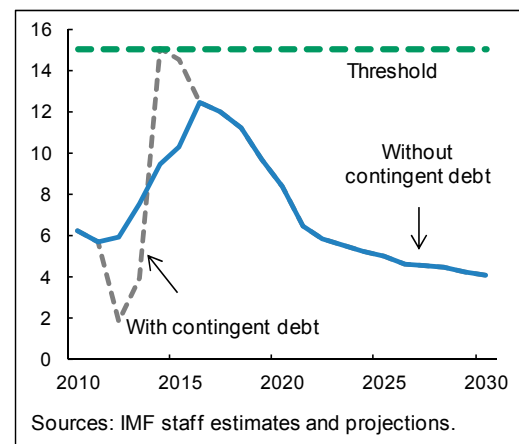
52. **Temporary reduction in repayment capacity.** The first simulation assumes a temporary slowing of GDP growth followed by higher subsequent growth, so that GDP returns to its baseline level. The interest rate on debt contracted prior to the shock is assumed to be contingent on the growth rate of nominal GDP, with slower growth triggering a lower interest rate.²⁵ Such an instrument would provide liquidity support following a temporary reduction in repayment capacity, as the contingency mechanism (reduced interest payments) decreases the debt service-to-exports ratio during the temporary shock (Figure 9). Thereafter, as GDP grows faster than the baseline, the debt service-to-GDP ratio increases. This mechanism affects interest payments only and does not impact the debt stock.

Figure 9. Indicators of External Debt-Temporary Growth Shock^{1/}



53. **Such instruments can, however, potentially magnify uneven debt service profiles (Figure 10).** Suppose, for example, the same shock were to hit at a time when debt service is relatively low but with higher debt service looming ahead. During the recovery phase, higher debt service as a result of the contingent instrument would exacerbate the unevenness of the debt service profile, perhaps magnifying potential liquidity pressures. Depending on how relief and repayments are linked to the shock, a contingent debt instrument could provide more relief than needed during the shock, and result in an unnecessarily burdensome repayment profile

Figure 10. Debt Service-to-Exports Ratio with an Earlier Shock

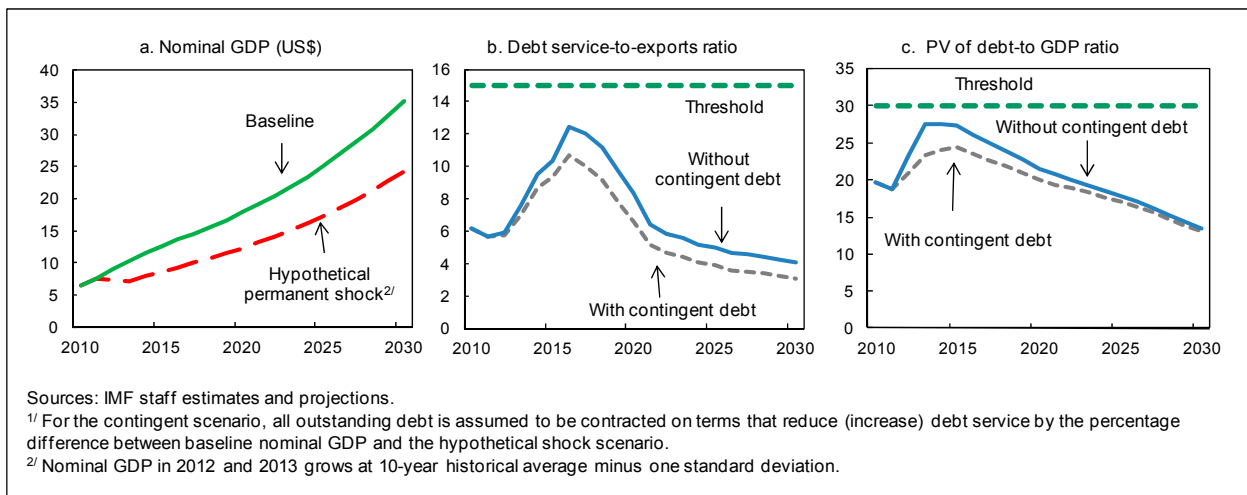


²⁵ This assumption follows the mechanics of a shock to GDP in the external DSA template, but is highly stylized and is made to simplify the simulation.

following the shock. This illustrates the complexity in designing contingent debt instruments to optimally address liquidity problems.

54. **Permanent reduction in repayment capacity.** This simulation assumes a two-year growth slowdown, after which growth returns to its historical rates and the path of output remains below the baseline. In this case, the instrument is designed so that both amortization and interest payments are based on the level of nominal GDP, which under this scenario would help to address long-term debt sustainability problems. The contingency mechanism decreases debt burden indicators following the shock as a result of lower principal and interest payments (Figure 11). Under the assumption that the level of GDP never catches up to the baseline, the instrument results in a change in the PV of debt and corresponding debt relief.^{26,27} Whether the debt relief provided in this way would exceed or fall short of that needed to maintain debt sustainability is, however, uncertain. The permanent shock to output would have broader macroeconomic effects and would likely require fiscal adjustment, all of which could influence the new sustainable level of debt and the potential need for relief.²⁸ Thus contingent instruments designed to address a permanent reduction in repayment capacity can provide meaningful relief. However, it is difficult to optimize the size of the relief provided *ex ante* since the size of the shock and the amount of required debt relief (which itself depends on the size of fiscal adjustment) are unknown.

Figure 11. Indicators of External Debt-Permanent Output Shock^{1/}



²⁶ However, the magnitude of this relief declines over time since it is assumed that relief would only be provided on existing debt at the time of the shock. As existing debt is gradually retired and new debt is acquired (that would not provide relief for a previous shock), the share of outstanding debt that provides relief to the shock decreases.

²⁷ Note that this PV transfer would be reversed in the event of a positive growth shock, i.e., debt would be increased.

²⁸ Permanent shocks may warrant more fundamental structural reform—for example, in the case of a commodity price shock that is deemed to be permanent, diversifying the economy away from the commodity in question.

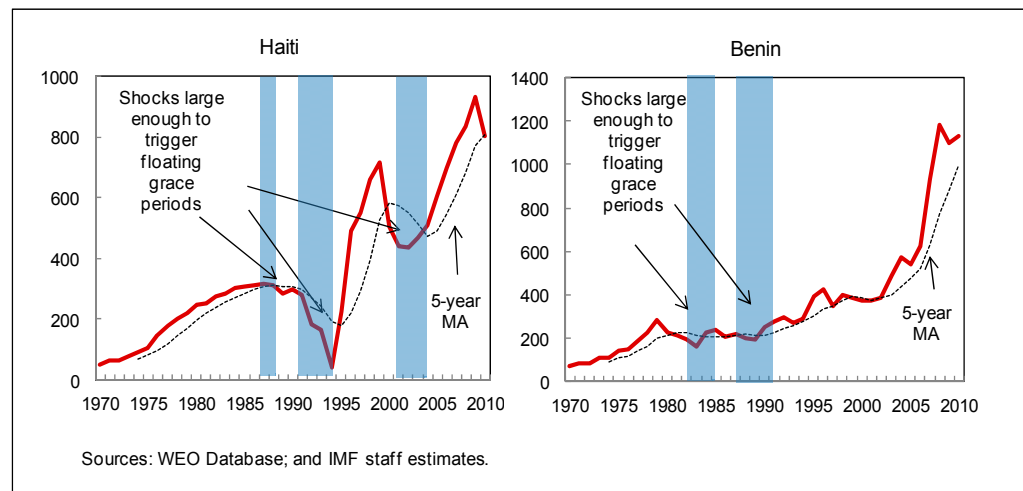
Deferred repayment loans

55. **Deferred repayment loans are a variant of indexed instruments.** For example, a loan with a “floating” grace period (such as used by AFD) provides some liquidity support in the face of eligible temporary shocks, while preserving the present value of the loan (relative to a similar non-contingent instrument with an initial 10-year grace period). The latter feature can make resource allocation more predictable for the creditor since the total amount of relief is known in advance. However, while this may be the case for some creditors, is not the case for revolving credit institutions like IDA.²⁹ Moreover, because deferred repayment loans require long loan maturities and the possibility of several grace periods, their applicability to commercial debt markets or to other creditors, such as the IMF, and the World Bank, that lend with short or medium-term maturities may be limited. Also, deferred repayment loans with discrete triggers are only weakly targeted in two respects: (i) a shock that reduces exports by 5 percent triggers the same relief as one that reduces exports by 50 percent, and (ii) a series of moderate shocks that exhausts the floating grace periods would leave the country vulnerable to a larger shock later.

56. **Two country examples illustrate how a deferred repayment loan would operate under different circumstances (Figure 12).** For a hypothetical loan issued to Haiti in the early 1980’s, for

example, floating grace periods would have been exhausted by 1994, leaving Haiti vulnerable to the sharp export decline of the early 2000’s. In Benin, sustained

Figure 12. Export Values and Instances of Would-be Deferred Repayment Loan Relief (In Millions of U.S. Dollars)



export declines would have triggered floating grace periods in two periods, covering a total of four years.

²⁹ Floating grace periods present serious challenges for revolving credit institutions, due to their reliance on reflows to finance new credit. Given that an exogenous shock hitting one LIC is likely to simultaneously affect other LICs, delayed repayments in response to a shock have the potential to introduce uncertainty into the institution’s ability to make additional long-term commitments. To manage the liquidity risk that would be generated, a revolving credit institution would need to hold additional liquidity to replace the credit reflows if borrowers invoke the floating grace period.

Mitigating potential problems with contingent debt instruments

57. **Contingent debt instruments can help address liquidity or long-term debt sustainability problems, but they have limitations.** The main advantage of these instruments is that they can offer an element of automaticity relative to standard instruments and therefore make financing for shocks more predictable. The main drawback is that they do not necessarily deliver relief in the amount needed.

