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**Contribution from the World Bank to the G20
Commodity Markets Sub Working Group**

**Market-Based Approaches to Managing
Commodity Price Risk**

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CONTRIBUTION TO G20 COMMODITY MARKETS SUB WORKING GROUP¹

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Introduction

Though well-established in the commercial sector, the use of market-based price risk management is not widespread in the public sector, particularly by sovereigns. Recent volatility in energy and food prices, however, has awakened the interest of some governments to learn more about how they can either use these tools, or foster supportive environment where these tools can be used by local supply chain actors. Since commercial relationships in commodity supply chains are complex and can be further complicated by the interaction with public actors and policy mechanisms, detailed risk assessment should be the first step toward developing appropriate risk management solutions. Equally important is ensuring that non-price related risks are isolated, monitored, and managed independent of direct price exposure. This note reviews lessons learned from recent efforts to advance risk management strategies in countries vulnerable to food and energy price shocks. It focuses specifically on the use of market-based risk management approaches and use by sovereigns.

Risk Assessment – What is the Fiscal Impact of a Commodity Price Shock?

Enhancing a sovereign's risk management tool kit begins with enhancing the capacity to measure and manage risk. In both food and energy sectors, detailed assessment of commodity price exposure at the sovereign level requires (i) a supply-chain risk assessment that analyzes risk but also defines the roles, responsibilities, and obligations of each actor in the sector, (ii) analysis of the interaction between public actors and policies (such as price stabilization programs, subsidies, social safety nets) and the roles of the private sector, and (iii) a financial assessment that quantifies the fiscal impact of commodity price shocks, with particular attention to the areas where price shocks create explicit or implicit contingent liabilities and/or fiscal risks for the government. Careful risk assessment must also take into consideration non-price related risks such as production risk, transportation risk, counterparty risk, and currency risk. To date, at a country level there is little evidence of national efforts to analyze commodity price shocks in terms of specific risks that affect the budget and fiscal framework. As an example, while many countries are net importers of fuel and thus exposed to the risk of upside price movements, further analysis is needed to more specifically isolate and quantify the nature of that exposure to government.

In the power sector, government often has financial exposure in the form of direct support to distributors. In some countries, this can represent a significant portion of the national budget and is a risk that has been difficult to predict. The government is often therefore concerned with (a) the impact of rising energy prices on the cost of production and pass-through of these costs to consumers and with (b) the risk of financial losses associated with un-hedged price exposure within the system, which is more serious for distributors unable to pass through price increases to consumers. For governments concerned about the risk of food price shocks, the fiscal impact is equally complicated as governments may be concerned about (a) the impact of rising food prices on consumers and (b) the need to finance, and potentially supply, subsidies or social safety nets for vulnerable populations or, in extreme cases, humanitarian operations. In both cases, the costs of budget uncertainty and the need to finance responses in the event of a shock can be significant. If market-based risk management solutions have value to add for

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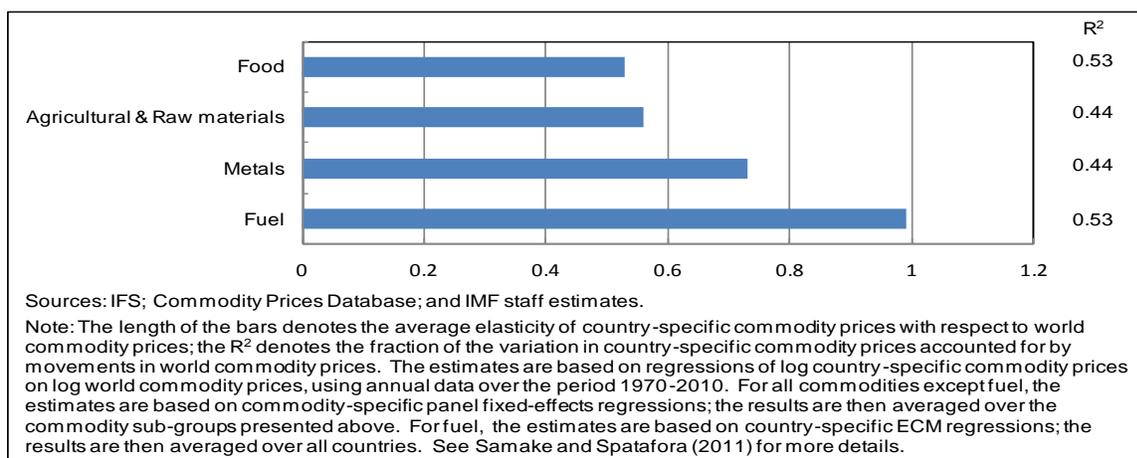
sovereigns, cost-benefit analysis must start with risk assessment that takes into consideration the potential fiscal implications of the shock and associated budget uncertainty.

