Managing Commodity Price Risks: A Technical Overview

DRAFT WORKING PAPER

Julie Dana
Technical Specialist
ARD/CRMG

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Technical Discussion, Illustrations and Operational Lessons

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3. Managing Commodity Price Risks

Managing risks in highly volatile commodity markets remains one of the major challenges of development, especially for the poorest countries. During 1983-2003, prices of many commodities fluctuated from below 50 percent to above 150 percent of their average prices. More than 50 developing countries depend on three or fewer leading commodities for more than one half of their export earnings. In Africa, commodities account for about three quarters of total merchandise exports. In many of these countries, commodity production and trade affect the livelihood of millions of people, the government's fiscal revenue and public expenditure, as well as the country's trade balance, foreign reserve and creditworthiness. Poverty reduction is a major objective in addressing the challenge of commodity risk management[1].

Recent research has established that the uncertainty generated from commodity price fluctuations hampers growth and is associated with increases in poverty. Inability to manage uncertainty makes it difficult for farmers to plan their crops, allocate their resources, obtain credit for inputs, and even simply recover costs. It also weakens the ability of governments to maintain a conducive and stable environment for domestic business and to implement policies and programs to reduce poverty[2].

This paper presents a technical framework for the management of commodity price risks. The framework includes the following:

- Proper diagnosis of *price risk problems* – macro, meso, and micro-level exposures
- Review of *price risk solutions* including past approaches used by governments in an attempt to *absorb* the financial impacts of price volatility and a review of market-based approaches, which alternatively, are designed to *transfer* price risk from one market participant to the other.
- Operational lessons learned from attempts to help developing countries make use of existing market-based tools.

3.1. Price Risk Problems

In general terms, most participants in the agriculture trade agree that price uncertainty and price volatility are problems. The issue can be complicated however, since there are different types of risk, which impact actors in the sector in different ways.

In analyzing price risk issues it is important first to differentiate between *direct* risk and *indirect* risk.

[1] International Task Force on Commodity Risk Management. September, 1999. "Dealing with Commodity Price Volatility in Developing Countries: A Proposal for a Market-Based Approach". Discussion for the Round Table on Commodity Risk Management in Developing Countries, the World Bank.

[2] Varangis, P. 2003. "Market-Based Commodity Risk Management Approaches", UNDP.

Direct Risk

Direct risk is the impact of price on specific commercial transactions: purchase of goods, sales of goods, processing of goods, and lending which supports any of these activities. *Direct* price risk is only experienced by market participants who are engaged in these transactions. Direct risks can be described as ***financial*** and ***physical.*** The differentiation between the two types of direct risks is key to proper risk assessment and can help lay the groundwork for finding risk management solutions.

Financial risk in commodity trading terms, is the financial impact or profit / loss position of a commodity producing or trading entity. Although many developing country market intermediaries, such as producer groups or cooperative unions, may not generally consider themselves to be traders, they are operating commercially as traders because they buy at one point in time at a certain price and sell at another. They also carry the financial risks of traders. For clarity's sake, financial risk can be quantified in four ways:

a) Net Risk Position. The net risk position can be "long" or "short". A "long" position describes the commercial situation where a trader holds fixed priced inventories or purchase commitments without having equal and offsetting fixed priced sales contracts. The risk of a long position is that prices will fall below the level of the purchase price committed. A "short" position is the opposite scenario, and describes the commercial situation where a trader has fixed priced sales commitments without having equal and offsetting inventories or purchase commitments. The risk of a short position is that prices will rise above the level of the sales price committed.

b) Price level. The price level is the price basis at which the inventories are valued or purchase / sales commitment are made. The price level of the risk is expressed in terms of the local price basis and, if applicable, the corresponding international market or exchange price basis. The difference between the two prices is the cost of getting the product to the market (processing, local transportation, insurance, freight), and a premium or discount for different grades or quality of product. The fluctuation of this difference between the local cash price and the terminal market price is referred to as basis risk.

c) Volume. This is the volume of inventories and/or purchase and sales commitments.

d) Duration. The time period for which the entity is "long" or "short" and exposed to price movements which may be unfavorable.

Physical risk is different from financial risk because it focuses on the trade of the physical product, and issues of volume, quality, timing, and delivery. Physical risk relates to a trader's ability to manage the trade in the commodity by obtaining volumes necessary to optimize processing capacity, meet sales requirements, meet quality standards (grades, etc), manage the supply chain adequately to make deliveries, fulfill contracts on time, and maintain competitiveness. Price risk falls within the category of financial risks. Physical risk is mentioned here because failure to manage physical exposures can be just as damaging as failure to manage financial risks.

Indirect Risk

Indirect risks are the knock-on effects of direct risk felt elsewhere in the system. *Indirect* impacts occur when direct price risk problems experienced at one level in the chain create uncertainty or economic and financial instability for other actors in the chain, or outside of it, such as government. The following table summarizes, very simplistically, the differentiation between direct risks (both physical and financial) and indirect risks.

	Direct Risk		**Indirect Risk**
	Financial	**Physical**	
Producers	Yes	Yes	No
Producer Orgnizations	Yes	Yes	No
Traders/Processors/Input Providers	Yes	Yes	No
Exporters	Yes	Yes	No
Banks	Yes, if take title to goods, i.e. through collateral management or trade finance	No	Yes
Government[3]	No	No	Yes

Impact on Actors

As described in the table above, price risk affects all actors in the commodity sector, but does so in different ways. The next step in a diagnosis of price risk problems is to look at the issue from the perspective of actors at all levels in the chain. This includes the micro level (producers), the macro level (government), and the meso level (commercial and financial intermediaries).

Micro-Level Risk Assessment

At the micro level, producers make investments and allocate resources to produce certain commodities based on expectations of a return. In developed markets, producers are served by commercial intermediaries who perform such functions as provision of inputs, transportation, sales, marketing, and risk management. In undeveloped markets, where commercial intermediaries are weak and can not provide services to farmers, price risk is absorbed at the micro-level. This is a problem for many reasons, but primarily because of all the actors in the commercial chain, producers, particularly if they are not diversified, are the most ill-equipped to manage price volatility. Risk at the level of the producer creates problems in planning, allocating scarce resources, obtaining inputs, and all of these problems will in turn have negative impacts on the strength of the sector overall.