58. **Various possible design features could help mitigate these drawbacks, however:**

- To reduce the risk that relief is delivered in circumstances where the country does not need it, LICs could be given the *option* of exercising their right to relief in the qualifying events or periods. Countries would have an incentive not to take the financing when there is limited need if they could save the relief for potential future shocks.
- Making relief proportional to the size of the shock could enhance tailoring, and could be combined with the “option” feature.³⁰
- Making the instrument symmetrical, with incentives for early debt repayment in the event of favorable shocks (say through additional deferral options contingent on early repayments), could also tighten the link between debt service and repayment capacity and promote countercyclical policies.
- Instruments with debt service indexed in a continuous manner to a given reference variable (which could generate uncertain contingent liabilities depending on the indexing formula and realization of the shock) could be designed to cap potential contingent transfers by predetermined bounds on the PV of transfers. Other types of instruments are also possible, where the envelope of the potential contingent transfer is known *ex ante*; one example is the Fund’s Post-Catastrophe Debt Relief (PCDR).³¹
- In the case of instruments that are intended to mitigate long-term debt sustainability risks, where the appropriate size of PV transfer is difficult to determine *ex ante*, one avenue could be to design the instrument such that it provides only liquidity support at the time of the shock, but then converts part of this support into a permanent transfer if and when it becomes clearer over time (during the life of the loan) that the shock is more permanent.³²

59. **While the likelihood that the contingent liquidity support would be limited is a concern, the instruments could still be worth considering.** The current debt outlook indicates that debt service is generally low in most LICs (Box 3), suggesting that these instruments would

³⁰ For example, if exports fell by, say, 1 percent within a quarter, an option to defer repayment of 2 percent of debt service could (but need not) be exercised. For further specified declines in exports, additional options to defer a share of debt service could be granted

³¹ Under the PCDR, which was created in 2010 to provide debt relief to poor countries facing the most catastrophic of natural disasters, the relief decision is made *ex post*, but guided by predefined principles and criteria and subject to the availability of resources.

³² For example, the instrument could provide that a specified proportion of the contingent loan (or of the debt service being deferred) would be waived if the negative shock persists for more than 5 years.

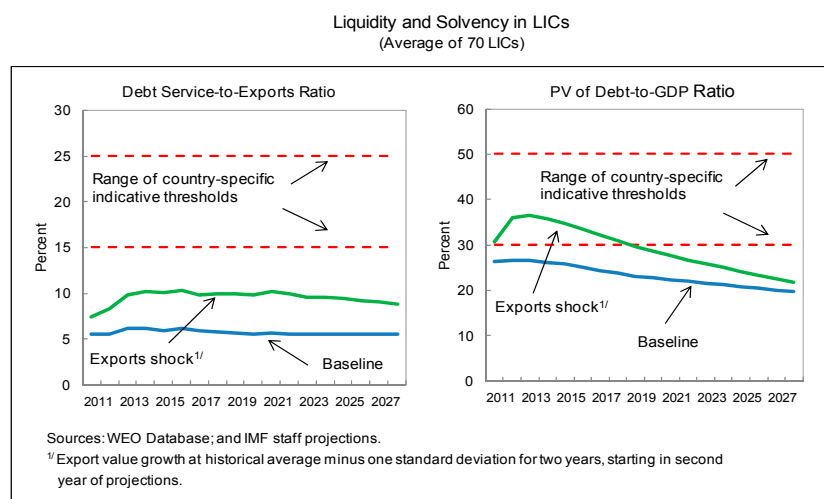
not be able to deliver significant liquidity in the event of shocks. Contingent debt instruments could still be worthwhile, however, for LICs with relatively high debt service ratios.

60. **Contingent debt instruments to address debt sustainability concerns also have potential.** Some donors (particularly MDBs) extensively use mechanisms geared to preserving debt sustainability, which adapt their financing terms to the level of debt distress (see Box 3 for the case of IDA). There may be, nonetheless a case for bilateral creditors that do not have the kinds of debt-mitigating mechanisms used by the MDBs to consider such mechanisms.

Box 3. Shocks and Debt Sustainability: Managing the Risks

Improved policy management, substantial debt relief, and a period of strong economic performance reduced debt service ratios for most LICs, although debt levels remain an issue in some. Recent LIC debt sustainability analyses (DSAs) suggest a benign outlook for the majority of LICs, with the present value (PV) of external public debt stocks and debt service projected to remain, on average, well below the lowest indicative thresholds (see figure). There are, however,

substantial differences among LICs in their debt outlook. As of September 2011, 20 of the 70 LICs for which there is a DSA fall in the high risk/debt distress categories. The World Bank, IMF, other international institutions, and donors have taken steps to ensure that LIC financing needs are met without compromising this improved debt outlook, and that the framework helps manage the debt risk of shocks.



- The joint IMF-World Bank DSF assesses the scope for new borrowing based on country-specific factors, including institutional and policy making capacity. The DSF helps to mitigate the risks to debt sustainability associated with external shocks. Investments in monitoring debt sustainability and improving debt management capacity are helping countries to better assess their ability to take on new debt.
- Adopted in FY06, IDA's grant allocation framework provides an ex ante response to the risks of future debt distress revealed by the DSF. Under this framework, IDA provides grants to those IDA-only countries facing moderate or high risk of debt distress (thus reducing future debt service obligations in response to the likelihood of the country facing an unsustainable debt burden that could result, among others, from shocks). (The "traffic light" system determines the grant/loan composition of new financing, with countries at low, moderate, or high (or in debt distress) risk of debt distress receiving credits, 50 percent credits and 50 percent grants, and grants, respectively.) Nineteen countries at high risk of debt distress received their entire FY2011 allocation on grant terms. Of total IDA FY2011 commitments of US\$16.3 billion, 17 percent was provided on grant terms. These grants help to contain the negative impact of exogenous shocks on a country's debt sustainability. Some other multilateral development banks (MDBs) and OECD-DAC donors also adapt the terms of their financing to the debt sustainability outlook.

Risk pooling: an example of how it might work

61. **Since commodity price shocks, in particular, can have opposing effects on different countries, there is scope for these countries to pool the risks they face.** There are many ways that this could be done. Consider a pooling arrangement whereby contingent loans to a group of countries are matched by time deposits (or bonds with coupons) from another group of countries. This instrument could be used to exploit natural hedging opportunities that arise from bringing together exporters and importers of a specific commodity, while taking into account coordination, sovereign risk, and political economy constraints.³³ When a specific commodity price (for example, oil) exceeds a certain threshold, the importers of that commodity would automatically borrow from the financial vehicle (the ‘Pool’), while the exporters of that same commodity would automatically deposit funds in the Pool.

62. **Contingencies would never generate losses; they would only trigger loans or deposits that are reversed later.** No insurance premia (or any other recurrent cost) would need to be paid *ex ante*. The size of deposits and loans would be proportional to deviations of the commodity price from the threshold price, but the schedule and amount of principal and interest repayments would not fluctuate with the price of the commodity.³⁴ Deposits would earn market rates and lending rates would match those of competing instruments, so the instrument would always be neutral in net present value.

63. **The instrument would encourage savings in good times.** Access to loans from the Pool would provide automatic financing when the country is hit by a shock, but countries would deposit equivalent amounts in the Pool when terms of trade are favorable. As deposits and withdrawals would be automatic, transparent, and apolitical, savings would be protected from the governance issues that have affected stabilization funds. In order to prevent incentives to default on the promise to pay into an insurance pool during good times, penalties such as the restriction on future access to the pool could be imposed.

64. **The maturity of the loans (and therefore of the matching time deposits) would need to be long enough to insure against persistent commodity price shocks.** Because repayments would not be contingent, longer maturities and a smooth repayment schedule would be needed to ensure net disbursements are countercyclical. For instance, for a Pool insuring against oil price shocks, maturity could be set to eight years.³⁵ Different financial vehicles—and different maturities—could be used for different commodities.

³³ See Araujo, Espinoza, and Patillo (2011) for a more detailed discussion of the instrument design.

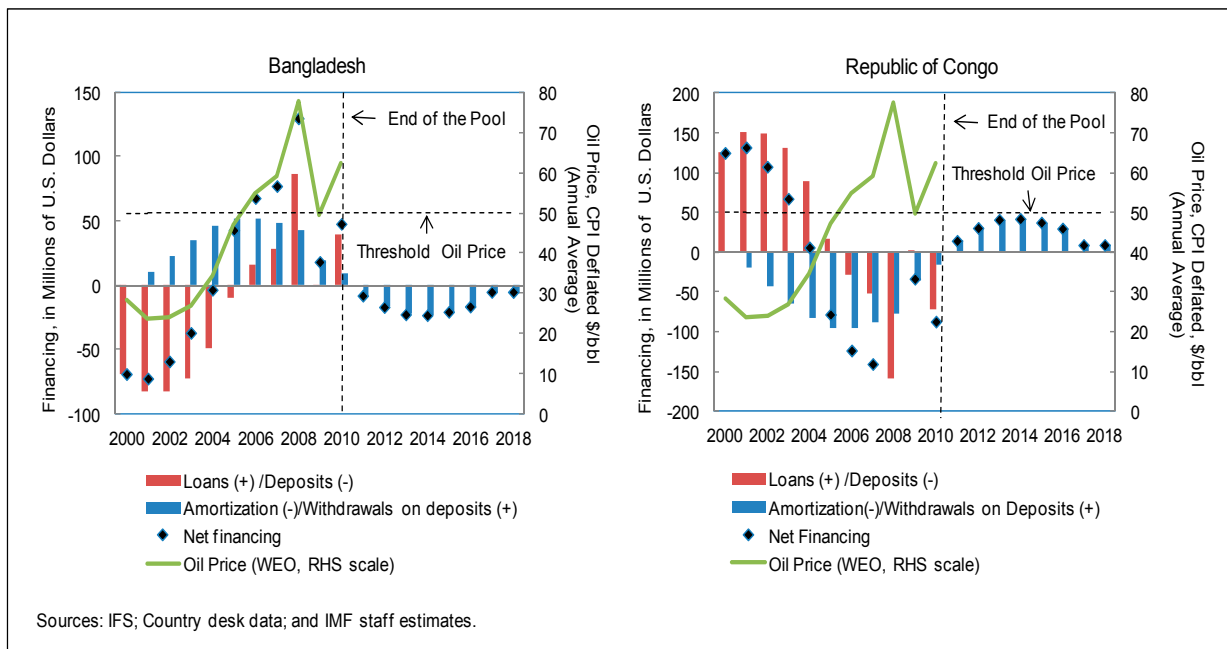
³⁴ For an oil exporter (importer) that pre-commits to cover, say, US\$100 million of exports (imports), an increase in the commodity price to 10 percent above the threshold would trigger a deposit (loan) of US\$10 million. The share of the oil balance that is insured would be specified in the contract.