Evaluating Instruments - What Works for Governments?

Review of commodity hedging solutions and analysis of their utility is often simplified in the economic literature by looking only at futures markets, generally with an eye toward evaluating the ability to smooth prices over time. In practice, however, the purposes and range of hedging solutions used by supply chain actors are broader and more complex. In both food and energy markets, there are two main categories of instruments: (i) physical and (ii) financial. Physical instruments can include storage, strategic timing of purchases and sales (e.g., “back-to-back” trading), forward contracts, minimum/maximum price forward contracts, price-to-be fixed contracts, and long-term contracts with fixed or floating prices. Financial instruments can include exchange-traded futures and options contracts and over-the-counter (OTC) products, including swaps, collar contracts, customized options, commodity-linked bonds or loans, trade finance arrangements, or other commodity derivatives. Decisions about which instruments to use to manage risk depend heavily on the specific risks an entity is trying to address. Is it short-term or medium-term price volatility? The risk of severe price shocks? The risk of price exposure only or price *and* supply risks?

The answer to these questions differs from country to country but can also between food and energy sectors. In energy markets, the existence of benchmark indices such as West Texas Intermediate crude (WTI) and Brent creates broader opportunities for financial hedging since the prices of many refined products (e.g., the products actually imported) are well-correlated to benchmark indices. Liquidity in these markets is high, customized settlement arrangements are common, and it is possible to easily create hedging structures that cover forward periods of 18-36 months. In contrast, for many food products there is no internationally traded commodity exchange and/or very limited liquidity, and therefore no relevant financial product available. For other food commodities--even staple foods such as wheat, maize, and rice--local prices are not well-correlated with international commodity exchanges as a result of differences in product, differences in market dynamics, transport costs, and cash versus physical price differentials. Lack of integration with international market prices creates “basis risk”,

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



Source: “Managing Volatility in Low-Income Countries: The Role and Potential for Contingent Financial Instruments”, IMF and World Bank, (2011).

that reduces the efficiency of any hedge. Figure 6 provides a demonstration of this for different commodity classes.

Another complexity affecting the development of risk management solutions for food price shocks is that governments are often concerned not only about price shocks, but equally about supply shocks. This, too, limits the utility of financial hedging of food price shocks, and points to the need for more customized solutions.

Finally, though not typically used to manage specific intra-annual or intra-seasonal price exposures, commodity-linked loans or bonds can also be used to manage exposure to price shocks on a more macro level. As an example, an oil-importing country exposed to the risk of oil price increases, can structure an external loan so that principal repayment and/or the interest rate would decrease if commodity prices increase. Conversely, for an oil-producing country exposed to the risk of price declines, a loan can be structured so that principal repayment and/or the interest rate would decrease if oil prices decrease. As with other commodity instruments, the cost for a commodity indexed loan would increase with the tenor or time frame of the price protection. Cost also depends on the relationship between the price level protected and the current market price, as well as the degree of market volatility. Since food markets are less integrated than energy markets, and since there are often higher levels of basis risk associated with relationships between local and international prices, commodity-index structures may not be as feasible for many developing countries.

Sovereign Hedging of Energy Price Risk – What is the Experience to Date?

Over the past few years, publicity about the Government of Mexico's oil hedging strategy has inspired other governments to take a more serious look at the possibility of hedging the fiscal risk of energy price shocks at a sovereign level. Mexico, a major exporter, hedges oil prices to mitigate the impact of global oil price volatility on government budget revenues. The government is currently using the purchase of put options to implement its hedging program. This strategy creates price floor for oil exports, which allows Mexico to take advantage of upward price movements if in fact the market moves above the average strike price but protects government revenues if oil drops below an agreed level. The government is using a specific type of option called an "Asian option" which bases the settlement of the contract on the *average* market price over a pre-determined period of time, as opposed to settling on one specific day. Similar to insurance, government pays a premium upfront to purchase the put option, and hence the price protection. Typically, the government has been transacting one-year (12-month) put option contracts, with a strike price that is equivalent to the projected oil price for the fiscal budget. Institutionally, the Ministry of Finance and Public Credit develops the hedging strategy and purchases put options for the following year paying the premium from the FEIP, through its financial agent, the Banco de Mexico.

