

Market-based price risk management

An exploration of commodity income stabilization options for coffee farmers

Lamon Rutten
Frida Youssef

July 2007



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Published by the International Institute for Sustainable Development

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International Institute for Sustainable Development
161 Portage Avenue East, 6th Floor
Winnipeg, Manitoba
Canada R3B 0Y4
Tel: +1 (204) 958-7700
Fax: +1 (204) 958-7710

E-mail: info@iisd.ca
Web site: <http://www.iisd.org/>

Lamon Rutten is Joint Managing Director, Multi Commodity Exchange of India

Frida Youssef is Coordinator, Commodity risk management and Finance, United Nations Conference on Trade and Development (UNCTAD)

This report has been written in a personal capacity. The views and opinions expressed herein do not necessarily reflect the positions of the authors' organizations.

Tackling Commodity Price Volatility

This paper is published as part of a larger project, sponsored by the Norwegian Government, on policy options to tackle the problem of commodity price volatility. More research and papers can be found at <http://www.iisd.org/trade/commodities/price.asp>

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Acronyms

ANACAFE	National Coffee Growers Federation
BBC	British Broadcasting Corporation
BM&F	Bolsa de Mercadorias & Futuros
COFEI	Coffee Futures Exchange of India
CPR	Cédula de Produto Rural
CRDB	Cooperative Rural Development Bank
FAO	Food and Agriculture Organization
FEDERACAFE	National Coffee Growers Federation of Colombia
IBRD	International Bank for Reconstruction and Development
ICE	Intercontinental Exchange
ICO	International Coffee Organization
IDA	International Development Association
IMF	International Monetary Fund
ITF	International Task Force on Commodity Risk Management in Developing Countries
KNCU	Kilimanjaro Native Cooperative Union
KYC	Know Your Customer
LIFFE	London International Financial Futures Exchange (now called Euronext.liffe)
MCX	Multi Commodity Exchange of India
NCDEX	National Commodity & Derivatives Exchange
NGO	Non-governmental Organization
NMCE	National Multi-Commodity Exchange of India
NYBOT	New York Board of Trade
OTC	over-the-counter
PTBF	price-to-be-fixed
UNCTAD	United Nations Conference on Trade and Development
U.S.	United States

Summary

Coffee prices are highly volatile and unpredictable. As the minimum prices offered by fair trade buyers only apply to a small percentage of world coffee trade,¹ most growers are faced with considerable price uncertainty. This poses severe problems for them. Most of the 20–25 million households engaged in the coffee sector are smallholders, without the financial wherewithal to withstand serious financial shocks. Naturally, they try to mitigate their risk exposure through such practices as diversification and reduced use of inputs.

Traditional risk management measures are costly. They lead to a considerable reduction of farmers' incomes, particularly poorer farmers. In the past, governments have tried to provide safety nets through such mechanisms as marketing boards, which buy at guaranteed prices, or price stabilization funds—but these also have proved to be very costly for farmers. Market-based risk management instruments can provide a more effective alternative, allowing farmers to optimize their risk/reward equation at a lower cost. **While overall, use of these market-based instruments does not reduce the volatility of coffee earnings, it makes them more predictable,** at least over a 6–12 month time horizon. This, in turn, makes it possible for farmers to better plan their activities, and improves their ability to raise bank finance.

The four major categories of risk to which farmers are exposed are: price, weather, pest and health. Market-based instruments are readily available for price risk, and are starting to emerge for weather risk. Organized exchanges offering the most basic of these instruments, futures and options, have operated for a long time, providing transparency to the market, and low-cost risk transfer tools for those able to access them. **While use of price risk management instruments is an incomplete solution, it has sufficient merits on its own and will make the overall burden of risk more bearable.**

There is a wide range of market-based price risk management instruments available: traded on organized futures and options exchanges or the over-the-counter market; incorporated into the pricing formulas of physical trade transactions; or encapsulated in financing deals. None of these instruments fundamentally alters the risky character of the marketplace, but **they empower those active in the market to manoeuvre a way through these risks,** considerably improving the certainty of receiving or paying certain prices six months, one year or even three years in the future (for soft commodity markets such as coffee, risk management markets rarely offer instruments beyond this time horizon). Futures and options are the building blocks: the use of futures locks in a fixed price for some time in the future; the use of options guarantees a minimum or maximum price while still allowing the possibility to benefit from price improvements. These building blocks can be combined and modified in many ways in order to create a risk management product that fits best with a user's requirements.

The use of market-based price risk management instruments by coffee growers has so far been very low. Direct use of futures and options markets—there are two of particular relevance, for Arabica coffee in New York and Robusta coffee in London—is difficult for developing country coffee farmers and even their cooperatives for a number of reasons: meeting the conditions of the intermediaries on these markets is hard; reaching the necessary levels of market sophistication requires considerable investment; and meeting the financial

¹ Fewer than a million coffee farmers sell to the fair trade system, and then generally only a portion of their production. This is out of a total of some 20–25 million coffee farming households.

requirements of the marketplace often falls foul of government controls on currency movements. To some extent, over-the-counter risk management instruments have provided a way around these obstacles: in particular, option-based tools (which require only the payment of an upfront premium) have been used by farmers' groups in Africa and Latin America.

The easier way to get access for farmers would be if risk management elements were part of the conditions of their physical sales or their financing, or other transactions. Coffee buyers—often large international firms—have the ability to incorporate a wide range of risk management tools, including “safety net” prices for future delivery, in their purchasing contracts. They can then lay off the resultant risks on the organized futures and options markets. However, they are not yet doing much beyond “Price-To-Be-Fixed” (PTBF) contracts for producers, in which prices for future delivery are expressed in terms of futures market reference prices. PTBF contracts can be used as a tool for risk management—e.g., to achieve the season's average price, or to lock in the profitability of certain investment decisions—but they can equally be used for speculation. Producers selling PTBF without any form of price protection must accept that, given the unpredictability of future price developments, they are losing all control over the final sale price.

Bank credits could also be made to incorporate risk management elements, but in practice, price risk management is hardly ever built in to farmers' credit, largely because most developing country banks have a very low level of understanding of price risk management markets. But there is a start—with international assistance, a bank in Tanzania has started making options a part of its financing package.

There are many obstacles hindering the use of market-based price risk management tools by coffee farmers. Lack of understanding by the farmers of the relevance of these tools is the least of these: once farmers become aware of the possibilities that these markets offer to manage their risks more efficiently, they are generally keen to use them and willing to pay realistic amounts for such use. While technical assistance and training would be necessary to make them fully familiar with the ins and outs of these markets, the ground for receiving such assistance is fertile. The larger problems are in the intermediation process: the risk management markets are far away, and have access criteria (including financial requirements) that small growers will have difficulties meeting.

Solutions involve bringing growers closer to the market (in particular, by encouraging farmers' association to take up price risk management), and bringing the market closer to farmers (by stimulating local commodity exchanges that can offer smaller contracts denominated in local currency and accessible through local brokers, and by incorporating price risk management into the routine transactions that farmers are engaged in). There is much scope for profitable action in this regard, and much room for innovation.