³⁵ Cashin, McDermott, and Scott (2002) find that cycles in oil prices last around 72 months.

65. **The institutional structure of the Pool would need to provide for a monitor and guarantor role.** Monitoring would ensure that Pool members remain solvent and liquid in good times, while a guarantee mechanism would protect deposits. The stigma attached to defaulting or repudiating an arrangement would also limit the risk that solvent members default or refuse to honor their contract at the time they have to deposit funds. If the initial demand for Pool resources was unbalanced (if the net supply of funds does not equal zero), three different mechanisms could be activated: (i) the volume of the contracts supplied or demanded could be scaled down to guarantee balance, implying rationing; (ii) the borrowing and the deposit rates could be changed to increase (or reduce) demand from the group that is in short (respectively) excess demand, or (iii) outside loans could balance the Pool.

66. **A two-country example illustrates the Pool's countercyclical features.**³⁶ The instrument is set to finance 5 percent of the net oil balance of Bangladesh (a large oil importer) and of the Republic of Congo (a large oil exporter) when oil prices deviate from US\$50 dollars per barrel (thresholds based on moving averages or futures could also be used). If the Pool had been in place in 2000-2005, when oil prices were low Bangladesh would have saved US\$260 million in the Pool and the Republic of Congo's gross borrowing would have reached US\$650 million (Figure 13). As oil prices increased after 2006, Bangladesh would have obtained fresh loans from the Pool and drawn down deposits made earlier, while the Republic of Congo would have made deposits.

Figure 13. An Example of Disbursements and Deposits from Bangladesh and Republic of Congo



³⁶ In a study of GDP risk pooling, Imbs and Mauro (2007) show that small pools can provide enough gains from risk-sharing when the countries in the pool are diverse, and they note that compliance with contracts is a risk so that pools may be more realistic politically when they build upon preexisting regional arrangements.

IV. ROLE OF THE INTERNATIONAL COMMUNITY: RECENT EXPERIENCE AND PROSPECTIVE STEPS

67. **This section looks at recent experience in making external financing for LICs more responsive to shocks, and lays out some possible future avenues that could be pursued.**

After a brief description of the financing roles of the IMF and World Bank, it summarizes recent reforms aimed at making *ex post* financing more responsive to members' needs, including to shocks, and discusses potential enhancements. We then consider what role the international community, particularly the IMF and World Bank, could play in addressing constraints to the development and use of contingent financing instruments by LICs.

A. The Roles of the IMF and World Bank in Shock Financing³⁷

68. **The mandate to assist members in meeting temporary balance of payments needs gives the IMF a clear shock-financing role.** The IMF provides financial support only for those LICs with BoP needs that remain after other financing and macroeconomic adjustment is considered. This residual financing role implies that IMF financing mainly be determined *ex post*. IMF financial support to LICs takes the form of concessional loans with relatively short maturities (8-10 years). The IMF also provides medium-term support to LICs facing protracted BoP imbalances, and this support can be scaled up quickly if necessary in the event of shocks.

69. **The World Bank provides financing for development.**³⁸ The Bank draws on a range of instruments to support LICs facing shocks, helping them to avoid abrupt cuts in core spending on social needs and infrastructure maintenance that can have lasting impacts and reverse development progress. The Bank also helps countries enhance their resilience to shocks, including by financing investments that foster economic diversification and enhancing capacity for disaster preparedness, as well as for risk and debt management. This work can reduce the impact that shocks have on individual economies.

B. Recent and Ongoing Reforms to *Ex Post* Financing Instruments

70. **Recent reforms have enhanced the range of instruments provided by the IMF and World Bank to deliver more predictable and timely financing to LICs in the event of exogenous shocks.** Some of these instruments were deployed during the 2007-2008 food and

³⁷ World Bank and IMF (2010) discusses the both distinct and complementary financing roles of the Bank and Fund. Bank and Fund roles are also complementary in other areas discussed below, such as helping LICs build capacity to manage risks, and support for asset and liability management. Provision of services is often coordinated, if not joint, focusing on areas of respective institutional expertise.

³⁸ The main purposes include development policy lending, investments in education, health, public administration, infrastructure, financial and private sector development, agriculture, and environmental and natural resource management.

fuel crisis and the subsequent global recession, and helped LICs to protect core development and social sector spending in the face of revenue shocks.³⁹

International Monetary Fund

71. **Since 2005, reforms to IMF concessional financing facilities have put increased emphasis on shocks support.** This followed two decades in which the Fund's financial support to LICs was channeled mainly through three-year financial arrangements, and shocks were addressed primarily by augmenting financing under these arrangements.⁴⁰ Recognizing improved macroeconomic management in many countries and the growing importance of short-term shock-related financing needs, a series of reforms was undertaken that culminated in the creation of two short-term financing instruments in January 2010—the Rapid Credit Facility (RCF) for emergency support, and the Standby Credit Facility (SCF) for short-term support. These complement medium-term support available under the ECF and the non-financial Policy Support Instrument (PSI), created in 2005 for LICs with broadly stable and sustainable macroeconomic positions and no financing need. While there is no automatic link to any IMF financing instrument, an on-track PSI can facilitate access to RCF and SCF financing. The new RCF provides rapid access to financing without *ex post* conditionality, and its relatively low access ceiling is doubled in the event of exogenous shocks. The SCF provides short-term financial arrangements and is applicable to shocks as well as many other circumstances.

72. **Recent reforms have made IMF support for LICs more predictable and responsive.** While most IMF financing facilities are *ex post* mechanisms, recent innovations have introduced elements of contingent support. First, the concessional SCF is available on a precautionary basis. This means that LIC members with an on-track SCF-supported program can choose to postpone drawing until they experience a shock. Second, for LICs faced with the most catastrophic natural disasters, the IMF Post-Catastrophe Debt Relief (PCDR) Trust provides debt flow relief on debt service falling due to the IMF for two years, and under certain circumstances can provide debt stock relief. Finally, the consolidation of emergency support instruments under the RCF has made it easier for countries to access financing rapidly in the event of any urgent balance of payments need and without *ex post* conditionality.

73. **The forthcoming 2012 review of IMF facilities for LICs could explore ways to refine the concessional financing architecture.** General areas for review could include the scope for:

- ***Enhancing the predictability of shock financing***, for instance by broadening options for contingent support, including making access to Fund resources automatic under certain circumstances.

³⁹ See, for example, IMF (2009) and IMF (2010d).

⁴⁰ In the absence of an existing arrangement in a particular country, financial support in the context of shocks had been provided only through new medium-term programs or on non-concessional (GRA) terms, and, for a period, natural disaster and post-conflict support was subsidized.

- **Tailoring financing terms more closely to debt service capacity**, for instance by providing higher levels of concessionality to the poorest LICs, and temporary interest relief during systemic shock periods.
- **Focusing PRGT resources more on counter cyclicity** by modifying access policies.

World Bank

74. **In response to the food, fuel, and financial crises, the World Bank made flexible use of its range of instruments, and augmented this use with new and innovative approaches.** Those approaches included IDA fast tracking, frontloading, the Global Food Crisis Response Program (GFRP) and the launch of the pilot Crisis Response Window (CRW). The CRW has subsequently been made a permanent feature of World Bank's support to LICs facing external shocks. The Bank's emphasis on *ex post* financing mechanisms reflects many of the issues discussed above, including the high opportunity cost of contingent instruments in an environment where policy makers struggle to respond to more immediate needs in the face of profound resource scarcity. Several efforts and innovations have enhanced the World Bank's ability to tailor its support to individual country needs:

- **New IDA credits/grants.** IDA's response to the food, fuel, and global crises entailed a significant increase in commitments and disbursements (22 and 17 percent respectively) in FY09-10 compared to FY07-08. For example, IDA provided support through the Productive Safety Net Program in Ethiopia to address short-term food needs and the underlying causes of rural food insecurity and, through a Regional Program fund, helped address shocks that cross national boundaries with the Africa Emergency Locust Project.
- **Front loading of new IDA credits/grants.** During FY09-10, IDA provided the flexibility for 34 IDA countries to front-load their available resources by about US\$1.8 billion to support new operations to respond to the needs emerging from the food and fuel crises and the global financial crisis.
- **Fast tracking new IDA credits/grants.** IDA established a US\$2 billion facility in 2008 to accelerate funds to help countries finance expenditures needed to maintain economic stability and sustain growth, address volatility, and protect the poor.
- **Additional financing.** IDA has streamlined procedures to provide additional financing to well-performing projects to allow a more rapid response to exogenous shocks. Examples include Nepal's US\$48 million Social Safety Nets Project and Nicaragua's US\$10 million Agricultural Technology Project.
- **Supplemental financing.** Supplemental financing may be provided for IBRD and IDA development policy operations for which an unanticipated gap in financing jeopardizes a reform program that is otherwise on track. Conditions include that the borrower is unable to obtain sufficient funds from other lenders on reasonable terms or in a reasonable time, and that the time available is too short to process a further freestanding Bank operation.
- **Re-programming disbursements for existing IDA operations.** IDA can restructure operations within a country's existing lending portfolio to support recovery from crisis and

emergency situations. This can be done on a stand-alone basis or combined with additional financing.