Macro Level Risk Assessment

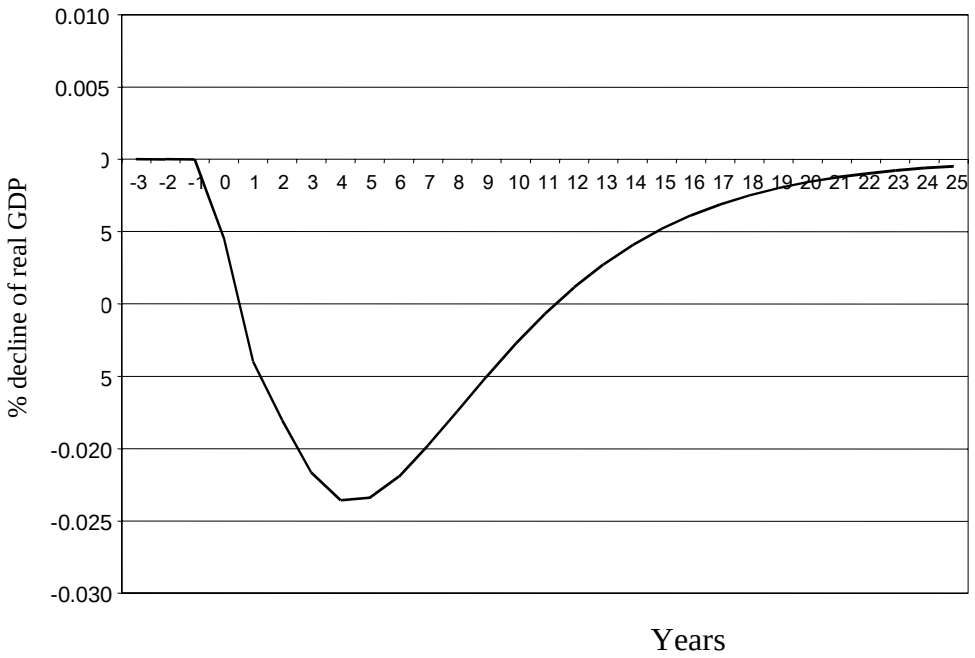
On a macro level, commodity price volatility can impact trade balances, foreign reserves, export revenues, GDP, and internal and external finance and credit markets. Since agricultural

[3] Assuming liberalized markets, where government is not a commercial actor in the commodity trade

commodity production in developing countries affects millions of livelihoods, price risk can have wide-ranging political and social ramifications. From a risk assessment point of view, governments are impacted by price volatility in three main ways.

- **Price shocks**. It has been shown that developing countries, in particular low income countries, are hit hard by the effects of commodity shocks because of the dependence on agriculture. In three out of five low-income countries, as compared to two out of every five middle-income countries, primary commodities account for 50 percent of total exports.[4] Price shocks in developing countries are often of greater magnitude and frequency than in more developed countries. In fact, the impact and duration of shocks in developing countries has been rising and the frequency and severity of these shocks is linked to growth. Fiscal and monetary policies in countries hit by these shocks tend to exacerbate the impact of the initial shock. Preliminary research has shown that the maximum effect of commodity price shock occurs after four years[5]. Price shocks in commodity markets can be caused by a number of factors, weather, trade policy decisions, and other political decisions. Appendix 1 shows the impact of shocks on price in the New York Board of Trade (NYBOT) coffee market.

Figure 3.1. The Impact Of A Commodity Price Shock Takes Several Years To Dissipate



Note. Figure shows the impact of a two standard deviation change of the country-specific commodity price index (Deaton Miller index) on real output (GDP) in a typical low-income country The impact is the percent change in GDP for low income countries, on average.
Source: World Bank staff calculations

[4] Varangis, "Market-Based Commodity Risk Management Approaches".
[5] Varangis, "Market-Based Commodity Risk Management Approaches."

- **Requests for intervention to provide support to financial and commercial institutions which have suffered business / trading losses**. This second main area of macro level risk generally does not receive as much attention as the problem of price shocks or volatility at the level of smallholders. However, over time there are significant costs to a government when it must intervene to support either producer groups/cooperatives with large scale annual losses or banks which have non-performing loans in the commodity sectors.

- **Social/Political/Economic instability associated with smallholder farmer welfare**. A final macro level impact of price volatility concerns the welfare of producers. In developing countries, smallholder producers represent a large proportion of the population and their welfare is critically important to the health of the economy. When commodity prices are low, smallholder producers will suffer. This risk is one of the most challenging since it is hedging the risk of longer-term price trends is generally prohibitively expensive.

In liberalized economies where governments are no longer involved in the commercial commodity activities, they are impacted only indirectly by the problems of price volatility. Rarely do governments carry direct price risks that can be managed effectively at a macro level. The exception to this is the occurrence of price shocks. Current work at the World Bank seeks to address how governments might be able to develop ex ante approaches to managing price shock, which may be less costly than the traditional ex post responses.

A final issue with respect to macro level price impacts is the issue of the long term trend toward declining commodity prices. Existing market-based price risk management tools cover price movements over only relatively short time horizons, generally within a crop year. For this reason, use of these instruments is not a solution to the secular, or even medium-term cyclical decline in prices of some commodities. Management of short-term price risks can be part of an overall strategy to adjust to these depressed market conditions, but more fundamental solutions must be sought elsewhere, through productivity growth, diversification, upgrading to increased value added production, and improvements in marketing channels.

<u>Meso-Level Risk Assessment</u>
In many commodity markets most of the price risk is carried at the level of commercial and financial intermediaries involved in the physical commodity trade. At these levels, there is direct price risk exposure that can be quantified in terms of product, volume, price level, and timing. The following is a brief review of price risks generally carried by commercial intermediaries.

- **Exporters.** Exporters buy and sell commodities from producers, traders and producer organizations and sell to the export market. Exporters can be “long” when they buy from producers at a certain price without knowing the price they will obtain for sale of the product. In this case the concern is that prices will fall before the sale is completed. At other times, exporters may also be “short”, if they enter into sales contracts with international buyers before they have procured the goods from the producers. The risk in this situation is that prices will rise before they will be able to procure the goods needed to fulfill the sale.