The various parties involved in the coffee ecosystem can all play a role. *Farmers' associations/cooperatives* and their apex organizations at the national and international level can educate their members, and put their political influence behind initiatives to enhance use of risk management markets. They can build risk management elements into the goods and services that they provide (inputs, credit, crop marketing). They can also play the role of broker/intermediary to advise and hedge for and on behalf of farmers. *Processors* (millers, roasters) can consider ways to use, in particular, options to become more competitive buyers in their markets. *Traders*, both local and international, generally already have access to risk management markets, and rather than just using these markets to manage their own risks,

can consider how to use their contracts to pass on risk management services to their suppliers in a mutually beneficial manner.

Local banks have a major role to play: to the extent that they are already active in coffee sector finance, they can reduce their capital costs by incorporating price risk management instruments into their credits (either side-by-side, or through the denomination of the principal and/or interest rate on their loans). By virtue of their access to the international banking system, they can also provide a pass-through to the international risk management market for the cooperatives and the enterprises in the country—it may even be worthwhile for them to set up a brokerage and risk management advisory unit. All or some of these groups can come together to promote a local commodity exchange, which, apart from offering new local contracts, can trade localized versions of international contracts (combining the benefits of existing liquidity with those of the comfort of being able to manage risks at one's own doorstep).

Governments need to review their rules, regulations, policies and practices with a view to modifying those that unduly restrict the ability of their coffee sector to manage price risk—including those that unnecessarily complicate or undermine commodity sector financing. Where a government is directly exposed to price risk (e.g., through its tax revenue, or its underwriting of a price stabilization program) it should consider how market-based instruments can help reach its objectives more effectively, at a lower cost and with a lower risk. And finally, the *international community* should support all these efforts and, furthermore, examine to what extent the success of its own interventions are dependent on commodity price risk, and take the necessary measures to manage this exposure *ex ante*, rather than after the fact.

Providing growers with access to market-based risk management instruments can do much to help them enter into a virtuous cycle of growth. Ultimately, however, it has to be kept in mind that coffee is one of the crops for which, if production increases, prices have to fall more than commensurately in order to reach a new supply/demand balance. So if it is to benefit the sector as a whole, any measure to improve an individual coffee farmer's income—whether it is through research, extension services, input supply or risk management—has to be accompanied by programs to facilitate the move of such farmers into other crops and other activities (that is to say, efficient diversification, rather than diversification driven by a desire to reduce risk exposure).

Introduction

Producers and many others in much of the developing world are exposed to highly volatile commodity revenues. A range of methods have been tried to either reduce this exposure (for example, through compensatory schemes and production/export controls) or to better manage it (e.g., through stabilization funds or market-based risk management mechanisms). This paper, one of a series on this subject commissioned by the International Institute for Sustainable Development (IISD), focuses on market-based instruments. Rather than providing a broad, theoretical description (which is amply available from other sources, including international organizations such as FAO, UNCTAD and World Bank) it takes the case of one commodity—coffee—and looks at how market-based risk management can be used to improve coffee growers' lives.

The focus is on farmers, not on governments or others active throughout the coffee value chain. The annex, which describes the principles and structures of the main market-based risk management instruments, does, however, contain a discussion of how some of these instruments could be used at the governmental level. Furthermore, the discussion is on market-based instruments to manage price risk, rather than volume risk (largely because the market for managing volume risks, in particular weather-related risks, is still in its infancy).

The coffee sector provides an interesting case study. Over the past decade, the share of coffee farmers in the price paid by consumers for their products has steadily eroded. In the late 1980s and early 1990s, the world retail value of coffee was around US\$30 billion, and the export earnings of coffee-producing countries were US\$10–12 billion. By 2002, coffee retail value had increased to US\$80 billion, and the exporting countries' share had declined to US\$5.5 billion.² While liberalization increased farmers' share in the export value of their crop, the net effect was a considerable fall in their share of their crop's retail value. This negative trend has not been compensated by the growing importance of local markets (with shorter supply chains) in many producing countries, and has happened despite the emergence of a whole range of fair trade and other schemes which aim to provide better rewards to the producer. One could think that this larger "buffer" between producer and consumer prices would help shield producers from price volatility—if supply or demand factors give reason for a re-alignment of prices, the burden should not fall predominantly on farmers as there should be much room in the margins made in the various parts of the supply chain. Unfortunately, despite the declining share of farmers in the final price of their produce, they still remain the ones who shoulder the bulk of the price risk—those further up in the chain generally manage to protect their margins.³

In this context, price risk management remains of crucial importance to farmers—and given the importance of the sector for the livelihoods of so many (an estimated 20–25 million coffee-producing households in some 85 countries, and many more indirectly dependent on

² International Coffee Organization (ICO), *Lessons from the world coffee crisis: a serious problem for sustainable development*, June 2004.

³ The market power of the intermediaries is clear from price behaviour at various times of the economic cycle. "Studies have shown that when commodity prices rise, the higher price is quickly passed on to consumers. But when commodity prices fall, retail prices rarely follow suit. Since the early 1990s, for example, even as coffee prices have plummeted, the value of global retail sales of coffee has more than doubled. The share of those sales received by coffee-exporting countries fell from around 35 per cent to less than 10 per cent." (FAO, *The State of Agricultural Commodity Markets*, 2004) See also David Hallam, "Falling commodity prices and industry responses: some lessons from the coffee crisis," in FAO, *Commodity market review 2003–2004*.

the coffee sector⁴), the issue should be of crucial importance for governments of coffee-producing countries as well as the international development community. Up to the late 1980s, governments often protected farmers from world market price risks—or at least, claimed to do so—but after a flurry of liberalization programs and the abolition of government marketing boards and stabilization agencies, farmers in most countries are now left to the vagaries of the marketplace.

The first chapter sets the scene. It looks at price volatility in the coffee sector, and the impact of this volatility on coffee farmers and their seasonal workers.⁵ It looks at the way that coffee prices move and at differences in price behaviour of Robusta and Arabica coffee. It discusses how prices are passed on from the world market to farmers, the role of intermediaries, and the evolution of schemes and programs that aim to provide a safety net for farmers. It also describes how price volatility plays itself out within the dynamics of the coffee sector, and how this affects livelihoods.

The second chapter reviews the practicalities of price risk management for coffee farmers, looking at strengths and weaknesses of the various instruments, past experiences and lessons learned. It does not discuss at any great length the generalities of risk and uncertainty, or of agricultural futures markets, on which much literature is readily available. It describes the coffee futures markets—the global price discovery centres in London (for Robusta) and New York (for Arabica), as well as the new markets in developing countries. It also looks at the various modalities through which farmers can get access to these risk management markets—from direct use of futures and options to price risk management built into physical marketing contracts, and various instruments offered on the over-the-counter market. It then, in a series of case studies, describes the experiences with price risk management by farmers in a representative group of countries. The various experiences are compared, and the lessons that one may draw from them examined.