- **Global Food Crisis Response Program (GFRP)** provides financing and technical advice to countries affected by the 2008 crisis. The rapid financing facility has been raised to US\$2 billion, and additional grants of US\$356 million are available through three externally-funded trust funds. As of June 2011, GFRP financing of US\$1.5 billion has reached nearly 40 million vulnerable people in 44 countries.⁴¹
- **IDA's Crisis Response Window (CRW)**. To help countries respond to economic crises while protecting IDA's core long-term development financing, IDA created a Pilot Crisis Response Window (CRW) in FY 2010 to provide additional resources to 56 non-oil exporting IDA-only countries; commitments in these countries were increased by about US\$1.5 billion in FY10-11. A dedicated US\$2 billion CRW has been established in IDA16 to provide additional flexibility to support all IDA countries in both immediate response and crisis preparedness. The CRW can provide additional allocations to IDA countries (i) in the aftermath of a major natural disaster, and (ii) in the case of a severe economic crisis that is caused by an exogenous shock and affects a significant number of IDA countries.

75. **The Bank uses these instruments to provide suitably concessional cash flow relief to LICs facing exogenous shocks.** World Bank instruments, used individually or jointly, can support individual country needs and conditions enabling governments facing an economic shock to protect core social sector and development spending.

IMF and World Bank support for asset and liability management

76. **Beyond their financing roles, both the IMF and World Bank can help countries protect against shocks by supporting enhanced asset and liability management.** Operational and practical advice on managing asset and liability portfolios can be provided through existing TA channels, taking account of commodity exposures. This advice covers both high-level decisions on strategic asset allocation and on debt management strategy, as well as advice on accessing specific derivatives markets or in structuring instruments to tap international capital markets. For commodity producers, this will be increasingly facilitated by resources available through the IMF Topical Trust Fund on Managing Natural Resource Wealth. Similarly, the planned IMF Topical Trust Fund on Sustainable Debt Strategies would provide TA related to managing liabilities.

Other institutions and donors

77. **The EC has used various initiatives designed to preserve essential fiscal spending in recipient countries in the face of adverse external shocks.** The Vulnerability Flex (V-Flex) was established to provide temporary financing during 2009-10 to African, Caribbean, and Pacific (ACP) countries affected by the global financial crisis. It provided a more predictable

⁴¹ World Bank (2010b).

source of financing in the event of a shock, and (as it relied on forecasts) could disburse rapidly. Its main limitation was that coverage was limited to revenue/fiscal financing shortfalls.⁴² The Asian Development Bank's Special Program Loan provides large-scale lending to crisis-affected developing countries where an international rescue effort is being mounted. The African Development Bank's Emergency Liquidity Facility addresses urgent liquidity requirements as a result of the withdrawal of international investors, cancellations of credit lines, or the closure of debt and equity markets. The Inter-American Development Bank's Liquidity Program for Growth Sustainability aims to address sudden reversals in capital flows that threaten the progress of economic and social development. Annex VI summarizes some other mechanisms now in place or that have been used in the past.

C. Contingent Financial Instruments for LICs: Future Considerations

78. **The starting point for any effort to improve the tool kit of risk management instruments available to LICs is to build the technical capacity of LICs to measure and manage risk.** This capacity is a necessary condition for the use of any risk management tool. International organizations such as the IMF and World Bank have key roles to play in supporting capacity building efforts.

79. **Contingent financial instruments can complement *ex post* financing.** Contingent instruments cannot match the targeting of *ex post* instruments, but are one way to provide for related financing that is quick-disbursing (and thus more likely to be counter-cyclical) and predictable. When well-designed, contingent instruments can mitigate the budget uncertainty, policy pro-cyclicality, and debt risks that otherwise arise from exogenous shocks. And while there are important constraints on their use, several of these constraints can be addressed. There is substantial scope for greater use of market hedging instruments, and room for development of market and official sector contingent debt instruments. Other innovative ideas such as pooling oil price risks could be further explored.

80. **Market failures and externalities in “insurance-type” markets suggest a possible role for IFIs.** These institutions can help overcome coordination problems that hinder the development of markets, intermediate LICs' access to market instruments, and develop mechanisms to help diversify some of the external risks faced by LICs through global pooling. The World Bank, IMF, and other agencies and donors can also play an important role in helping to bridge the knowledge gap through efforts to overcome weaknesses in fiscal risk management that now limit LICs' use of some types of instruments. The World Bank continues to be very active in this area. Many of the specific actions outlined below to address constraints, facilitate access to market hedging instruments and develop contingent debt instruments, are areas where the Fund could consider taking steps.

⁴² With the V-Flex recently expired, the EC is considering: (i) returning to the earlier Flex framework, (ii) extending the V-Flex (with possible modifications), and (iii) developing a fully integrated shock facility that coordinates financing provided by the various official donors (including the IMF and World Bank).

Addressing constraints

81. **Some of the factors that constrain LICs' use of contingent financing instruments can be addressed.** Regional and global institutions may be able to help overcome first-mover and coordination failures. When private markets lack the financial depth or experience to deal with elevated sovereign risk, donors and IFIs have sometimes shared in the risks associated with hedging transactions, helping to expand the reach of these tools, driving down their costs and making the tools more widely accessible.

82. **Policy advice and technical assistance can help address constraints associated with weak technical capacity.** This support can also raise familiarity and the 'comfort level' of officials in LIC governments. Extensive World Bank technical assistance has already helped countries like Ethiopia and Malawi. Building capacity for the development of risk management frameworks and providing advice on the necessary legal, regulatory, and governance frameworks to support the good use of contingent financing instruments is a useful role for the international institutions.

83. **Subsidies for hedging or insurance instruments can mitigate demand-related constraints, but there are also other forms of support.** Subsidies have the potential to distort the price signal and may discourage structural reforms that a government might take to mitigate risk (such as diversification and infrastructure investment). Although often conceived as temporary incentives, political economy considerations can make subsidies difficult to phase out. On the other hand, without subsidies many LICs will not be able to absorb the cost of implementing shock-related financing programs. Support for public goods (such as developing standards and legal frameworks, and data dissemination) can also be effective in reducing first-mover costs, reaping benefits from risk pooling, and thus cutting the cost of hedging.

Facilitating access to market instruments

84. **Several approaches might be needed to improve LICs' access to market hedging instruments.** The lessons from the experience of non-LIC developing countries suggests that many LICs could also benefit from using them, but that they need certain types of assistance. Technical assistance and capacity building on risk management frameworks are the core priorities. Direct IFI participation—helping to structure and execute physical and financial hedging transactions, intermediation of hedges, and risk-sharing in the credit exposure—could alleviate specific constraints (credit risk, high cost of insurance) so as to expand the reach of these tools. Other specific actions to facilitate LICs' use of these market-based instruments might include:

- Analyzing country-specific fiscal risk exposure to commodity price shocks.
- Further developing and communicating principles of good risk management frameworks for commodity or terms of trade risks, with supporting country assessments.
- Cultivating donor interest in subsidizing the cost of hedging products.

- Providing advice and technical assistance on pricing models and on standardizing financial products.
- Introducing standardized indices, such as for relative commodity prices. (These could also be useful for indexed debt products.)
- Offering data verification services and promoting adherence to data dissemination standards to allow a more reliable identification of contingencies.

Some of these types of actions are incorporated into the World Bank initiatives described below.

Exploring interest in contingent debt instruments

85. **The international community, including the IMF and World Bank, may be able to play roles in facilitating the use of contingent debt instruments.** The IFIs could contribute to relieving constraints that have made it difficult for markets to develop. These instruments could be useful for countries that are most susceptible to shocks. Possible actions could include:

- ***Gauging interest from debtor countries.*** IFIs and donors could continue their dialogue with LICs on the potential benefits, but also the limitations, of contingent debt instruments. This could help to form a better view on the kind of shocks that borrowers would like to address.
- ***Fostering interest from creditors.*** To help overcome risk diversification concerns and coordination problems, the IFIs could apply expertise and cross-country knowledge to encourage simultaneous issuances for several countries.⁴³ To increase market liquidity for contingent debt of a particular country, the international community could consider introducing such instruments in debt restructuring negotiations when a large share of the country's debt is under discussion.
- ***Advising countries on optimal instrument design.*** To maximize effectiveness, contingent debt instruments should be tailored to individual country circumstances. An instrument that may benefit one country may not benefit another. At the same time, IFIs could encourage consistency in design to facilitate market development.
- ***Helping to improve the timeliness and quality of the data.*** Ensuring that indicators accurately reflect the state of the economy is crucial for countries to reap the full benefits of indexation. Improving the timeliness, quality, and frequency of data is critical for some forms of indexation, including those that would address a wide range of circumstances (e.g., GDP indexation). To help overcome constraints to the production of quality data or the

⁴³ One proposal would coordinate issuance of GDP-indexed bonds by a group of small emerging market countries situated in different regions (Perry, 2009). Coordinated actions by a number of borrowers to issue GDP-linked bonds could overcome the problems of critical mass and illiquidity. Having a number of countries issuing these instruments simultaneously would also help establish the comparability needed to ease pricing and enhance the diversification benefits for investors. Importantly, this could have a demonstration effect and might make it easier for other developing countries, including LICs that are mature stabilizers, to issue similar instruments over time.

potential to misreport data, the international community could emphasize the importance of independent statistical entities and enhance technical assistance to improve data. However, overcoming the challenges in this area requires a long-term commitment.