- **Producer Organizations (Farmer's groups, unions, societies).** Producer organizations marketing a product on behalf of their members look to make the maximum profits for the producers. In some commodity sectors, one of the functions of the producer group is to announce a purchase price for farmers at the beginning of the season. The producer group may advance a percentage of the purchase price so that farmers can buy inputs, or it may advance the inputs itself. Announcing the purchase price at the beginning of the season appropriately serves to shield producers from the impact of intra-seasonal price volatility. However, this practice creates a large, often unidentified, risk for the producer organization as the intermediary. As soon as the producer price is announced, the intermediary which has committed to pay that price has a "long" position. It runs the risk of making trading losses if prices fall throughout the season and it is unable to sell at a level which covers the predetermined purchase price. Producer groups which have direct links with buyers at times will also go "short" by selling fixed price forward contracts. In this case, the intermediary carries the risk that prices will rise while the goods are being purchased and procured to meet the sales commitment. In the past, in this situation, producer groups have chosen to default on sales contracts rather than meet the commitments and absorb the trading loss. Such responses do tremendous damage to the reputation of the producer organization, and the country/sector as a whole. It also impacts the ability to develop beneficial trading relationships going forward.

- **Traders/ Processors/ Input Providers.** Traders and processors, like exporters, often buy from producers before they sell, or sell before they purchase. In the case of processors, the length of time in between transactions relates to the time it takes to carry out the processing activity, i.e. milling or ginning. Traders/processors who can not effectively manage price risks during this time frame will have difficulty staying profitable. They may raise processing costs in order to counteract the risk or recoup trading losses. As with exporters, this directly affects the price that can be paid to producers.

- **Banks**. Financial institutions that lend to commodity sectors take on the same price risks as their borrowers. The ability of borrowers to repay agricultural lending is related to whether or not they are able to cover costs, make profits, and avoid trading losses. In the past, mismanagement of price risk has made agricultural lending very risky for banks. In many countries and sectors, high levels of risk are reflected by high costs for lending. High interest rates, in turn, have a negative impact on the profitability of the commercial intermediaries, and on producers since intermediaries will reflect the cost of borrowing into the purchase price that they will be able to pay for the product.

Conclusions about Price Risk Problems

To summarize, the following are important conclusions about the problems of price risk in developing countries:

- Thorough risk assessment is an important first step in analyzing the problems of price volatility. Risk assessment needs to first differentiate between direct and indirect price risks, and then look at impacts for all actors in the commodity chain (from micro to meso to macro levels).

- In liberalized markets, governments are impacted by price risk indirectly. Since they do not carry direct price risk that results from commercial activity in the sector, they generally do not have hedgeable exposures.
- Commercial intermediaries who operate at the meso level in the chain often carry the highest levels of price risk in the system. Since the types and functions of commercial intermediaries are diverse and unique to each market, risk assessment should focus carefully on the characteristics of the commercial activity taking place in each institution.
- Since commercial intermediaries are involved in specific transactions (buying, selling, processing, or lending) they are carrying direct price risk which can be quantified very clearly. This ability to clearly quantify the risk is an important precondition for finding solutions to manage it.
- Price risk at the level of banks is high, and often overlooked.

3.2. Past Approaches by Governments to Absorb Price Risk

In practice, the only commercially viable way to manage commodity price volatility is to transfer price risk to an actor who is willing to manage the risk either by:

a) being prepared and able to absorb the risk financially or
a) having access to mechanisms which will allow the transfer of the risk to another market actor

In the past, concerns about commodity price fluctuations have led economic interventions by national governments. These programs arose out of a political will indicating that governments were *prepared* to shield producers from price risk. The goal of such intervention has generally been to insulate producers and consumers from market price fluctuations through price controls or subsidies. Many countries have unilaterally pursued price stabilization, particularly in agriculture. Such policies have typically taken the form of institutional arrangements such as physical buffer stock schemes, stabilization funds, or variable tariffs. However, over time such interventions have proven to be financially unsustainable. Although the political will may have been in place, it has become clear that most governments simply *lack the financial ability* to absorb the financial impact of price volatility. In some cases, sharp fluctuation in currency values or other economic events had a negative impact on commodity price stabilization efforts. In other cases, the interventions displaced competition in marketing and processing to the detriment of the producer. Still other schemes failed because they were based on unrealistic, administratively set benchmarks which required large cash transfers in years of low prices. Administratively determined prices were often the outcome of political bargains and failed to reflect market fundamentals. Then, with limited borrowing capacity and generally unhedged exposure to price risks, internal stabilization programs were difficult to maintain when large payments were required over consecutive years. For governments which can afford to take on additional debt, compensatory financing or other borrowing opportunities could provide some support for balance-of-payments disruptions that result from commodity price instability, but there are limits to the capacity of many countries to borrow for such purposes. Other mechanisms, such as marketing boards which were once common for coffee, cocoa, and food marketing agencies have been abandoned, either unilaterally or as a result of budget pressures or liberalization reforms. At an international level, the stabilization components of international

commodity agreements also proved unsustainable and are no longer in force[6]. The conclusive lesson of such policy interventions is that price volatility is a reality of liberalized markets, and attempts to manage it outside or without regard to the market are unsustainable.

3.3. Market-Based Approaches to Transfer Risk

Since the financial impact of price volatility has proven to be too large for government or any other actor to simply *absorb*, producers or commercial actors who are negatively impacted by price volatility must turn to the market, and find mechanisms to *transfer* the risk to market actors who are better equipped or more willing to manage it. Over time, as markets develop, risk transfer between participants who are unwilling to carry price risk and those who are willing to carry it takes place on a regular basis. The willingness to manage risk is generally based on expectations of an opportunity to make a profit in return. Market-based risk transfer therefore takes place either on a physical basis, through commercial trade of the actual commodity itself, or on a financial basis, by using instruments specifically developed for the purpose.

- **Physical instruments** involve strategic pricing and timing of physical purchases and sales (such as "back-to-back" trading), forward contracts, minimum price forward contracts, price-to-be fixed contracts, and long-term contracts with fixed or floating prices.

- **Financial instruments** are exchange-traded futures and options, over the counter (OTC) options and swaps, commodity-linked bonds, trade finance arrangements, or other commodity derivatives.

The following section presents a review of these instruments, with a short discussion on advantages and disadvantages of each for commercial intermediaries in developing countries.