The third chapter evaluates the experiences so far, juxtaposing the realities of risk exposure by farmers (not just in terms of price, but also in terms of weather and other risk factors) with the benefits that can be and, in practice, have been delivered through use of price risk management instruments. It formulates “best practices” and assesses the obstacles that hinder these best practices from being more widely followed. It looks at the possible roles of governments, trading companies, final off-takers (buyers such as supermarkets and retail chains), the international community and the farming movement itself in improving access and use of risk management instruments, and discusses possible ways to move forward—including some new and innovative ideas that may merit further exploration. This chapter is followed by a set of recommendations for farmers, the private sector, governments and development agencies.

⁴ For example, in Brazil there are some 221,000 coffee farms, many of whom have an extensive work force. In total, more than four million people depend on the sector. In Colombia, over 500,000 coffee farmers provide more than a third of the country’s total rural employment. In Indonesia there are more than a million smallholders producing coffee. In Mexico there are over 280,000 coffee farmers employing more than 700,000 seasonal workers. In Cameroon, two million people depend on coffee for at least part of their income. In Papua New Guinea, the number is similar, accounting for almost half of the country’s population. In Ethiopia, there are an estimated 1.2 million coffee growers, and a quarter of the country’s population of over 65 million people is estimated to be directly or indirectly dependent on the coffee sector (numbers from a series of sources, including ICO, *The impact of the coffee crisis on poverty in producing countries*, 2003).

⁵ Farmers will be referred to as “he” in the remainder of this report, although it should be noted that there are many coffee-producing households headed by women.

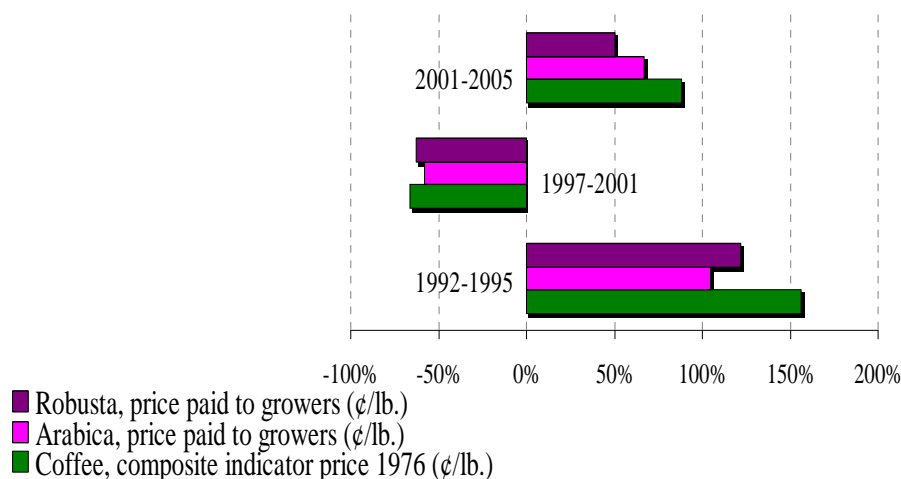
An annex describes the principles of market-based risk management tools, and offers an inventory of some of the market tools available for commodity price stabilization (with some discussion of what the emerging weather risk management market may contribute). These market tools include stand-alone products such as futures, options and commodity swaps; and risk management products embedded in physical trade, finance or other transactions, such as forwards, price-to-be-fixed contracts, commodity-indexed bonds or commodity-linked loans.

1. Coffee farmers' price risk exposure: An examination

Coffee is a tree crop, and supply does not readily adapt to price fluctuations. When prices are very low for extended periods, farmers may uproot their trees, but this is a rather extreme measure. The more common response to periods of low prices is that use of inputs is reduced, and fewer seasonal workers are employed—which in turn exposes farmers to higher yield risks as poorly maintained plantations are more at risk from infestations and crop diseases.

Historically, large falls in prices are reflected in prices paid to producers, but price increases are to a significant extent absorbed in the marketing chain. According to data provided by the International Coffee Organization, in the two periods of growth—1992–1995 and 2001–2005—producer prices rose by much less than the composite indicator price. On the other hand, when prices fell between 1997 and 2001, we see that the reduction in the producer price matched very closely that in the composite indicator.⁶ In other words, when prices rise, producers do not fully share in the benefits but when they fall producers take the full extent of the pain. This points to structural impediments in world commodity markets that work to the disadvantage of commodity producers.

Figure 1: Coffee price changes



Source: Calculated from price data provided by the International Coffee Organization

But coffee price risk does not only affect farmers as producers: it can also affect them as processors and traders, given the important role that cooperatives play in the coffee sector in many countries. It takes time for coffee to move down the supply chain from farmer to export market, and during this time, a cooperative is exposed to considerable price risk. These various risks and how farmers respond to them will be discussed in this chapter.

⁶ Calculated from price data provided by the International Coffee Organization.

1.1 The volatility of coffee prices

Somewhat less than two-thirds of the world's coffee production consists of Arabica, and more than one third consists of Robusta coffee (in 2006–2007, production was respectively 73.25 and 46.64 million 60-kg bags). Some 85 per cent of world Arabica production and 20 per cent of Robusta production is in Latin America. Asia accounts for five per cent of Arabica production and 60 per cent of Robusta production. Africa accounts for the rest.⁷

Arabica grows at higher altitudes, and the tree is less “robust” (more demanding in maintenance) than Robusta. It has a milder taste, and trades at higher prices. Nevertheless, it is Robusta which has in recent years seen the fastest growth—not that long ago, it only accounted for about a quarter of production. This increasing prominence of Robusta is not so much because of the effects of global warming, which over time will indeed make it necessary for some of the current Arabica producers in Africa to shift to Robusta, but rather because of changes in coffee drinking habits and technological advances which have made Robusta easier to use in blends.⁸

Chart 1 shows world Arabica and Robusta prices. There are five aspects of price behaviour evident from this chart that merit commenting:

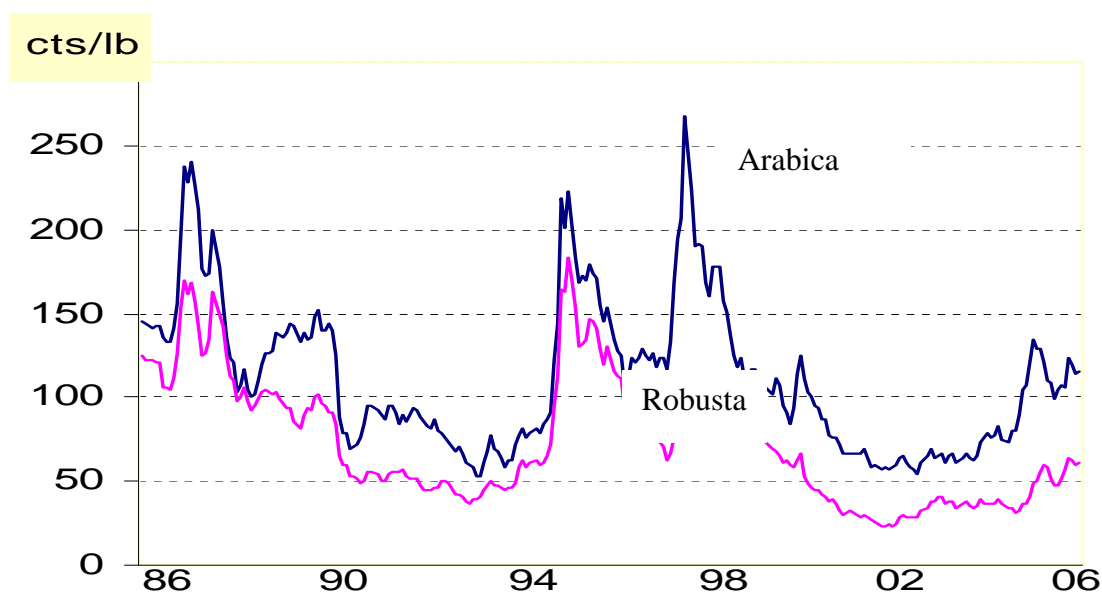
1. In the long run, coffee prices show a declining trend. For some farmers, price declines have been compensated by productivity increases, but this has been the case only for a minority. By and large, coffee farmers have seen their coffee revenue falling. At the same time, the total amount paid by the final consumers for coffee has been growing, indicating a rapid decline in the share of the “coffee pie” received by producers.⁹
2. Around this long-term trend, coffee prices have been very volatile. In the period covered by this chart, Arabica prices, for example, have moved between around 50 ¢/lb and over 250 ¢/lb. Even in a year with relatively stable prices, the difference between the year's lowest and the year's highest price is easily 20 per cent. Similar volatility can be seen within a month and even, when observing futures market prices, within a day. Table 1 further illustrates this point: almost half of the time, the average price of a month is more than five per cent higher or lower than the average price of the previous month.

⁷ FO Licht's International Coffee Report, March 2007.

⁸ Among the consumer trends that have boosted demand for Robusta: many of the “frontier” markets for coffee, e.g., traditional tea-drinking regions, have a preference for instant coffee in which one can easily use Robusta; the craze for “flavoured” coffees in North America makes the taste of the underlying coffee less important; and many coffee consumers have shifted to cappuccino and the like, in which the coffee is mixed with milk. At the same time, new processing techniques such as steam-cleaning are making it easier to remove undesired flavours from coffee beans, making it possible to use more Robusta in blends without negatively affecting the taste.

⁹ The main reasons for this are threefold. First, most of the benefits of developing niche markets and value-added products (such as soluble coffee and branded coffee) have been captured by roasters, not producers. Second, wage, packaging and marketing costs for coffee (mostly incurred in developed countries) have steadily increased. Third, developed country taxes are normally a percentage of sales value, and have thus increased in line with or even beyond the overall increase in sales prices (developed country governments now receive more in tax income on the coffee imported from developing countries than the growers receive in total revenue). See Bryan Lewin, Daniele Giovannucci and Panos Varangis, *Coffee Markets – New Paradigms in Global Supply and Demand*, The World Bank, March 2004.

Chart 1: Nominal prices for mild Arabica and Robusta coffees, 1985–2006



Source: Based on data of the International Coffee Organization. These prices reflected the monthly averages of spot prices in New York and various European ports.

Table 1: Frequency of month-to-month price changes for mild Arabicas and Robustas, 1997–2006 (in per cent of total number of observations)

	Size of price change (plus or minus)			
	< 5%	5–10%	10–20%	> 20%
Mild Arabicas	54%	30%	15%	2%
Robustas	54%	36%	8%	2%

Source: Calculated from ICO spot price data (monthly averages)

3. Coffee prices show a particular pattern, more pronounced for Arabica than Robusta: relatively long periods of low prices are interspersed with short periods of very high prices. This is a result of the dominant role of Brazil as an Arabica producer. Most of Brazil's Arabica is produced in highlands, where from time to time a frost can destroy part of the coffee crop. During the critical period of Brazil's Arabica season, much of the world coffee community closely follows weather in Brazil's coffee-producing states, and even a rumour of frost damage can set off a price hike.
4. Robusta prices traditionally followed Arabica prices—the relationship between the two markets once was so strong that traders commonly managed Arabica price risk on the Robusta market and vice versa, depending on where they perceived prices to be best. This relationship has weakened over the past decade though, and these two kinds of coffee are increasingly behaving as if they are separate commodities. To draw a comparison, in the past the price relationship between the two was like that

between white and raw sugar; now it is like that between soybean oil and palm oil—two connected markets which nevertheless have their own separate price determinants.

5. The particular graph used shows spot prices. Had futures prices been used instead, the graph would have looked largely the same. Futures prices tend to follow spot prices closely, only rarely and for relatively limited periods of time (days rather than weeks) are futures prices pushed away from the underlying supply/demand conditions by the position-taking of large investment funds and other speculators on the futures exchanges. Incidentally, this implies that using futures markets is not a way to reduce volatility of earnings. Those who use futures or options will find their revenues much more predictable, but in the long run, they will hardly become more stable.

There is another possible way to make revenues more predictable: forecasting them, using one or more of a series of models. Table 2 shows the forecasts made by the World Bank in late 2003.

Table 2: World Bank forecasts of Arabica and Robusta prices, 2004–2015

Year	Arabica (US¢/lb)	Robusta (US¢/lb)
2004	68.00	38.00
2005	72.00	40.00
2006	74.43	41.40
2007	76.94	42.85
2008	79.54	44.34
2009	82.22	45.89
2010	85.00	47.50
2011	86.91	49.21
2012	88.87	50.98
2013	90.87	52.83
2014	92.91	54.73
2015	95.00	56.70

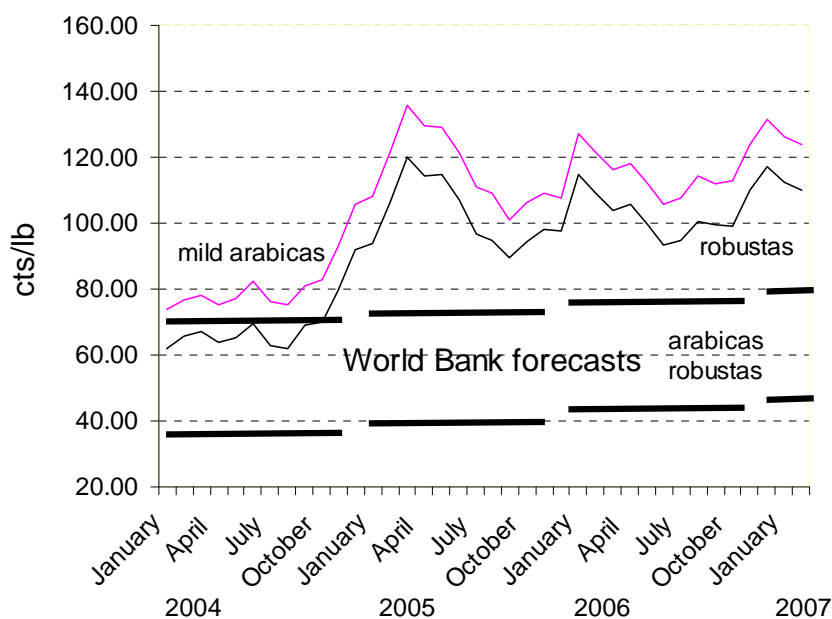
Source: World Bank, *Global Economic Prospects and the Developing Countries: Realizing the Development Prospects of the Doha Round*, Washington, D.C., 2004

World Bank price forecasts have been no better or worse than those made by other forecasting agencies, and unfortunately, reality generally fails to meet the expectations of forecasters. Chart 2 compares forecasts with real price developments from January 2004 to February 2007—as can be seen, even in the first year the forecasts were rather inaccurate. It should be clear that trying to forecast price developments and making decisions on the basis of such forecasts is of little use for managing price risk exposure.