World Bank initiatives

86. The World Bank Group is exploring options to expand the use of hedging and pooled insurance instruments to more LICs. These include:

- *Deepening and expanding advisory services in the area of risk financing.* The Bank is taking a broad view of the range of instruments available to governments and encouraging the development of frameworks that draw on solutions customized to their specific needs. This work begins with support to help governments better quantify the impact of shocks.
- *Facilitating governments' access to risk management markets* by helping to structure and execute financial and physical commodity risk hedging, and by building legal, regulatory, and technical capacity to use these instruments. This could involve using the Bank's market infrastructure and information systems.
- *Expanding the IFC APRM* by rolling-out the APRM product with two other financial intermediaries focused on LICs in Sub-Saharan Africa, North Africa, and the Middle East, and exploring interest from multilateral and regional development banks in risk-sharing in APRM facilities. This could also involve extending the client base to include government entities (state-owned enterprises, banks, and sovereigns).

V. CONCLUDING QUESTIONS

87. The paper emphasizes that exogenous shocks such as natural disasters and large changes in terms of trade can complicate LICs' fiscal and debt management and can threaten core development spending. Is the staffs' discussion of their main economic effects generally accurate?

88. The paper suggests a complementarity of *ex ante* and *ex post* mechanisms in providing shock-related financing for LICs. Is there a need to enhance the availability and design of both types of mechanisms?

89. The paper identifies a number of constraints to the use by LICs of market hedging instruments. Is there a greater role for the international community in helping LICs to make use of hedging and other contingent financing instruments?

Annex I. Categories of Contingent Finance for Natural Disasters and Types of Hedging Instruments

1. The major source of catastrophe (CAT) risk capacity globally is the traditional reinsurance market.¹ CAT risk capacity is concentrated in the United States, Europe, and Japan, but most LICs transfer some CAT risk via the catastrophe risk reinsurance market; Insurance Linked Securities markets supplement the traditional reinsurance market. Extreme natural risks are also traded in the weather derivatives market, including contracts based on temperature variability (mostly in the U.S. and Europe) and rainfall transactions (a growing market in developing countries), where demand from multilateral institutions working with developing countries on drought and excess rainfall risk mitigation has been important. This is the market segment where multilaterals have been more active in trying to participate by expanding the availability of these instruments for developing countries.² The OTC rainfall market in developing countries is near US\$1 billion annually, mainly concerning India's Crop Insurance Scheme and Mexico's Drought Safety Net.

2. Catastrophe risk transfer can be very costly, with premiums sometimes several times the expected loss. The inherent volatility (and uncertainty) in losses from natural disasters, particularly for severe, infrequent events, means substantial capital must be held to meet obligations to the covered counter-party. A cost of capital must also be factored in, therefore, to compensate capital providers for the opportunity cost of putting their capital at risk in the insurance enterprise. The high costs deter LICs, whose governments may prioritize more immediate needs. With fluctuating market conditions, the cost of renewing CAT risk transfer exposes countries to the price volatility.

Market Limitations for Commercial Players

3. While risk transfer markets for natural perils in emerging economies are developing, insurance penetration in LICs remains very low. One of the main limitations in terms of market access is related to the weakness of the primary insurance sector and/or financial intermediaries in general. Others, like the lack of demand or institutional and regulatory constraints, also create obstacles to the development of international markets.

4. Investments in local technology and infrastructure are needed to overcome these supply side challenges. Key areas include underwriting and the legal and regulatory environment. Global financial markets have not been in a position to invest in these areas because they are not able to capitalize on those investments. However, experience has shown that once the barriers of entry have been overcome and a lead or reference price has been set (after proper underwriting), the barriers to entry are removed for all other market players, and therefore the followers can be more competitive due to their lower investment.

¹ In market terms, CAT risk encompasses mainly earthquake, windstorms (hurricanes), and winter storms.

²The OTC rainfall markets include traditional weather station settled contracts, but also alternative settlements like satellite imagery to track droughts.

Table 1. Summary of Contingent Financing Instruments for Natural Disasters

Category	Product	Benefits	Costs/Risks/Constraints
Risk Transfer	Indemnity CAT Reinsurance	No basis risk Less technical work/investments involved in product design (follow the fortune approach) Technology transfer expertise from international markets being replicated worldwide for decades Less restriction of geography/peril for a specific contract Liability is transferred from gov't balance sheet to financial markets	Works better in mature markets with solid local delivery systems and insurance regulatory framework Market focused on asset based approach (concepts of interest for sovereigns like emergency relief, low income housing, safety nets are considered usually non insurable) Difficult to create investor confidence on potential moral hazard when sovereign risk is involved Up front premium One year protection is the norm Counterparty credit risk
	CAT Bonds	No credit risk Access to a broader source of funding (Capital Markets + Insurance) No moral hazard Multi-annual protection (lock pricing for a period of 3 years usually) Liability is transferred from gov't balance sheet to financial markets	Basis risk High up-front costs Investors' appetite for only very low probability events (rarely below 1 in 75 year triggering events) Limited geography/perils by transaction Historically has traded above CAT Reinsurance for similar risk layer Non cancellable It is regulated as an investment security (not insurance) and therefore the legal framework can be complicated for sovereigns
	CAT Derivatives (ex. Insurance Loss Warranties)	Limited basis risk (settled on third party industry loss indices or tailor made indices) Simplifies entry point for new investors into the Insurance Linked Securities Space Liability is transferred from gov't balance sheet to financial markets	Works only when there is a mature a credible methodology to generate an aggregate industry loss estimation Annual protection only
	Weather Derivatives	Flexibility with regards to incorporate tailor made indices Multi-annual protection available Flexibility with regards to perils/geography of protection	Sufficient historic data and ground measurement tends to be limited in LIC High up-front costs Counterparty credit risk
Risk Financing	Contingent Credit Multilaterals (Ex. CAT DDO)	Lower costs No basis risk (Use of softer triggers that can be linked to gov't actions like Declaration of Disaster) Flexibility on financial terms (including a longer term than any of the other risk financing alternatives) No counterparty credit risk	Financial impact is retained in gov't balance sheet Institutions like the World Bank have an absolute size limit of 0.25% of GDP, which is very limiting in LIC because the potential impact of natural disasters can usually be substantially higher
	Structured Financing Vehicles	Limited credit risk (fully funded vehicles) Possibility to generate positive cost of carry (service of debt repaid through the vehicle) Multi-annual availability	Basis risk (triggers/risks are usually limited on a similar fashion as done in the CAT Bond space) Financial impact is retained in gov't balance sheet
Structured Risk Financing	Finite Risk Contracts	Can be used to combine risk retention (through reserving), risk financing and risk transfer elements into the program Provides flexibility to include a wider spectrum of risks (from lower to higher probability events) Can combine both soft and tighter parametric triggers Multi-annual contracts (5 year terms are not uncommon) Contract includes cancellable clauses	Few countries have legislation in place to regulate this instruments Lack of supervision has led some financial intermediaries in developed countries to use this tools to hide liabilities Legal language is sophisticated

Annex II. Summary of Financial and Physical Commodity Hedging Instruments

Table 1. Summary of Financial Commodity Hedging Instruments

Product	Benefits	Costs/Risks/Constraints
Futures	No upfront costs. Provides ability to lock in forward prices through a financial contract.	Prices are "locked in" and hedger has limited ability to take advantage of positive price movements that may occur in the future. Creates unknown and unpredictable future liability since hedger will owe the market counterparty if the market moves in an adverse direction. Requires financing of a credit line or a credit guarantee. Requires managing cash flow /liquidity requirements to support (potential) daily margin calls.
Options	Provides ability to lock in maximum (minimum) prices while still providing hedger with ability to take advantage of positive price movements that may occur in the future.	Has an upfront cost, which is market-driven and volatile but can range from 5-12% of the value of the underlying price for a 6-18 month coverage.
Collar Contracts	Limits price exposure to within a price band or "collar" that has both a ceiling and a floor. Upfront costs can be lower since hedger is simultaneously buying a call option and selling a put option.	Creates unknown and unpredictable future liability since hedger will owe the counterparty if the market moves below the price floor. Requires financing of a credit line or a credit guarantee. Requires managing cash flow /liquidity requirements to support (potential) daily margin calls.
Swaps	No upfront costs. Provides ability to manage two commodity exposures, or financial flows, at the same time.	Creates unknown and unpredictable future liability. Requires financing of a credit line or credit guarantee. Requires managing cash flow requirements to support (potential) daily margin calls.
Commodity-linked loans	Could be used on more macro level to connect borrowing or financing programs to the performance of a specific commodity index.	Can be more complex to structure. May not be effective as a hedge for specific commercial exposures.