Physical Instruments

Physical price risk management involves contractual negotiations between buyers and sellers regarding the terms under which the exchange of the physical good will take place. Managing price risk through physical instruments can include:

Strategic Timing of Purchases and Sales. This is a conservative and simple way to manage price volatility that works if there is sufficient flexibility in a trader's ability to set contractual terms. One of the most common of these mechanisms is "back-to-back" trading which refers to being able to time the financial impact of the purchase with the financial impact of the sale. In back-to-back trading, price risk is minimized because there is very little time between accruing the costs of the purchase and negotiating the price at which those goods will be sold. Presumably, a trader who is doing back-to-back business is able to negotiate a profit margin between the purchase and sale, which is easily identified because the two transactions take place close together.

Forward Contracts are agreements to purchase or sell a specified product on a specified forward date for a specified, predetermined price. Forward contracts are for physical delivery of

[6] World Bank, 2003

the product, and payment is expected to occur at the forward delivery date. The seller of a forward contract does not have knowledge about what will be the prevailing market price at the time of delivery, however, he/she agrees to a specified, predetermined price ahead of the delivery date.

Minimum-Price Forward Contracts are forward contracts which give a minimum price guarantee, or floor. The minimum price guarantee level is negotiated at the time of the forward contract. The added advantage of these contracts, though, is that if the prevailing market price at time of delivery is higher than the predetermined minimum price, the producer can take advantage of the price increase. If the prevailing market price at time of delivery is lower than the predetermined minimum price, the intermediary has a guaranteed minimum sales price, and does not have to sell at the lower market level. A minimum price forward contract mimics a financial put option contract (see next section) in such a way that it can also be referred to as a physical put option.

Price-to-be fixed Contracts are also referred to as "executable orders" or "on call" contracts. With these contracts, the seller or buyer negotiates flexilibity in the contract which will allow him to fix the contract price at a time of his own choosing.

Long-term contracts with Fixed or Floating Prices are variations of the above, in contracts with longer maturities.

Financial Products

Financial risk management products are available either through
a) established commodity futures exchanges, or
b) over-the-counter trade between two independent counterparties.

The financial instruments available in both of these markets will never present a perfect hedge to manage the price volatility of a commodity traded in physical markets far away from the exchange. However, the use of these instruments can provide protection against fluctuations in the international price, which is valuable in markets where local prices are impacted by international prices. Risks which are not covered, and in fact, can be created by the use of these instruments include:

- Currency risk – these instruments are generally traded in US$, so there is the risk of fluctuation between the US$ and the local currency.
- Basis risk – these instruments are based on a standardized physical product, with a price basis determined by costs for delivery to an exchange-licensed location. Thus, there will always be a differential between the international price and the local product, and correlations between the two market prices can vary.
- Credit risk – the exchange-traded products are guaranteed by the clearing house, but over-the-counter products carry credit / counterparty risk.

Exchange-Traded Products

Commodity exchanges are clearinghouses that transfer risk from one commercial participant to the other. Commodity exchanges perform functions in price formation, and provide transparency to the market. They also perform a credit risk management function for the market, since all trades going through the exchange are backed financially by the exchange itself. The clearinghouse performs credit risk assessments for all exchange members, who then do the same for their own counterparties. In well-established commodity exchanges, the exchange price serves as the reference price for physical trade. An important precondition for the development of futures exchanges that can offer financial risk management products is market liquidity, or commercial interest from a wide variety of actors. Appendix 2 has more information about preconditions for establishment of commodity exchanges, and Appendix 3 has a list of active exchanges and the agricultural products traded on them.

Commodity exchanges offer future and options, which are financial tools for mitigating price risk.

Futures Contracts are similar to forward contracts in that they are agreements to buy or sell a specific quantity of a commodity, at a specific price, on a specific date in the future. Unlike forward contracts, however, futures contracts do not necessarily imply physical delivery to fulfill the contract. Futures contracts can be considered "paper" contracts because they can be cash settled, and do not require physical delivery of the commodity. This aspect makes futures contracts a useful tool for a wide variety of market participants, including those who are geographically far away from the exchange delivery points. Appendix 4 has more information on the credit risk implications of using futures contracts.

Option Contracts are similar to physical minimum-price forward contracts in that they are agreement providing the opportunity (but not the obligation) to buy or sell a specific quantity of a commodity, at a specific price, on a specific date in the future, but they also provide an opportunity to take advantage of favorable price movements in the future. Unlike minimum price forward contracts, however, options contracts do not necessarily imply physical delivery to fulfill the contract. Like futures, they can be considered "paper" contracts, financial instruments that can be used in parallel with the physical trade.

Option contracts are risk management contracts that are actually purchased by the market participant. The buyer of an option contracts purchases the right but not the obligation to declare a futures contract. The instrument is valuable because it avoids absolutely "locking in" a price level as happens with a futures contract, and it provides the user with an opportunity to take advantage of favorable price movements which may occur between the time of purchasing the instrument and the time of its expiration.

There are two types of options contracts. "Put" options are options to sell a futures contract, at an agreed upon "strike price" and "expiry date" in the future. "Call" options are options to buy a futures contract, at an agreed upon "strike price" and "expiry date" in the future. Both types of contracts have a cost, called the "premium" which is based on the relationship between the "strike price" and the current market price, the time between purchase of the instrument and its "expiry date" and the price volatility in the market.

Over-the-Counter Products

In the past decade or more the need to customize and tailor financial risk management tools to the particular needs of participants has resulted in an increase of over-the-counter (OTC) trade. OTC tools include swaps, customized options, and commodity-linked bonds and loans. Instead of having an exchange act as clearinghouse for these trades, they are bilaterally negotiated between the client, and generally, a bank. OTC contracts are governed by internationally recognized agreements called "International Swaps and Derivatives Agreements" (ISDAs). There is counterparty risk on these contracts, since either party could default on the contract.

Swaps are purely financial transactions designed to manage the exposure to two different commodities over a period of time. In a simple swap contract, the price of one commodity is fixed while the price of the other is variable, or floating. Swap transactions are more common in currency and interest rate markets then in commodities, since they are designed to mitigate risk of a commercial participant who has exposure to two products. As an example, a manufacturer who buys raw material, at a fixed point in time in one currency, and sells finished goods, over a longer period of time in another currency, can use a fixed-for-floating swap to manage the fluctuations between the two currencies.