World market prices tend to be passed on at the local level. By and large, farmers are now well aware of international prices (in many countries, they listen to the BBC’s World Service’s coverage of coffee futures prices and equivalent price information services), and will use these as a benchmark for their own sales decisions. There are, however, an important number of exceptions. In no particular order of priority, the following can be mentioned:

- In the eyes of many people, coffee is primarily an export crop—so the price should be the world market price minus transport and other transaction costs. However, the role of national and, in some cases, sub-regional markets has increased in recent years. While in the 10 years from 1997 to 2006, coffee production increased by 22 per cent, local consumption in the producing countries increased by 28 per cent. Almost a quarter of coffee is now consumed in the country where it is grown. Brazil, where home consumption now accounts for almost 40 per cent of total production, has become not only the world’s largest coffee producer, but also its second largest coffee consumer.¹⁰ Furthermore, and further weakening the importance of the traditional coffee consumers in Europe and Northern America, in some cases, sub-regional demand has come to dominate price behaviour—for example, in recent years Sudanese buyers have at times driven coffee prices in Uganda. This trend is influencing the way that traders operate (for example, they will leave more stocks in the producing country so that they have greater flexibility in allocating coffee to one market or the other). It is also influencing the behaviour of the “basis” between local and international prices—in a way, rather than having a relatively stable basis determined by the costs of bringing the coffee from the national to the international market, one will have a “maximum” basis, where bringing coffee to the international market becomes a decision of last resort, as traders often can do better locally.
- Growing national and sub-regional markets are just part of a shift in trade flows away from the traditional buyers in the U.S. and Western Europe. The two traditionally dominant coffee futures markets—for Arabica in New York and for Robusta in London—reflected the position of Latin America as a major Arabica producer and Africa as a major Robusta producer, with most coffee flowing across the Atlantic Ocean. Now, Vietnam has become the world’s dominating Robusta producer, and much of the production remains within Asia. Robusta prices in Asia have increasingly become dissociated from London, resulting in, among other things, efforts to create new futures markets in the region. For the time being, however,

Chart 2: Coffee prices, 2004–2007, as compared to World Bank forecasts



¹⁰ Calculated from ICO statistical data.

such efforts have not been successful; while London Robusta prices have become less representative, the market is still liquid and users can be certain that they will easily be able to enter and exit.

- A still small, but increasing, part of the market has pricing that is at least partly determined by special considerations: in particular, how is the coffee produced? There is now a wide series of programs to provide above-market prices to producers. Traceability “from the hoe to the cup,” from farmer to roaster, is a common element in all of these programs. Generally, the price paid will be market-linked, but with a premium; and often with a guaranteed minimum that is meant to cover production costs (a rather elusive concept in the case of coffee; it can be more appropriately described as a price at which farmers and their seasonal workers can achieve an acceptable standard of living). Box 1 provides an overview of these various programs and how they affect farmers’ risk exposure.
- Some coffee is of a quality that commands large “gourmet” premiums over “standard” coffee.¹¹ For example, Jamaica’s Blue Mountain coffee, or Hawaiian Kina coffee. There are efforts to increase the amount of coffee for which buyers are willing to pay such specialty prices, through branding (the creation of “appellations” or “indications of origin” similar to what one can see in the wine market), improving quality, and creating new marketing systems (in particular, electronic auctions). These efforts have had real success (very significantly so for the farmers who have seen their prices double or triple), but ultimately, one cannot expect this premium market to grow much beyond its current levels.

Box 1: Special marketing arrangements and their impact on farmers’ risk exposure

For an increasing number of growers, the price they receive for (part of) their coffee is determined by how it is produced rather than by the intrinsic quality of their coffee beans. The number and variety of schemes is steadily expanding, but the following are among the major, at times partially overlapping schemes:

Fair trade coffee

This is coffee produced in a way that the buyer considers “fair.” Until recently, buyers were western NGOs, but now a number of corporate houses have also started their own fair trade brands. Criteria to qualify differ a bit from buyer to buyer, but they include such things as fair payments to workers. Generally, farmers are organized into a cooperative which has to be certified by an NGO. The price paid is set at a premium to world market reference prices, with a certain minimum that reflects sustainable production costs. The NGOs that are part of the fair trade movement coordinate price levels with each other. Negotiations in 1988 between European fair trade leaders, farmer representatives and the industry established the initial floor prices, and for years, they have been kept stable at US\$1.26 per pound for washed mild Arabica (US\$1.41 if organically certified); and US\$1.10 for washed Robusta (US\$1.25 when organically certified). Market prices have remained below these levels, but if this were to change, the fair trade premium will be only US\$0.05 per pound. The premium may be allocated to the cooperative for community activities (education, healthcare or

¹¹ See for a discussion chapters 5 and 6 of Bryan Lewin, Daniele Giovannucci and Panos Varangis, *Coffee Markets – New Paradigms in Global Supply and Demand*, The World Bank, March 2004.

infrastructure) rather than to individual farmers. In addition to receiving higher prices, participating cooperatives also benefit from credit facilities.

Organic coffee

This is coffee grown without use of inorganic fertilizers, herbicides or pesticides; and then processed in an organic manner. Farmers receive an above-market price, but have to agree to be subject to a fairly stringent monitoring and certification process. Processors and roasters also have to be certified. About half of fair trade coffee is also organically certified.

Eco-friendly coffee

The major product in this relatively new category is shade-grown coffee, which is more friendly to the local fauna (in particular birds) than the traditional production of coffee as a mono-crop. It is predominantly procured from small farmers, who are paid a better price in return for accepting certain eco-friendly production methods (multi-storey shade trees, and avoidance of chemicals that endanger fauna). One of the two major certifications, by the Rainforest Alliance, also includes social responsibility criteria particularly in terms of labour practices.

Private/corporate standards

A number of large companies have adapted their own standards for procuring “sustainable coffee.” Criteria normally include both social and environmental factors as well as food safety conditions. Several of the world’s largest supermarket chains have come together under the “Utz Kapeh” initiative which sets standards for the coffee that they procure (directly from producers’ groups or from trading houses). The other major initiative is by Starbucks which tends to buy directly at origin. In both cases, an above-market price is paid. But not all corporate standards may lead to higher revenues for farmers—they constitute conditions that sellers have to meet, and the sellers have to carry the related costs.