Table 2. Summary of Physical Commodity Hedging Instruments

Product	Benefits	Costs/Risks/Constraints
Forward Contracts	Since forwards are physical supply contracts, the risk management solution is embedded in the supply contract and there is no need for a separate contract / documentation. Pricing of forward contracts can be customized to the needs of the hedger – prices can be fixed, floating, or include caps/floors, and collars (a pre-agreed range or band). Depending on the pricing formula used, forwards will have same benefits as the financial products described below.	May be complex for government to implement if importers/ exporters are privately held. Depending on the pricing formulas used, forwards will have same costs/risks/constraints as the financial products described below.
Physical Option Contracts	Provides ability to lock in maximum (minimum) prices while still providing hedger with ability to take advantage of positive price movements that may occur in the future.	Has an upfront cost, which is market -driven and volatile but can range from 5 -12% of the value of the underlying price for a 6 -18 month coverage.
Physical Collar Contracts	Limits price exposure to within a price band or "collar" that has both a ceiling and a floor. Upfront costs can be lower since hedger is simultaneously buying a call option and selling a put option.	Creates unknown and unpredictable future liability since hedger will owe the counterparty if the market moves below the price floor. Requires financing of a credit line or a credit guarantee. Requires managing cash flow /liquidity requirements to support (potential) daily margin calls.

Annex III. Developing Country Experiences with Market-Based Risk Management

A. Direct Use of Market Tools

Panama–Hedging the Import Price of Fuel Oil

1. Panama has had a generally successful experience with its strategy of hedging hydrocarbon risks. The Tariff Stabilization Fund (TSF), which seeks to mitigate the impact of oil price volatility on consumer electricity costs, had previously required substantial fiscal transfers (fiscal transfers to the TSF in 2009 were US\$96 million). In December 2009, the Government approved a National Strategy for Hedging the Risk of Hydrocarbons based on the use of Asian call options on fuel oil prices, which function as a form of price insurance by creating a price ceiling. Hedging against the contingent liability associated with the fiscal transfers to the TSF provides greater budget certainty without introducing greater volatility to consumer electricity costs. The program is being expanded to cover liquefied petroleum gas (LPG) for domestic household consumption and diesel fuel for public transportation.

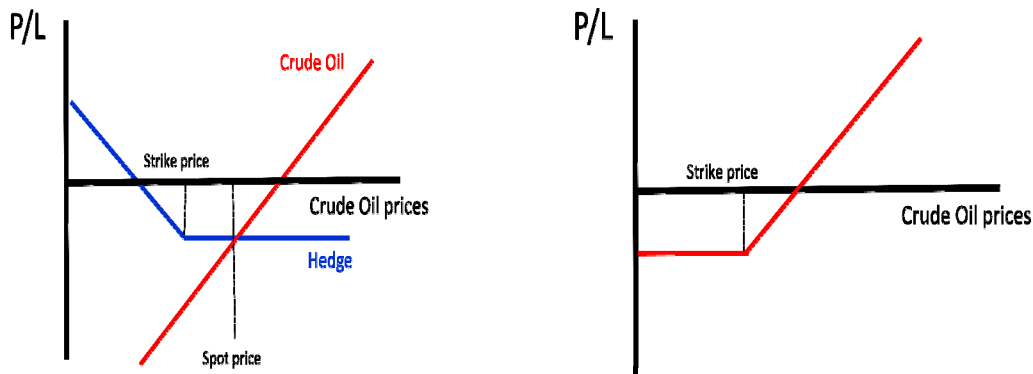
Mexico–Hedging the Export Price of Oil

2. Mexico's oil hedging strategy has helped to moderate the effect of oil price volatility on the government budget. The Mexican Government has implemented oil price hedging programs since the 1990s to manage potential reductions in oil revenues. The current Oil Hedging Program hedges the value of Mexican oil exports at a price consistent with that in the Federal Budget Law for the next fiscal year, and complements the Oil Income Stabilization Fund (OISF) established in 2000, which covers budget gaps when oil revenues fall below the levels established in the Federal Income Law. The Oil Hedging Program is therefore part of a broader strategy to manage oil price volatility.

3. The Central Bank executes the Oil Hedging Program on behalf of the Mexican Government. The OISF's operation is the responsibility of the Technical Committee formed by the Ministry of Finance. Among its responsibilities, the Committee decides whether an oil price hedging program will be implemented and, if so, defines its general guidelines. An Oil Price Hedging Sub-Committee then determines the characteristics of the hedging instruments and coordinates the execution of the oil hedging program. The Central Bank is responsible for collateral management, and prepares reports on hedging strategies and results of the hedging program. The profits and losses of the hedging program become part of the OISF.

4. The Central Bank buys *put options* to execute the Hedging Program. As an oil producer, Mexico has an initial *long* position in oil and as a result benefits from increases in oil price but loses when the price of oil decreases. It will therefore benefit from a strategy which hedges a downside move in oil prices while keeping the benefit of an upswing in prices. The combination of a *long* oil position and a *long put* option limits losses when the price of oil falls but profits from an increase in oil prices (see Figure below). This strategy (*long* oil and *long put*) is also called a *Protective Call Option*.

Final exposure with hedge



5. The Central Bank purchases One-Year *Asian Term Put* options, whose design is consistent with the objective of hedging the value of oil exports over the full fiscal year (rather than, for example, at any particular expiration date). The payoff under an *Asian* term option is determined by the difference between the strike price and the average price of oil set over a predetermined period of time (e.g., the budget year). The Central Bank also reduces *basis* risk by buying *put* options on *Maya crude* (which Mexico produces), rather than derivatives on typical benchmarks such as WTI, Brent, and Dubai.

Sri Lanka—Hedging the Import Price of Oil

6. In January 2007, as oil prices were increasing, Ceylon Petroleum Corporation (CPC), the national company in charge of importing and refining oil products in Sri Lanka launched a hedging strategy. The hedge instrument used by the CPC is a “collar,” which creates a price band with a ceiling and a floor. A collar structure is less expensive than a call option since, in exchange for a reduction in the cost of the premium, the hedger (in this case the CPC) agrees to limit (and in effect, give back) the benefits received when prices move below the level of the pre-agreed floor. In an effort to reduce the cost of using options, the CPC chose to use *zero-cost collar* contracts where the premium *paid* for the purchase of a call (for buying a hedge against price increases) is exactly offset by the premium *received* for the sale of a put option (for selling a hedge against price decreases).

7. In exchange for the reduction of cost, Sri Lanka effectively renounced its claims on the benefit of falling prices, in effect promising to pay the difference when prices moved below the level of the floor. Because the CPC was looking for upside price protection at levels close to the current spot price, the collar structure reflected a very narrow price band, between US\$94 and US\$137/barrel for crude oil and between US\$124 and US\$139 for gas oil. The contracts, established to hedge 14 million barrels (i.e., 40 percent of imports) had 12-month maturities. When market prices fell dramatically after having reached a maximum of US\$147/barrel in July 2008, CPC faced a financial liability since prices fell below the floor established by the collar. The costs, estimated at US\$1 billion in December 2008, led to the resignation of the chairman

of the CPC, a government investigation, and international legal proceedings that remain in progress.

Ghana—Hedging the Import Price of Oil

8. The Government of Ghana mitigates the impact of higher world petroleum prices on domestic consumers by absorbing the costs. These subsidies are invariably unfunded, however, placing stress on the fiscal situation and undue risk on petroleum service providers. In October 2010, the Cabinet implemented the Petroleum Price Risk Management Program, a hedging program that aims to stabilize the domestic market by guaranteeing the provision of petroleum products at affordable rates.¹

9. The hedging program involves the purchase of call options from counterparty banks. The call option specifies a strike price—a cap on the price of crude oil purchases over the period of the option—thus insuring against price increases above the cap. Increases in prices above the cap are settled in cash by the counterparty banks in Ghana’s favor. The choice of a call option was to ensure that Ghana retained the option to buy at the open market price if the price of crude oil fell below the cap. To contain premium costs, hedged amounts were limited to half of the estimated monthly demand. The hedging account recorded losses in the first two months of the program when crude oil prices remained below the strike price, but by end-May 2011 had accumulated a surplus of US\$87 million (net of premium costs).

10. The hedging program is implemented by a Dealing Team in the Ministry of Finance and Economic Planning (MFEP) and overseen by a National Risk Management Committee appointed by the President and under the aegis of the MFEP, with oversight from the Cabinet. The committee has representatives from the (a) Ministry of Finance and Economic Planning, (b) Ministry of Energy, (c) the Attorney General’s Department, (d) the Bank of Ghana, (e) the Ghana National Petroleum Corporation, (f) the Cocoa Marketing Company, and (g) the Volta River Authority. The Dealing Team received intensive training.

11. The immediate benefits of the hedging program have seen a stabilization of the prices of finished petroleum products, which were partially protected by the hedge as crude oil prices soared from US\$80 per barrel in October 2010 to US\$125 per barrel in April 2011. The key challenge is how to educate the public and manage expectations, underscoring to the public that the hedge is primarily a price protection strategy and not a mechanism for generating surpluses to subsidize the price of petroleum products. This dialogue with the public will be important to in order sustain public buy-in of the program. There are, however, emerging concerns about transparency, as the hedging operations are conducted off-budget which makes it difficult for both the government and the public to assess the costs.

¹ The commencement of production of crude oil created a new price risk exposure for the government. Cabinet also authorized the use of put options to insulate oil tax revenues from a fall in oil prices. All anticipated fiscal receipts from crude oil have been fully hedged to the end of 2011.

Ghana–Hedging the Export Price of Cocoa

12. The state-owned Ghana Cocoa Board (Cocobod) and its Cocoa Marketing Company (CMC) manage and control Ghana’s cocoa exports. The government fixes the buying price for cocoa from small farmers at a discount to prevailing market price, and effectively transfers the price risk onto the Cocobod. On the selling side, the Cocobod implements a hedging strategy using forward contracts to insulate itself from world price volatility and to stabilize foreign exchange earnings and government revenues. Its forward contracts collateralize offshore financing for domestic purchasing of cocoa beans.

13. Using three-month forwards arranged bilaterally with its many buyers, the CMC agrees to deliver a specified amount of cocoa beans at a pre-determined strike price, which differs for each buyer. Sales volumes are based on the Cocobod’s expected yields for the coming crop season. The purchasing months cover October to May for the main crop season (major season) and June to September for the light crop season (minor season) and allow for quality control processes and transportation to the ports; shipment begins between December and June.