Customized OTC Options are similar to exchange-traded option contracts, but customized to meet specific needs of the client. One popular example is Asian options, which settle automatically over an average period of time, rather than at a specific expiry date.

Commodity-linked Bonds or Loans are another specific, and quite complex, type of financial transaction. These products are often constructed to help mitigate the exposure of investment projects, or for management of debt that is related to commodity activities.

Price Insurance

In developing countries, the term "price insurance" is often used when talking about price risk management because it helps to simplify the concepts and the product. In practice, however, price insurance products are uncommon, and most insurance companies do not have business lines that focus on commodity prices. Price insurance programs are often referenced as an ideal way to mitigate the risks of groups of smallholder producers, and theoretically could do so by mirroring the mechanics of a put option contract. In both cases, the buyer of the contract pays a premium to receive a minimum guaranteed floor price, along with the opportunity to take advantage of price increases that might come at a later date. Price insurance programs are not very common, but have worked in markets where the risks of the insurer can be offset through the purchase of put options on a futures market. The danger in not being clear about the definition of the specific product offered is a regulatory one, since insurance and commodity derivatives markets are regulated independently, and differently. Currently a large reinsurance entity is looking at the feasibility of offering a commodity price product, but investigations are in early stages. The most important consideration from the insurers' point of view will be achieving the scale necessary to make the product commercially viable. Without the ability to lay off the risk of the insurer, price insurance programs can run into the same types of problems

faced by prior price stabilization programs because the costs of trying to absorb price volatility, rather than transfer it to the market, have proven to be unmanageable.

Conclusions about Market-Based Instruments

Tables on the following pages summarize the costs/benefits of existing instruments and identify which products are realistically accessible and appropriate for producers and intermediaries in developing countries.

Physical Products			
Product	**Benefits**	**Costs / Risks / Constraints**	**Accessible/Appropriate for Developing Country Participants?**
Strategic Timing of Purchases/Sales – i.e. "back-to-back" trading	-No upfront cost -Negotiating flexibility into purchase/sales decisions can help minimize time between purchase / sale transactions, thus minimizing risk.	-Developing country actors may lack the negotiating power to be strategic in timing of purchases and sales.	Yes, but the need to make advances to producers generally limits a seller's ability to minimize the time between fixing the price on the purchase and the end market sale. Customizing these contracts with a financing component is a potential solution to this problem.
Forward Contracts	-No upfront cost. -Can be beneficial to "lock in" forward sales price, particularly if it covers costs. -Can be used for pre-harvest financing.	-Buyer has risk of default if prices move higher than forward contract price and seller does not deliver.	Yes, but counterparty risk limits buyer's interest in offering these contracts more widely. Credit guarantee programs are a potential solution to this problem.
Minimum Price Forward Contracts	-Can lock in forward sales at a minimum price, while still providing opportunity to take advantage of favorable price movements in the future.	-Market cost of a price "floor" ranges from 3-18% of the value of the underlying price.	-Yes, if counterparties can make use of forward contracting. Requires education since the pricing formulas are often not well understood.
Price-To-Be-Fixed Contracts	-No upfront cost. -Provides flexibility to be able to fix prices when they are at a level that is favorable.	-Can lead to speculation and disruption of physical trade flows if seller avoids fixing prices because they are not moving in a positive direction.	-Yes, if counterparties can make use of forward contracting. Requires negotiating so that seller has flexibility to fix the price when it suits him.
Long Term Forward Contracts with Fixed or Floating Contracts	-Strengthens trade relationships -Provides assured "home" for product.	- Fixing prices on long term forward contracts is not necessarily advantageous since it impacts a seller's ability to take advantage of positive price movements in the future.	-Yes, if counterparties can make use of forward contracting. Not necessarily helpful on fixed price basis. More advantageous on a price-to-be fixed basis.

Financial Products – Exchange-Traded ***Generally available only for commodities with established exchanges**			
Product	**Benefits**	**Costs / Risks / Constraints**	**Accessible/Appropriate for Developing Country Participants?**
Futures	-No upfront costs. -Provides ability to lock in forward prices through a financial contract. -Is useful when the ability to sell in the physical market is limited, as can happen when prices are high but the product is not in harvest or buyers are not buying.	-Limits the potential to gain from positive price movements in the future. -Requires financing of a credit line or a credit guarantee. -Requires managing cash flow requirements to support (potential) daily margin calls.	-Limited where credit is not available to support financial exposures and cash flow needed to manage margin requirements. -Is a higher risk instrument than option contracts because cost/risk is not limited and use of futures contracts can create large liabilities (funds owed to the market).
Options	-Provides ability to lock in minimum prices on the international market, while still providing opportunity to take advantage of positive price movements in the future.	-Market cost of a price "floor" ranges from 3-12% of the value of the underlying price.	Yes, but requires education.
Swaps	-No upfront costs. - Provides ability to manage two commodity exposures at the same time.	-Requires financing of a credit line or credit guarantee. -Requires managing cash flow requirements to support (potential) daily margin calls.	No, because rarely are trading intermediaries in developing countries exposed to two commodity prices at the same time.
Customized Options	-Same benefits as options above. -Can be structured to more closely match specifical risks.	-Same costs as options above.	Yes, but requires education.
Commodity-Linked Bonds or Loans	-Could be used on macro level to manage exposure to price shocks.	High transaction costs, can be difficult to structure.	Possibly, on macro level.
Price Insurance	-Could be structured in such a way to meet risks of smallholder farmers. -Mirrors benefits of options contracts.	-Intermediaries must be willing / prepared to absorb financial impact of price volatility if not transferrable to an international market. -Low levels of interest on provider side (exchanges, banks, insurance companies) -Cost can be higher than exchange-traded or OTC	Limited to markets where risk can be transferred to established exchanges using futures/options; as yet very few examples of commercial application.

		products because of structuring fees.	

3.4. Operational Issues

Pre-Requisites

Improving price risk management for commercial actors within a commodity sector is an important objective in efforts to improve the financial sustainability of agriculture, rural finance, and commodity trade in developing countries. The answer to the question of whether or not market-based instruments can be used in a sector depends on the level to which the market is developed, and the commercial sophistication of its actors. The following table outlines some of the basic prerequisites for use of market-based instruments to manage price risk, with a description of how three different Tanzanian markets, for example, vary in these aspects..