"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 associated with the hedging instrument itself. This is an important advantage for governments since it helps to explain the investment as insurance, ensuring that all decision-makers agree with spending a specific amount to protect the country against the negative impact on revenues if risk of prices move below a stated level. Instruments such as futures, swaps, and collars create contingent liabilities that can be difficult to predict, budget, account for, and manage in the event that prices move in an adverse direction against the hedge. These tools, which are difficult even for commercial actors to manage, can be extremely complex for governments.

Following Mexico's lead, the Government of Ghana has hedged the cost of fuel imports since October 2010, using call options which provide price protection against the risk of prices moving higher.

According to the government the program has contributed not only to budget stability but to stability of the Ghanaian *cedi* against major trading currencies. Also using call options, the government of Panama has also hedged fuel prices in order to reduce the risk of increased contingent liabilities arising from the Tariff Stabilization Fund, a subsidy program which mitigates the impact of oil price volatility on the consumer.

Sovereign Hedging of Food Price Risk – What is the Experience to Date?

For sovereign hedging of food price risk, there is less experience to date. For the same reasons as indicated above, however, call options can be a useful way to cap prices and/or ensure supply of food imports. During the food crisis in 2005, the Government of Malawi purchased call options for maize as a result of concern not only about price increases but also about logistics constraints and delivery. The call option contract was customized as an OTC (“over-the-counter”) physical option which provided more flexibility than a standard financial instrument. Price protection was provided on a delivered basis, thus combining the price for white maize on the exchange in South Africa (SAFEX price) plus transport costs to Malawi and the contract also specified terms (including flexible delivery locations) 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 attractive to the government. In late 2005, as prices increased and food shortages grew, the government exercised the call option, electing for physical settlement, and allocating the majority of imported maize for humanitarian operations. Since then, rains in Malawi have been good and surplus crops have reduced concern about imports; it will be interesting to see if the strategy is replicated in future food shortage scenarios. In 2008, the Government of Haiti considered, but did not implement, a similar solution in response to concerns about rising costs of rice subsidies and uncertainty about import supply chains.

One major advantage of embedding risk management solutions in physical supply contracts is simplicity: physical contracts are customized to provide the required price protection, and there is no need to manage an additional counterparty relationship (e.g., with an investment bank providing a stand-alone financial hedge) or additional documentation. Physical hedges can generally be negotiated with existing suppliers and are somewhat easier to manage from an accounting and auditing point of view. For governments, on the other hand, physical hedging can be complicated since importers may be private actors not directly involved, from a supply-chain perspective, in the policy mechanism (e.g., stabilization or subsidy program) that is creating financial risk for the government.

Challenges Affecting Sovereign-Level Commodity Risk Management

Challenges to wider use of market-based commodity risk management by sovereigns apply across countries affected by food and energy price volatility, or both. Major challenges include:

- i) Many governments are not focused on *ex ante* management of commodity price shocks and are not carefully quantifying and assessing the risks and impacts,
- ii) Governments often lack the necessary legal and institutional frameworks to support hedging transactions.
- iii) In low income countries, governments may not have funds to invest in risk management solutions (such as insurance or hedging transactions)

- iv) If funds are available, governments are often reluctant to make the investment in hedging since such decisions are vulnerable to *ex post* criticism (and associated political risk)
- v) There is a lack of technical capacity to manage hedging programs in many developing countries.

Recommended Areas of Action

In the 1990s, the financial crises in East Asia and Latin America drew attention to the quality of public debt management in developing countries and its role in reducing developing countries' vulnerability to crisis. Similarly, the 2008–09 food and fuel crisis and increased market volatility has drawn attention to the extent to which developing countries are exposed to commodity price volatility. Discussions with governments about these problems have revealed a gap in technical capacity and knowledge. Governments considering the use of commodity hedging tools require similarly sound frameworks for their use as for other issues of risk management and finance.

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. Six key steps underlie a commodity hedging strategy

- Risk assessment to identify 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.

During the 2011 French G20 Presidency and in the Action Plan on Food Price Volatility, international financial institutions and development partners were encouraged to strengthen efforts to assist countries with these issues.

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