14. The hedging program is seen as insurance and not a speculative venture. In 2009/2010, forwards averaged US\$2,907 per ton, compared to an average US\$3,241 spot price. The difference represents a marginal loss; however, marginal gains have been posted over the last five years and ten years, respectively. Any losses arising out of the strategy are passed on as reduced margins to the Cocobod and the Government. However, to reduce potential losses the government has recently established a stabilization fund, financed by a share (0.58 percent) of any profit from export sales.

15. Ghana’s nearly six decades of experience with cocoa marketing practices and hedging strategy reflects institutional arrangements established by the Cocobod for risk management. The other stakeholders and the general public understand the objectives of the hedging program and its contribution to supporting farmers’ incomes and the economy.

B. Market Tools Used with Assistance from International Organizations

Ethiopia–Hedging & Arranging Contingent Financing to Improve Responses to Drought

16. The Ethiopian Productive Safety Net Programme (PSNP) was designed to address the near continuous rainfall deficit, which directly affects the rain-fed farmers and pastoralists that comprise the majority of the population. The PSNP is intended to replace ad hoc emergency appeals on a near annual basis with a more permanent program targeted on the chronically poor. In 2006, the World Food Programme (WFP) and the Ethiopian government launched a pilot drought index insurance scheme, targeting five million transiently food-insecure people. The program was intended to provide extra capital for the safety net programme in the event of an extreme drought, and the index was based on historical rainfall data and a crop water-balance model. The scheme was internationally reinsured to recover up to US\$7.1 million in the event of a severe drought, and the first year’s premium of about US\$1 million was paid by the United States Agency for International Development (USAID) on behalf of the Ethiopian government.

No payments were triggered and the policy was not renewed in 2007 because donors preferred the option of contingent grants as part of the PSNP program.

17. The pilot has served as a model for the design of a more comprehensive risk financing framework under a collaborative effort of the World Bank, WFP, DFID, and the Ethiopian government. An improved sub-national drought index known as Livelihoods, Early Assessment, and Protection (LEAP) was incorporated into this wider risk management framework. The LEAP index is linked to donor contingency funding, providing timely delivery of cash to additional distressed households through the PSNP in the event of a drought. The contingency funding supports transient food-insecure households that are not covered by the PSNP, contributing to the sustainability of the overall PSNP by preventing asset depletion and increased levels of destitution amongst additional households as a consequence of drought. In 2008, the World Bank approved a US\$60 million drought index contingent grant in support of this framework, replacing the weather insurance contract. In 2010, the Bank provided another contingent grant of US\$50 million, with DFID and USAID together adding US\$110 million.

Malawi–Hedging the Risk of Severe & Catastrophic Drought

18. Following a 2005 drought that brought widespread hunger to much of Southern Africa, the government requested assistance in developing *ex ante* risk management tools to improve planning and reduce dependency on humanitarian aid in the event of a drought-related crisis. Technical assistance and capacity building to support these efforts has been provided under an IDA operation called the Malawi Agricultural Development Program Support Project. A *weather derivative* was proposed as a management tool for coping with the impacts of catastrophic drought. With financial support from DFID, Malawi purchased three annual contracts for weather risk protection from 2008 to 2011. The fourth transaction, to cover the maize production cycle in 2011/12, was completed in October 2011. The government used funding from the IDA operation to finance the premium.

Malawi--Hedging the Import Price of Maize

19. In June 2005, the government announced a new approach to managing food shortages by using South Africa Exchange Market (SAFEX)-based instruments to help cap the cost of food imports. The World Bank provided technical assistance to support this operation, including education on the SAFEX market, training on futures and options, risk assessment, help in building consensus with stakeholders, communication with potential market providers, and assistance in contract negotiation.

20. Since the government was concerned not only about price increases, but also about logistical constraints and delivery performance, the call option contract was customized as an OTC (“over-the-counter”) contract which would give more flexibility and better coverage than a standardized financial instrument. First, price protection was provided on a local delivered basis, thus combining the price for white maize on the exchange in South Africa (SAFEX price) with transport costs to Malawi. Second, the contract carefully specified terms for physical settlement so that it could be used as a contingent import strategy if needed. Uncertainty about the extent of the food shortage, levels of commercial imports, transportation constraints,

performance of local traders, the humanitarian response, and efficiency of procurement processes made the contingent import aspect of the contract very attractive to the government.

21. The *over-the-counter (OTC) call option*, which represented one of the first instances of macro-level hedging by an African government, covered imports of 60,000 mt of white maize with a value of US\$17 million, and a premium payment of US\$1.53 million. DFID provided budget support to the government for purchase of the contract. Later in 2005, as prices increased and the food shortage grew more severe, Malawi exercised the call option and allocated the majority of the maize to humanitarian operations. The maize purchased through the option contract had a better delivery performance than most other procurement procedures, and during the delivery period spot prices rose to US\$50-90/mt above the ceiling price of the contract, following increases in the SAFEX white maize price and transport costs over the period October to January.

Caribbean—Risk Pooling to Finance and Hedge the Risk of Hurricanes and Earthquakes

22. The Caribbean contains many small developing states, and is prone to both earthquakes and hurricanes. Single events can devastate entire economies. Given the potential of climate change and sea-level rise to exacerbate hurricane hazards, catastrophe risk is a high priority for Caribbean governments in their pursuit of sustainable development. CCRIF was developed to help mitigate the short-term cash flow problems small developing economies suffer after major natural disasters. A critical challenge is often the need for short-term liquidity to maintain essential government services until additional resources become available. Although *ex post* disaster funding from bilateral and multilateral agencies can be an important component of a government's catastrophe risk management strategy, over-reliance on this approach has obvious limitations. Donor assistance often takes months to materialize, and usually supports specific infrastructure projects. CCRIF represents a cost-effective way to pre-finance short-term liquidity to begin recovery efforts for an individual government after a catastrophic event, thereby filling the gap between immediate response aid and long-term redevelopment. The cost of catastrophe insurance is usually much higher than the pure risk premium, mainly because of the cost to the insurer of backup capital to cover claims for events affecting multiple communities; over the long term, premiums cost more than losses. Between 1970 and 1999, for example, catastrophe insurance premiums in the Caribbean were about 1.5 percent of GDP, but average losses per year (insured and uninsured) were only about 0.5 percent of GDP.

23. With new modeling techniques for estimating and pricing the risks of natural disasters, along with new insurance instruments, the donor community can help the poor cope with the economic repercussions of disasters before they happen.

24. In 2005, at the request of a group of Caribbean governments, the World Bank and other partners began work that led to the establishment in 2007 of the CCRIF—the world's first regional insurance fund. The CCRIF offers hurricane index-based insurance based insurance under which payouts are based on objective, local indices tracking hurricane wind speeds, excess rainfall and earthquakes that serves as a proxy for actual loss.

25. Caribbean governments may purchase coverage which triggers for a ‘one-in-15-year’ hurricane and a ‘one-in-20-year’ earthquake, with maximum coverage of US\$100 million available for each peril. The cost of coverage is a direct function of the amount of risk being transferred, ensuring no cross-subsidization of premiums and a level playing-field for all participants. Donors provided start-up funds, and the Bank later arranged a US\$20 million reinsurance “cat swap” that transferred a portion of risk to capital markets. By pooling their risk, the 16 member countries have saved about 40 percent compared to premium costs had they negotiated individually on commercial markets. Because the facility does not need to tally the damage after a catastrophe, payouts are immediate: for example, after the January earthquake CCRIF made a US\$7.75 million payment to Haiti.

C. Nigeria’s use of Commodity-Linked Bonds in Debt Restructuring

26. Following the oil price collapse in the late 1980s, Nigeria found it difficult to remain current on its external debt obligations. After having first agreed to a Paris Club rescheduling in 1991 with its official creditors, Nigeria the following year agreed with its London Club creditors on regularizing its commercial debt obligations, including by exchanging US\$3.4 billion of commercial debt for US\$2 billion in par bonds expiring in November 2020. The par bonds carried an interest rate of 5.5 percent per annum the first three years and 6.25 percent thereafter. The principal payment was collateralized by U.S. Treasury zero coupon bonds. As the debt exchange entailed a significant decrease in the present value of outstanding claims, the exchange included a claw back provision in the form of a value-recovery right or warrant attached to the bonds. The provision specified that the warrants would trigger payments in the case of higher oil export prices over a preceding six months period. The oil price threshold was set at US\$28 per barrel to be adjusted in line with movements in the US producer price index. In addition to determining whether the warrants are in or out of the money, the oil prices also determine the amount falling due with higher prices triggering higher payments subject to a cap of US\$15 per warrant per coupon date. Close to two million warrants were issued.

27. Initially the warrants traded together with the bonds, but in 2002 they were detached from the bonds and started trading separately. The warrants were out of the money until November 2000. During 2001-06, the warrants were in the money six times and out of the money six times. In this period, industry sources (as quoted in FT, February 2007) noted that some payments were made with a delay. Since May 2007, the warrants have been continual in the money.

28. In President Obasanjo’s second administration (2003-07), efforts were directed at extinguishing Nigeria’s external public debt in the context of major debt buy-back operations. Following the buy-back of Nigeria’s Paris Club debt, the par bonds were bought back in late 2006 and the prepayment of other London Club obligations—with the exception of the oil warrants—followed in early 2007. The government also attempted to buy back the oil warrants, but at a price of US\$220 only around 400,000 warrants were tendered in March 2007.