Note that auctions (as used, for example, in Kenya and Tanzania) do not really influence the link between local farmgate prices and world market prices (other than imposing an extra cost). Auctions allow prices for some high-grade coffees to be discovered, but for the major part of the coffee passing through an auction, this is just an administrative phase (indeed, often the buyer is the same as the seller, or an associated party)—and an occasion for the government to impose taxes.

1.2 Farmers’ exposure to coffee price risks

Once a farmer decides he is to be a coffee producer (a decision often determined by tradition and lack of alternatives) he becomes exposed to coffee price risk.¹² There is not much that he can do about the nature of this risk, other than uprooting his trees—a radical decision which is made only very rarely, following prolonged periods of very low prices. But he can, and does, influence the scale of this risk. Farmers’ behaviour in this regard is rational, optimizing their risk/reward equation within the constraints of their environment.¹³

¹² For a formal discussion on what risk and uncertainty mean for farmers, see Jagdish Parihar, “Risk and Uncertainty in Agricultural Markets,” in Nigel Scott (ed.), *Agribusiness and Commodity Risk: Strategies and Management*, Risk Books, 2003.

¹³ For the case of coffee, see, for example, Ruth Vargas Hill, *An analysis of abandonment and investment in coffee trees*, Oxford University, mimeo, 2005. The paper concludes “Using econometric models of friction different models

This report focuses on price risk, although this is of course only one of the major risks to which farmers are exposed. The three major risk categories, as reported by farmers, are price risk, quantity risk and personal health-related risk (see for example Table 3).

Table 3: Risks faced by coffee-producing households in the Dominican Republic (per cent reporting risk as “very important”)

Risk	Holding size		
	< 5 ha	5–10 ha	>5 ha
Weather-related yield risk	46.5	60.9	49.1
Disease-related yield risk	64.1	67.1	62.5
Price risk	73.2	82.9	81.2
Yield risk in other crops	35.2	46.3	35.7
Loss of employment	30.3	28.1	33.9
Illness	56.3	70.7	60.7
Lack of credit	64.1	78.1	72.3

Source: International Task Force on Commodity Risk Management in Developing Countries (ITF), *Dominican Republic: Price Risk Management for Coffee and Cocoa*, World Bank, 2002

The order of importance of these risks varies from country to country and from household to household; in reality, other than from an academic perspective, it is not really that relevant whether price risk ranks first, second or third among a farmer’s concerns—what matters is that it is important, and that in many cases there are markets to which these risks can be shifted. The relevance of price risk management is not diminished by an inability to provide tools to manage weather- or health-related risks.

It is worth noting that while quantity risk is in some coffee-producing countries primarily a weather-related risk, in others, it is primarily a result of potential exposure to crop pests and diseases—the latter, in turn, is correlated to the level of maintenance of the coffee trees, which is influenced by coffee price levels. Health-related risk can be covered through insurance, which is made increasingly available to farmers (in particular through the efforts of banks which recognize that an ill farmer is unlikely to reimburse his debts)—but still, only a minority of farmers currently has access. Quantity-related risk coverage is largely unavailable to coffee farmers, but the future may bring more over-the-counter products that provide cover for weather risk. Price risk can in many cases be covered on existing markets, but these markets are so far hardly used by farmers, directly or indirectly—instead, farmers rely on a range of costly traditional risk management tools.

A first way for coffee farmers to manage their price risk exposure is **diversification**. Most small coffee growers produce much of their own staple food; coffee is their cash crop, paying for crucial expenses such as school fees, medical costs and social obligations. Given average coffee price levels as compared to the prices of food crops, they would often have been better off using more of their land for coffee and less for food crops, but such a decision would have exposed them to major risks. Similarly, many farming households will use family labour for off-farm revenue-generating activities, even sending their youngest and strongest hands to the cities—at the cost of productivity on the farm. In other words, the first impact of price risk on coffee farmers is that it leads to inefficient diversification, cutting

of investment are tested with data on Ugandan coffee farmers. Models of investment which allow for irreversibility, uncertainty, fixed costs and liquidity constraints are found to perform well in explaining the abandonment and investment patterns observed.”

long-term income in exchange for reduced risk exposure. Another traditional risk management tool is **consumption smoothing**: investing in assets that can be sold again when the need arises—again, the result is a lower than expected average income as money is saved, not invested.

Once a coffee tree has started bearing fruit (three years after planting), farmers have to make decisions with respect to maintenance: how many inputs should be used, how much labour for pruning, etc. These are decisions that have to be made each year about six months before harvesting starts—a long period in terms of what can happen with coffee prices. While there are important differences between Arabica and Robusta (the former is much more vulnerable to poor maintenance and requires many more inputs), in both cases farmers' decisions are once again guided by an effort to optimize risk and reward within the constraints posed by their ability to finance maintenance activities. Consequently, they tend to spend less on maintenance than would be needed to maximize their revenue; and in a year following low coffee prices, they tend to spend less on maintenance than they would have liked to.¹⁴ Large plantations and well-organized producers may already be able to remove part of their risks at this stage by entering into forward contracts with traders, but this is not a possibility open to the vast majority of growers.

A related factor is that even if farmers wish to maintain their trees properly, they may not have access to the cash flow required to do so. Like most developing country farmers, coffee farmers tend not to lack cash and have poor access to credit. Credit constraints are largely due to the overall inefficiencies in agricultural lending in developing countries, but price risk does play a role too. Too often, banks lending to coffee farmers have found themselves in the role of unofficial stabilization funds, seeing reimbursements on their loans to coffee farmers dry up in times of low prices and, if they are fortunate, the arrears paid off when prices pick up again.

The next decision-making point comes at harvest time. The coffee harvest is labour-intensive, and even small farmers tend to recruit seasonal workers. Harvesting coffee berries is subject to the law of diminishing returns (the berries that are easiest to pick get picked first). While higher prices lead to higher yields per tree, once again, price expectations influence the farmers' decisions; a risk-averse farmer will give up part of his return in order to keep risks at acceptable levels. But the costs of risk exposure at this stage are low. The period of price exposure is small. Once the berries have been harvested farmers will normally dry them (only cash-desperate farmers sell their berries wet), but this only takes one week or so. Furthermore, in quite a few countries, to secure supply itinerant traders are willing to enter into one-week forward contracts at a fixed price, even advancing the farmer's harvesting expenses.