Pre-requisites for use of market-based price risk management tools	Example – Tanzania		
	Cotton	Coffee	Maize
• Large % of production volume is commercially traded	Yes	Yes	No
• Signficant intra-seasonal price volatility	Yes	Yes	Possibly
• Well-organized market intermediaries (traders, coops, unions, processors) buy from producers and sell elsewhere	Yes	Yes	No
• Market intermediaries have high levels of direct price risk between time of purchase and sale because: o Producers receive credit or inputs in advance of harvest – or - o Fixed price forward sales are a prerequisite for receiving finance	Yes	Yes	No
• Local banks or other strong commercial intermediaries are interested in offering price risk management tools	Yes	Yes	No
• An organized international exchange for the commodity exists and offers risk management products	Yes	Yes	Yes
• Local prices have a relationship to an international exchange	Yes	Yes	No

Checking for Providers

If most of the prerequisites listed above are in place, the use of market-based price risk management can be appropriate, but the next important step is to verify that providers of these instruments will be interested in offering them to the market.

Physical price risk management products described above can only be offered by physical trade counterparties already involved in the business, for example international buyers, exporters, or

traders. Recent observations provide evidence that traders, exporters, and buyers do in fact have an interest in offering such products to developing countries, when they can offset the direct price risks they incur by doing so. As with any business, there needs to be a commercial incentive on both sides of the transaction. For the buyer/exporter/trader, the commercial incentive in integrating price risk management with the physical trade is to strengthen what can sometimes be financially unstable suppliers. In markets where producers/suppliers are financially unstable, buyers cannot rely on the business and may be forced to leave the market.

Financial price risk management products are currently offered by banks and brokerage houses in the business of making markets for exchange-traded or OTC risk management products. These providers are interested in expanding business to emerging markets and reaching new clients in developing countries. Major concerns are know-your-client issues, and the capacity of developing country clients to understand their exposures and be able to use the instruments for hedging appropriately. With both types of product, the major limitation on the supply side is that the instruments are currently only available for commodities which are traded on organized exchanges.

The Market Gap

Currently there is a market gap between many developing country commodity producers/intermediaries and the markets for physical or financial price risk management. For both types of tools the major obstacle is education. Bridging the gap requires building capacity on how to do proper risk assessment, how the tools function, and how to apply them to manage specific exposures.

Recently, the Commodity Risk Management Group (CRMG) within the Agriculture and Rural Development Dept. of the World Bank has been implementing pilot programs to expand the use of market-based tools for managing risk. The majority of the implementation work is capacity building provided to a partner who has expressed a strong interest in improving risk management practices. A table in Appendix 5 shows countries/sectors where pilot work has been taking place, with a comment on outcomes of the implementation activities in each. Initial lessons learned from this work are listed below:

Lessons Learned

- ***Thorough risk assessment is the first step***. Commercially-based risk assessment that analyzes the direct price risks of all actors in the supply chain is a critical first step in the process of trying to improve price risk management in developing countries. Very often, price risks and their commercial and financial impacts are misdiagnosed, leading to interventions that are inappropriate for the market. Risk assessment must take into consideration the presence or absence of commercial incentives to make change in the way the trade is being conducted.

- ***It is possible to bridge the market gap between developed world markets for risk management and developing country organizations that need the products and services.*** Commodity risks are severe in developing countries, and are felt not only by producers, but throughout the trading chain. Demand for education about risk management solutions is

high. Within the trading chain at the level of commercial intermediaries, it is possible to provide training and education that enables implementation of commercially-based risk management.

- ***Companies that provide risk management instruments (e.g. international banks, commodity brokers, trading companies) are positive about looking at new business in developing countries.*** Providers view risk management training and education as a vital precondition which supports their ability to enter new and emerging markets. Other concerns from the provider side include:
    - The rigorous nature of know-your-client requirements and increasingly stringent anti-money laundering initiatives require a process of due diligence, particularly for unknown clients in developing countries. Although providers view the background work and relationship with the World Bank's CRMG as a valuable addition to the due diligence process, they continue to require a lengthy list of background documentation before opening accounts to trade. This process is more complicated for producer groups and cooperatives than for higher level intermediaries, and for local banks.
    - Providers are interested in commercial sustainability and support a strategy of pursuing larger aggregators. Working with local banks is an attractive solution to the aggregation problem, and providers support the new strategy of trying to engage banks as partners.
- ***Legal and regulatory issues are important.*** Commodity derivatives markets are regulated stringently in developed countries, particularly in countries where exchanges are located. Most developing countries do not have a legal and regulatory framework to either support or prohibit trade in commodity derivatives, but governments appear to be willing to approve pilot activities and business development in these areas, because they are anxious to provide solutions to the important problems of commodity price volatility.
- ***Attempts to market risk management products directly at smallholder producers have not proven to be viable*** because
    a) price setting policies of market intermediaries in many cases shield smallholder farmers from intra-seasonal price volatility and in effect transfer the hedgeable exposure from the smallholder to the intermediary itself
    b) small production volumes do not equate to minimum lot sizes,
    c) high levels of training are needed to achieve even a basic understanding of the instruments, and
    d) providers are not willing to do business with very small groups of farmers.

  Since it is not easy to overcome these limitations, price risk management solutions for smallholder producers must come originate with an actor higher up in the supply chain, i.e. producer group, trader, processor, or bank.
- ***There is a strong link between price risk management and lending.*** Local financial institutions have a very strong incentive to improve risk management since lending to the sector is not profitable or sustainable when there is a pattern of repeated financial loss. High

capacity building requirements at the level of market intermediaries demonstrates the need for a permanent, local partner who can assist with implementation of risk management. Local banks are well-positioned to play that role and act as market intermediary. Hedging with overseas providers requires ongoing communication with partners in London/New York/South Africa and local banks have the highest levels of commercial sophistication and communications infrastructure to support this business. They also know borrower's business problems extremely well, and have a solid understanding of the impact of price volatility on profitability. As a larger aggregator, involvement of local banks strengthens the potential for the development of sustainable business. From a lending perspective, the use of price risk management instruments can potentially help banks extend lending in the sector, and/or reduce the cost since hedged customers are more credit-worthy than unhedged customers. Finally, since local banks have to compete to find clients, expanding the range of financial services that can be offered is an advantage for market competitiveness.