Annex IV. Comparative Analysis of Insurance Costs: Developed and Developing Country Markets

1. Despite the conventional wisdom that insurance costs are higher in developing countries because of such things as transaction costs and weak regulatory frameworks, the price of insurance depends on other factors as well. Insurance pricing is based on three major components:

$$\text{Price} = \text{Capital Loadings} + \text{Administrative Costs} + \text{Risk}$$

2. The *capital loadings* component reflects the costs to the insurer of holding capital, which depends both on the expected payout under an insurance contract and the expected volatility of losses. The insurance company needs to have enough capital to survive extreme events, and more volatile businesses lines generally require more capital. Since the capital allocation for each business line is calculated based on the insurer's broader risk portfolio, international markets transfer some of the diversification benefits for risks in areas not considered peak risks. (Peak risks are those with the highest monetary exposure for the insurance company.)

3. Apart from exceptions such as Caribbean hurricanes (which accumulate with insurers' exposure to the southeastern United States), developing country catastrophe risks typically are non-peak. This translates into lower capital loadings: the ratio of the capital allocation for CAT risk in the southeastern United States can be four to eight times that applicable to non-peak CAT risks, such as an earthquake in Chile or Pakistan.

4. *Administrative costs* vary greatly between business lines or countries, due to local constraints, portfolio size, regulatory frameworks, and other factors. One argument for using parametric insurance mechanisms in LIC's is to reduce transaction costs, since parametric instruments are less susceptible to moral hazard and require no monitoring. The challenge, however, comes with the frequent need to improve risk measurement at the local level, such as by constructing weather stations or shoring up data verification mechanisms, in order to facilitate the use of parametric insurance mechanisms. Without this, cost/premium ratios can vary greatly and be difficult to compare. Market size also matters: for example, a contract distributed directly by an international reinsurer that uses public information generated by a third party agency and with a notional value over US\$1 million would imply about a 1 percent cost/premium ratio; by comparison, for a contract distributed by a local agency in a middle-income country, the same ratio can be about 35 percent, based on the transaction costs differences related, for example, to using readily available data.

5. The final component, the actuarial value of *risk*, reflects the risk profile of each country. From an insurer's perspective, risks in one LIC may vary greatly from those in another, depending upon the type of contract, country conditions, and market size for the relevant transaction.

Annex V. Elements of an Asset and Liability Management Approach to Risk Hedging¹

1. As the policy focus moves toward balancing financial stability and fiscal solvency considerations, an integrated balance sheet approach to sovereign assets and liabilities (SALM) becomes useful. Although a SALM approach has been used in the past to identify debt-related vulnerabilities, a more formal approach allows for monitoring the impact of movements in exchange rates, interest rates, and commodity prices on a country's sovereign financial assets and liabilities. For commodity-exporting countries, a balance sheet approach can highlight the potential risk management needs within the framework of a comprehensive medium-term fiscal strategy. This approach can help countries to identify and manage emerging financial challenges, such as an unfunded pension liability and how it affects the balance sheet as a future claim on financial resources to be managed.

2. Operationally, a SALM approach can enhance understanding of the financial characteristics of the sovereign balance sheet and identify sources of costs and risks as well as correlations among these sources. If the financial aspects of the assets and liabilities can be matched or hedged by the application of prudent but active risk management practices, then a stronger policy focus could become possible on preserving the sovereigns' net financial position. In a short- to medium-term perspective, a financial strategy could be developed to reduce risk exposures. In a long-term perspective, a sovereign can use economic development strategies to diversify the economy in a way that improves the structure and composition of the sovereign balance sheet. Thus, specifying a SALM sovereign strategy within a medium-term macroeconomic framework could become integral to a country's overall economic strategy.

3. The selection of the optimal currency illustrates added practical benefits of SALM. With a liability management framework, the optimum currency composition of debt is usually determined by minimizing projected debt service costs subject to constraints regarding certain foreign exchange, interest rate, credit, and liquidity-risk levels. With a SALM framework, the optimum currency composition of debt could be determined by an optimization that takes into account both the minimization of projected debt servicing costs and maximization of the return of the country's assets (in particular, international reserves and projected primary balances) subject to constraints regarding specified risks and the country's asset-liability structures. The latter approach, in essence, espouses the view that the currency composition of the sovereign liabilities should closely match that of the assets in a sovereign's balance sheet.

4. Some countries already carry out partially-coordinated SALM. Typically, this involves integrated management of the net position on central government debt and cash reserves thereby setting objectives and risk constraints only in account of these balance sheet items. In other cases, the allocation of assets between alternative portfolios and funds may consider the sovereign's broader priorities and objectives, but not specifically balance sheet risks. Overall, effective SALM requires strong coordination. In the most integrated case, decision-making authority for both assets and liabilities would be assigned to one agency (e.g., the ministry of finance), which would then delegate responsibilities for day-to-day management and coordinates the planning and execution of the borrowing and investing.

¹ This section builds on Das (2011).

Annex VI. Shock Financing Mechanisms

1. Several financing mechanisms now in use, or used in the past, have features that particularly relate to shock financing.

Present Schemes

- *The European Communities (EC) Flex Mechanism* was established in 2000 to provide a comprehensive and simpler mechanism than its predecessor, the commodity-related STABEX scheme. It aims to mitigate the adverse effects of short-term fluctuations in export earnings. The Flex is available to ACP countries when an exogenous shock leads to a 2 percent loss in export earnings compared with the average of the preceding four years (excluding the most extreme value). In addition, the drop in export earnings must exceed 0.5 percent of GDP.
- *The IMF Trade Integration Mechanism (TIM)* was introduced in 2004 to help countries address the transitional BoP implications of qualifying trade liberalization measures taken by other countries. Under the TIM, the Fund can use simplified procedures to consider augmenting access (by up to 10 percent of quota) in the event that the country experiences a larger-than-expected BoP need that is related to a specified trade policy event.

Previous Schemes

- *The EC Vulnerability-Flex (V-FLEX)* was established in 2009 as an ad hoc temporary mechanism to allocate resources during 2009-10 to ACP countries most affected by the global financial crisis. Eligibility for the V-FLEX was based on a substantial actual or forecast government revenue loss. This use of forecasts and very recent fiscal information carried positive aspects, but in some cases capacity in LICs may have been inadequate to provide the information required.
- *The IMF Compensatory and Contingency Financing Facility (CCFF)* was established in 1988 to provide financing to countries that encountered temporary BoP difficulties as a result of temporary export shortfalls, adverse external contingencies, or excess costs of cereal imports. To qualify, the BoP difficulties had to stem from factors outside the authorities' control. Compensatory drawings were repaid within three to five years; however, the Fund recommended earlier repayment in any year in which member's exports exceeded the medium-term trend. Over time, provisions that were introduced into the CCFF to reduce moral hazard increased the complexity of using the facility.
- *The IMF Buffer Stock Financing Facility (BSFF)* was established in 1969 to provide financial assistance to members with a temporary balance of payments need arising from contributions to buffer stocks that the Executive Board considered to operate consistent with the broader BSFF principles. Buffer stocks proved problematic as a means to stabilize commodity prices, however, and the benefits from the modest price stabilization achieved were in practice outweighed by the interest and carrying costs of the buffer stock.

Annex VII. Are Commodity Linked Bonds a Useful Option for LICs?¹

1. The value of a security depends on the state of nature in which payments take place. In that vein, a natural question is whether commodity-linked debt can be a useful policy instrument for LICs to hedge against volatile growth. One way to assess the usefulness of such an instrument is to examine an optimal hedge for, say, export risk. This examination begins by looking at the correlation of variables of interest (terms of trade, export earnings, the trade balance, perhaps GDP) with the returns on various debt instruments.

2. The long run relation between export shares in GDP, oil prices and US T-bill returns can be estimated using a Vector Error Correction Mechanism approach and the long run hedge portfolio derived from those estimates for all LICs. The shares of the various assets in the hedge portfolio are derived by seeking to minimize the variance of the combined variable to be hedged and the portfolio returns. The results are interesting, although much further work needs to be done. Almost without exception, oil prices feature high in the optimal hedge, and substantial variance reduction is obtained through maintaining such a hedge portfolio.

3. The volatility of export earnings as a share of GDP was compared with and without the optimal hedge, and with a very suboptimal hedge with just U.S. Treasuries. Although imposing the same model structure on all countries leaves room for improvement, the portfolios constructed on the basis of this panel VAR approach produced strong results. Defining R_t as the variance reduction obtained by applying either the optimal hedge or the suboptimal U.S. Treasuries only hedge, the table summarizes the results.

4. As the distribution of R_t is highly skewed because of the presence of a few outliers, the results concentrate on the median rather than the mean. The table shows that for the country with the median R_t , the combined variance would be reduced by 75 percent with the optimal hedge. This means that for half of the countries, the variance is reduced by more than a factor of four, and for half less than that. And altogether 80 percent of the countries will see their variance reduced ($R_t < 1$).² In comparison, pursuing a suboptimal hedge strategy (defined here as consisting of U.S. treasuries only) is problematic. Less than 30 percent of LICs would see their variance reduced, and the median country would see its variance actually double.

	Optimal hedge	Suboptimal
Median R_t	0.25	2.16
% $R_t < 1$	0.8	0.29

5. The volatility reduction for LICs from a hedged debt portfolio found in this exploratory analysis suggests there could be potential in these commodity-linked debt instruments. In practice, results are likely to be more complex, so more research is needed. Maturity of existing debt and restrictions on short positions may make it impossible to actually implement the optimal hedge; on the other hand, imposing the same lag structure on all countries in the estimation of the hedge is likely to be overly restrictive.

¹ Prepared by Sweder van Wijnbergen and Alexander France, University of Amsterdam.

² This is less than 100 percent in spite of the minimum variance properties of OLS because only the long run relation between the variables concerned is used, and possibly because the same lag structure is imposed on all countries.

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