Until now, risk exposure and the responses to this applied more or less uniformly to all farmers. But paths diverge once the berries have been harvested and dried: there are large differences from country to country and even within countries in the way that coffee processing and marketing are organized, and hence, in the nature and scale of farmers' risk

¹⁴ Thus, farmers pass on part of their price risk to seasonal workers. Indications are that low prices affect both the number of seasonal workers employed and the salaries (in cash and in kind) that they are paid (see for example ICO, *op. cit.*, 2003, and P. Varangis et.al., *Dealing with the coffee crisis in Central America, impact and strategies*, World Bank Policy Research Working Paper, March 2003. As an example, in five Central American countries, a total of some 42 million labour days were lost in the coffee sector in 2001). Given the large importance of the coffee sector for seasonal workers in Central and Latin America and the dearth of alternative sources of employment, the welfare costs of this indirect exposure to coffee price risk are large.

exposure. Farmers may sell their berries in an unmilled state, or they may mill it in a cooperative coffee mill or even toll-mill it with a private miller. They may sell all of their coffee once their berries have been dried or milled, or they may stock a significant portion for later sales (most farmers store at least some of their coffee). In some cases, farmers give up ownership and all upside price potential directly after the harvest; in others, they sell their crop but keep the opportunity to benefit from price increases; in yet others they (generally through a cooperative) keep control over marketing and pricing until or even after the sale of the processed product. Possibly with their cooperative as a buyer, some farmers sell at prices determined in local markets (which, as discussed in the previous section, tend to follow world markets), others can benefit from minimum prices and/or above-market prices paid under special trading arrangements (fair trade, organic coffee, etc.).

Conceptually, there are two special aspects of price risk exposure in this post-harvest phase. First, in some cases, farmers give up all upside price potential; in others they keep it—which is equivalent to the financial market’s *call option*. Given the nature of coffee price movements (occasional extreme price peaks) such call options can be very valuable for farmers. Second, organizational relationships become complex—in particular, when some risks are explicitly borne by a farmers’ cooperative, how can this cooperative fairly distribute such risk between itself, as an independent entity, and its member farmers? Socio-political and economic factors (competitive pressures from private traders) have an important impact on how cooperatives deal with risk—Box 2 describes this in some more detail.

Risks hit the poor hardest.¹⁵ It is worth noting that in all areas of risk exposure, farmers’ response to risk depends on their ability to carry risk. This, to a large extent, is a function of their overall wealth, and the poorest farmers therefore tend to be the most risk averse. To the extent that traditional risk mitigation tools lead to reduced average incomes,¹⁶ then, exposure to risk is likely to perpetuate and reinforce rural income inequalities. “Avoiding high-risk investment choices can lock poor households into low-risk, low-return production patterns, thus keeping them in a classic poverty trap.”¹⁷ One study of Ugandan coffee farmers concludes that “coffee farmers who believe coffee to be more risky, are more risk loving, and better able to take on risky activities devote more resources to coffee production. For wealthier farmers, risk preferences do not affect crop production choices to the same extent. Estimates suggest poor, risk-averse farmers may be losing a potential of 7 per cent of annual crop income as a result of being less likely to produce coffee.”¹⁸

¹⁵ “When a poor household does not have an effective strategy to insure itself against risks, this can send it into a catastrophic downward spiral to destitution. This causes the severity of poverty to worsen as already-poor households sink deeper into poverty and increases the prevalence of poverty as previously non-poor households fall below the poverty line. Shocks can also have non-catastrophic consequences for poor households that nevertheless cause them to suffer very high and often irreversible income losses.” Human Development Group, Africa Region, *Dynamic risk management and the poor*, The World Bank, July 2000.

¹⁶ “The costs of informal insurance against risk can be very high for poorer households... Households in risk-prone semi-arid areas of India may have had to sacrifice as much as 25 per cent of average incomes to reduce exposure to shocks.” (idem). “Traditional systems might persist well after they are the best means for addressing problems... In these cases, risk-mitigating mechanisms that are part of a household’s own poverty alleviation strategy can turn out to be part of the problem... There is a role for policy in fostering movement towards situations where poor households use more flexible mechanisms to address risk.” (J.J. Morduch, “Issues on risk and poverty,” mimeo, Stiglitz Summer Research Workshop on Poverty, The World Bank, Washington D.C., July 6–8, 1999).

¹⁷ idem

¹⁸ Ruth Vargas Hill, *The role of risk in shaping production decisions: an application to coffee farmers in Uganda*, University of Oxford, mimeo, 2005.

Inversely, providing access to modern price risk management instruments (which tend to be virtually cost-free) is in relative terms of the greatest benefit to the poorest farmers. This implies that one should be careful when evaluating the impact of programs to bring such tools to the farming community. In practice, better-off, generally better-educated farmers can respond more easily when provided with the opportunity to use modern risk management tools, and also, the absolute volumes that they produce are larger. So it is likely that in the short term at least, one can see the largest benefits of such programs accrue to the farming elite. But in the medium term, the impact on poor farmers' livelihoods, and their capacity to escape from the poverty trap, is likely to be significant.

Box 2: Cooperatives' price risk exposure

Cooperatives may engage in a number of marketing and pricing functions:

- At some part of the production cycle (often at the time that the major decisions on input usage are made) they may guarantee a (minimum) price to farmers.
- They may provide inputs on credit, and sometimes also cash credit, to farmers, with reimbursement to be made through deduction from the farmers' final sales revenue
- At harvest time, they buy from farmers. Nowadays, this is often a competitive process, with farmers ready to abandon their cooperative (and their obligations to reimburse their loans) by selling to a trader who may offer only a few per cent more. Often, the cooperative may offer their farmers an initial first payment, with a second payment to be made once the coffee has been sold (assuming that the sales price is sufficiently high), and a third payment in the form of a share in the cooperative's profit at the end of the season.
- The cooperative then processes the coffee, and sells it—directly to a trader, exporter or processor, or through an auction. In the case of Arabica, processing and transport time together, it may take six to eight weeks for the coffee to be ready for sale; in the case of Robusta, the cooperative may carry the inventory only for two weeks or so. In this period, the cooperative generally carries all the risk on the value of its inventory. In some cases, the cooperative may already sell the coffee before it is processed, at a fixed price, or at a price-to-be-fixed (PTBF) at some time prior to delivery (PTBF contracts will be discussed in the next chapter).

Cooperatives can thus be exposed to a complex series of price risks:

- When a cooperative promises a minimum price to farmers six to nine months prior to the expected time of sale of the coffee, it runs the risk that prices fall to a level at which it cannot keep its promise; this can destroy farmers' trust in their organization. When it is linked to a system of input credits, the cooperative can then also expect massive defaults. In principle, the cooperative could hedge this risk by buying options, but in what quantity?
- If the initial price that the cooperative offers to farmers is too much below that offered by traders (typically, farmers may desert their cooperative for a price difference of as little as 5–10 per cent) they will not be able to buy and process enough to cover their fixed costs; not to mention the fact that farmers who sell outside of the cooperative marketing system may default on the (input) credits that the cooperative provided to them. So there is much pressure on the cooperative to pay as high an initial price as possible, leaving little or no protection against the risk of price falls.
- Once the cooperative has taken possession of the coffee, farmers generally feel that price risks are now the cooperative's problem. They will not accept to reverse part of their initial payments to cover their cooperative's losses. Given the time between the purchase of coffee by the cooperative and its sale, the cooperative runs a significant risk (in one

exercise with a major Tanzanian Arabica coffee cooperative, it was found that month-to-month losses on inventory value in the post-harvest season at times exceeded well over a million dollars).