- ***Capacity building needs are high***. For intermediaries lacking basic business skills, the benefit of education about price risk management instruments will be marginal. Additionally, attempts to build risk management capacity in organizations that have more critical problems such as poor communications infrastructure, institutional instability, underdeveloped marketing/financial skills, and weak managerial authority are likely to be ineffective and inefficient. Of the prerequisites for successful implementation, the most fundamental is that the institution involved must have a strong commercial incentive to improve risk management practices. This interest should be expressed by a willingness to meet external project assistance with time and resources to jointly invest in the work.

- ***Capacity building on risk management has broad benefits.*** The goal of capacity building on these subjects is to help producer organizations, traders, and lenders both better understand price risks and pilot solutions to manage them. The ability to use risk management techniques is critical to all actors engaged in commodity trade and a key component of overall business capacity. Governments and policy makers also need to know about the choices, policies and instruments that would facilitate better risk management at the commercial level.

- ***Solutions should be broad enough to encompass a range of products, commercial activities and responses to risk.*** Early implementation work has shown that an organization's responses to new knowledge and a proper assessment of risk leads to risk solutions that may not always involve financial products such as futures/options. For example, changing commercial buying/selling patterns, pricing formulas, and incorporating price protection into physical contracts and/or financing are market-based responses that do not require the use of futures or options. Since hedging and doing business in markets is always opportunistic, these responses may change and shift over time.

- ***Monitoring and evaluation of the impacts of improved price risk management may be limited by the fact that clients have shown a preference to keep confidential the commercial aspects of this business.*** Since the World Bank and donors are not subsidizing the transactions and do not act as a commercial counterpart, it is not advisable for the

bank/donors to request full public disclosure of the details of pilot transactions. Work with clients has demonstrated that they would not be interested in participating in the project if public disclosure of corporate information were a requirement, which means that other mechanisms for monitoring and evaluation the impact of these improvements are necessary.

References

Adams, D.W., D. H. Graham., and J. D. von Pischke, eds. (1984). *Undermining Rural Development with Cheap Credit*. Boulder, CO: Westview Press.

Adams, D. W. and R. C. Vogel (1986). "Rural Financial Markets in Low-Income Countries: Recent Controversies and Lessons," *World Development* 14(4):477-487.

de Aghion, B. A. and J. Morduch (2005). *The Economics of Microfinance*. Cambridge, MA: The MIT Press.

Arrow, K. and R. Lind (1970). "Uncertainty and the Evaluation of Public Investment Decisions," American Economic Review 60(3), 364-378.

Braverman, A. and J. L. Guasch (1986). "Rural Credit Markets and Institutions in Developing Countries: Lessons for Policy from Practice and Modern Theory," *World Development* 14, 1253-67.

Diagne, A. and M. Zeller (2001). "Access to Credit and its Impact on Welfare in Malawi," International Food Policy Research Institute Report No. 116.

Goodwin B. and O. Mahul (2004).

Fackler, P.L and B. K. Goodwin (2001). Spatial price transmission. In Gardner B. and Rausser, G. (eds.) *Handbook of Agricultural Economics, Volume 1*, Chapter 17. Elsevier Science.

Goodwin, B. and O. Mahul (2004). "Risk Modeling Concepts Relating to the Design and Rating of Agriculture Insurance Contracts," World Bank Policy Research Working Paper 3392.

Gurenko, E.N. and R. Lester (2003). "Financing Rapid Onset Natural Disaster Losses in India: A Risk Management Approach," World Bank Report No 26844-IN.

Gurenko, E. and O. Mahul (2004). "Enabling Productive but Asset-poor Farmers to Succeed: A Risk Financing Framework," World Bank Policy Research Working Paper 3211.

Ibarra, H. and O. Mahul (2004). "Self-Insurance Funds as Agriculture Insurance Providers: The case of Fondos in Mexico," World Bank Working Paper.

[1] International Task Force on Commodity Risk Management. September (1999). "Dealing with Commodity Price Volatility in Developing Countries: A Proposal for a Market-Based Approach". Discussion for the Round Table on Commodity Risk Management in Developing Countries, the World Bank.

Kalavakonda V. and O. Mahul (2005). "Crop Insurance in Karnataka: Diagnostic and Room for Improvement," World Bank Working Paper.

Mahul O. and J. Skees (2005). "Managing Agricultural Catastrophic Risk at the Country Level: The Case of Livestock Mortality Risk in Mongolia," World Bank Working Paper.

Mahul, O. and B.D. Wright (2003). "Designing Optimal Crop Revenue Insurance," *American Journal of Agricultural Economics*, 85(3): 580-589.

Morduch, J. (1999). "The Microfinance Promise," *Journal of Economic Literature*. 37, 1569-1614.

[1] Varangis, P. (2003). "Market-Based Commodity Risk Management Approaches", UNDP.

Annex 3.1. Commodity Exchanges - Preconditions

On established commodity futures exchanges, the trade in financial risk management tools is made possible by generally high levels of market liquidity coming from a diverse group of market actors.

- **Producers, consumers, and processors.** Most of these actors participate on the exchange through trade houses or brokerage firms. In some markets, such as soft commodities, consumers and processors are much more active than producers, because market access is not always available for producers, many of whom are in developing countries. All of these actors use the exchange instruments for the purposes of hedging price risk which is a component of their physical trading.
- **Trade houses.** Although this activity has been consolidating over the past 10 years, there are a number of international, multi-commodity trade houses using the exchanges to manage physical and financial exposure of trading operations worldwide. Generally trade houses will focus on a category of commodities, such as metals, soft commodities, or grains.
- **Brokerage houses.** These are financial institutions, also called commission houses, which act as market intermediaries and make profits based on fixed commissions. Most brokerage houses are active on more than one exchange. This business is based on relationships with other market participants such as producers, consumers, processors, funds and investors. International banks with commodity lending portfolios may also have a commodity brokerage division which is designed to both mitigate the risk of the lending and earn profits from market-making activity.
- **Managed funds and Institutional Investors.** The expansion of market capital seeking opportunities for return on a diverse portfolio of risk has contributed to a high level of "fund" business in the commodity exchanges. Funds are generally run by professional money managers. Institutional investors can be pension and insurance funds, which consider commodity futures markets as a risk-diversifying alternative to other investments. Both fund managers and institutional investors follow technical trading signals to guide their activity in the market, and do not focus on fundamentals as much as other actors. Since they are often following similar technical signals, they can go in and out of the market at the same time, and in large volumes. In many markets, this activity has contributed to the increase in price volatility.

This strong commercial interest on all sides of the trade, from physical buyers and sellers to speculative interest from financial stakeholders, is a very important precondition for the establishment of a commodity exchange, particularly one that will be able to offer risk management products.

Other preconditions for the development of commodity exchanges (either physical or financial) include**:**

- potential users of the exchange must be willing to use the exchange price as the reference for physical trading (and a large education effort is genuinely required to start off such a process and obtain appropriate buy-in and support)

- the commodity traded must be well-standardized, with grades widely accepted by commercial parties, and independent entities able to evaluate grades
- local market prices must be sufficiently volatile to create large price movements and pricing should be left to market forces with little likelihood of manipulation by private interests and government entities
- well-functioning, accessible services and infrastructure facilities to facilitate trade in the commodity,e.g. good access roads, transport companies, weight bridges, quality control services, an efficient administration, warehousing, telecommunications, etc.
- judicious government support is needed, including a willingness to adopt suitable new regulation/legislation and appropriate oversight over trade[7].

[7] Rod Gravelet-Blondin, Director of Agricultural Markets, Johannesburg Stock Exchange (SAFEX)

Annex 3.2. Major International commodity markets for Agricultural Products

Exchange	Commodity	Product
Chicago Board of Trade	Corn, Soybeans, Soybean Oil, Soybean Mill, Wheat, Oats, Rough Rice	Futures & Options
Euronext LIFFE	Cocoa, Robusta Coffee, Corn, Potato, Rapeseed, White Sugar, Feed Wheat, Milling Wheat	Futures & Options
Kansas City Board of Trade	Wheat	Futures & Options
New York Board of Trade	Cocoa, Cotton, Frozen Concentrated Orange Juice, Wood Pulp, Sugar	Futures & Options
Brazilian Mercantile & Futures Exchange	Arabica Coffee, Robusta Coffee, Cotton, Feeder Cattle, Live Cattle, Soybean, Crystal Sugar	Futures & Options
Singapore Commodity Exchange	Rubber, Robusta Coffee	Futures
Johannesburg Stock Exchange (SAFEX)	White Maize, Yellow Maize, Wheat, Sunflower Seeds, Soybeans	Futures & Options

Annex 3.3. Futures Contracts, Credit Exposure, and Margining

For commercial intermediaries in developing countries, futures contracts have an advantage in that they can "lock in" a sales price in advance of the actual delivery of the product. This is beneficial when prices are at a level which covers the costs, or financial breakeven point. Since the contract is financially settled, there is no need to worry about quality and transportation issues with respect to fulfilling the contract. The use of futures contracts as a financial tool should parallel the activities in the physical market. For example, an intermediary could use a futures sale to lock in a sale price in advance of the delivery. When the time comes for physical delivery of the goods to take place, the intermediary will use a futures purchase to essentially "buy back" the obligation to sell on the exchange. The gain or loss on the physical transaction will be offset by a roughly equivalent gain or loss on the financial transaction.

The major disadvantage for use in developing countries, however, is the credit risk inherent in trade of these contracts. If the market price has fallen below the level of the futures sale at the end of its maturity, the intermediary, by "buying back" the position at the prevailing lower price, will gain the difference. However, if the market price has risen above the level of the futures sale at the end of its maturity, the intermediary, by "buying back" the position at the prevailing higher price, will lose the difference, and will owe it to the market. This kind of exposure can be very high since market prices are volatile. Although the loss on the financial futures transaction would be offset by an equivalent gain on the physical transaction, there are very few market providers willing to take such levels of credit risk on behalf of developing country producers. Trade in futures contracts requires managing this credit exposure on a daily basis, which is done through a market technique known as margining. Even prior to the maturity date, margin calls are owed daily to the market if the prevailing market price has moved in an adverse direction from the futures trade. Managing the margin requirements requires the ability to make significant cash outlays, and many developing country participants would be unable to financially support this requirement.

Annex 3.4. Summary of Price Risk Management Test Cases

Country/Sector	Targetted Partner	Product	Outcomes
Nicaragua / Coffee	Cooperatives	Options / Minimum Price Guaranteed Forward Contracts	• High needs for capacity building at the level of producer groups limited impact and take-up
Honduras / Coffee	Cooperatives	Futures / Options / Minimum Price Guaranteed Forward Contracts	• Initial transactions were futures trades but limited by high margin requirements • Currently evaluating other instruments
Peru / Coffee & Cotton	Cooperatives / Banks	Back-to-Back Trading / Minimum Price Guaranteed Forward Contracts / Options	• Very successful change in cooperative's risk management strategy through use of physical instruments • Currently evaluating options
India / Coffee & Others	Coffee Board of India National Commodity & Derivatives Exchange	Options	• Attempts to target individual producers using government agency as the intermediary were unsuccessful • Working with NCDEX (local exchange) to link farmers to collateral management companies and banks for fully hedged pre-harvest finance structure
Tanzania / Coffee & Cotton	Cooperatives / Ginners / Banks	Options / Minimum Price Guaranteed Forward Contracts	• Initial work with cooperatives was limited by high needs for capacity building • Recent partnership with bank led to successful options product roll out, with bank sharing responsibilities of educating borrowing clients • Bank also reducing interest rate for borrowers who are hedged • Physical buyers offering more minimum price guaranteed forward contracts
Uganda / Coffee & Cotton	Farmer Societies / Exporters / Ginners / Banks	Options	• High needs for capacity building at the level of farmer society limited impact • Implementation with 1st bank unsuccessful due to change in internal managerial support for product roll-out • Currently working with exporter/ginners to encourage offer of minimum price forward contracts • Recent expression of interest from a second bank and from Cotton Development Organization
Burkina Faso / Cotton	Ginners / Banks	Entire range of physical and financial tools	• Feasibility assessment being carried out by AFD
Zambia & Malawi / Grains	Government	Futures	• Successful pilot of SAFEX-based maize option contract that a) capped the price of maize imports for the Government of Malawi and b) provided contingent import mechanism to give more flexibility