- If the cooperative enters into PTBF contracts with exporters, they have to properly time their price fixing. Normally, in a PTBF contract, the seller can fix incremental parts of his sales price between the period of the initial signature of the contract and the time of delivery. The “safe” way to use a PTBF contract would be to spread out the timing of price fixation—e.g., in the first week, the price of 10 per cent of the volume-to-be-delivered is fixed, in the second week, a further 10 per cent, etc. However, the temptation to set opportunistic pricing—fix the major part when prices are perceived to be high—can be large. As seen in a number of cases across the world, the risk of this is that, in a collective decision-making structure, when prices are falling, the cooperative fails to fix any prices until the last moment, thus receiving the worst possible price rather than the average price of the period.

2. Price Risk Management in Practice

2.1 Price risk management markets and instruments

Coffee price risk management markets consist of organized futures and options exchanges, and the over-the-counter (OTC) market (for a description of the main market-based risk management instruments available, see the annex to this paper).¹⁹ The major organized exchanges are in New York and London. In New York, the world's Arabica futures prices are determined on the New York Board of Trade (NYBOT). NYBOT is, since early 2007, part of the Intercontinental Exchange (ICE), an electronic upstart which was set up in the late 1990s by a number of oil companies and banks as an OTC exchange for energy products. Robusta futures and options are traded on the London International Futures Exchange (LIFFE), currently known as Euronext.liffe, after its takeover by Euronext in January 2002.²⁰

There are also coffee futures markets in Indonesia, Brazil and India. In Indonesia, a Robusta contract introduced at the country's exchange in the early 2000s has not seen any volumes. In Brazil, the local exchange (Bolsa de Mercadorias & Futuros, BM&F) offers Arabica futures and options, denominated in U.S. dollars. Trade in these coffee futures is quite active: in 2005, futures and options for some 50 million bags were traded, double the volume of production. In India, there have been efforts by four exchanges to build an active market for coffee futures trading. The first initiative was an independent coffee exchange, the Coffee Futures Exchange of India (COFEI), set up in 1999 and supported by some of the country's large plantation companies and traders. The initiative failed and COFEI was disbanded in 2004. Then, the three multi-commodity exchanges which resulted from the country's liberalization of futures trading each made an attempt. The first was the National Multi-Commodity Exchange (NMCE), followed by the National Commodity & Derivatives Exchange (NCDEX) and then, in February 2007, the Multi Commodity Exchange (MCX). So far, success has been elusive. One factor has been resistance from part of the trading community, which is not too keen on the level of transparency that a modern exchange can bring and which has tried to use weaknesses in the country's physical infrastructure for coffee grading and warehouses to disrupt futures trading.

In the past there were also Robusta coffee futures contracts in Singapore (which never took off) and in China (where the Robusta contract at the Hainan exchange for some time was the world's most traded commodity futures contract, until the exchange was closed down in 1997 as part of efforts of the Chinese government to streamline the country's futures industry).

Price behaviour on the futures markets closely reflects that on the physical market—futures exchanges merely “discover” prices, providing an indication of expected developments of supply and demand. Use of futures markets for price risk management purposes (also called “hedging,” as opposed to “speculation”), then, is not a tool to realize better prices, but a way to obtain more certainty about the prices one can expect to realize. Greater predictability, in turn, makes it possible to make better decisions and to obtain credit at better terms—these

¹⁹ For an extensive discussion, see for example UNCTAD, *A survey of commodity risk management instruments*, 1998.

²⁰ LIFFE was created in 1982, to take advantage of the removal of currency controls in the UK in 1979. The exchange modelled itself after the Chicago Board of Trade and the Chicago Mercantile Exchange and in the mid-1990s absorbed the city's much older commodity futures market.

indirect benefits, rather than better price realizations, are what allows those who use price risk management to improve their revenues.

The instruments offered on these exchanges are futures and options (except in India, where options are not yet allowed by law). Futures contracts offer producers the opportunity to lock in prices, while producers who buy options either get protection from downside risk (in the case of put options) or the opportunity to benefit from price increases even if they have already sold their crop (in the case of call options). Note that in quite a few countries (including the United States) certain government entities, cooperatives and/or institutional investors have restrictions in their statutes or regulations on the use of their resources for “speculation.” If then these countries consider futures and/or options as speculative instruments (as some for unclear reasons do), the entities concerned cannot use these markets. For example, when in the early years of this decade Vietnam’s major coffee exporter, a state-owned entity, started looking at possibilities to hedge its price risk, with the explicit purpose of passing on the benefits to the country’s cooperatives in the form of a minimum price scheme, it found that it could not do so as the country’s law defined use of options as “speculative.”

Use of organized futures and options markets can be cumbersome for a developing country producer. Consider the steps involved:

1. First, the producer has to make the decision to manage price risks—which in the case of a cooperative body may not be an easy process.
2. Second, the producer has to identify a reputable broker who is willing to provide him access to a relevant futures market; and open a trading account with him. Each of the elements of this step have their own problems (“reputable”—there have been quite a few cases of brokers abusing their clients; “willing”—will a broker find it worthwhile to service a small client?; “relevant”—what makes a market relevant?; “open an account”—is subject to often heavy regulatory requirements).
3. Third, the producer has to ensure that he has access to the funds necessary to enter into a futures or options transaction. When the broker is abroad and hard currency is required, this may necessitate permissions from a central bank and/or other government entities.
4. Fourth, the producer then has to use his new-found access to make appropriate trading decisions. In the case of the more traditional markets, he will trade through his brokers; in the more modern exchanges such as those in India, the broker will provide him with a password and a trading limit, and he can directly buy or sell on the exchange platform. But given the fast movements of futures markets, what constitutes “appropriate”? And given production uncertainties, what quantities should one hedge? In practice, these cannot be committee decisions: an individual will have to be given the authority to decide what constitutes an appropriate transaction, and to execute it—and presumably, he will need to undergo rigorous training and will need to be given access to up-to-date market information in order to make the right decisions. But how can such individuals be controlled? How can a cooperative ensure that the staff authorized to hedge does not abuse their position to speculate? One would require strong administrative systems for registering, monitoring and auditing trading decisions. Even large banks have had difficulty putting into place a proper system of checks and balances.

5. Fifth, once the producer has entered into a position which, in principle, provides him with a hedge against unfavourable price movements, he may well prefer to just wait until he can unwind his physical position (that is to say, sell his coffee). But this is not how a futures exchange works. Rather, the exchange has a clearing department or clearing house which has to ensure that at any moment in time, those who have entered into futures contracts or sold options are able to meet their commitments. The clearing house does so through a system of margining: an initial margin has to be paid upon entering the position, and then “maintenance margins” or “margin calls” may have to be paid in order to ensure that at no moment in time, it becomes attractive to default on one’s obligations. In the case of a producer who has hedged his future production, this implies that if futures prices go up, he will be asked to pay margin calls (note that his crop is still in the field and he may not have easy access to ready cash). The producer needs to have mechanisms in place, including relevant authorizations, to ensure that such payments are made in time.
6. Finally, when the physical position that was hedged disappears (that is to say, the product is sold at a fixed price), the producer needs to unwind his hedge position. Again, this involves discretionary decisions: at what time of the day does he buy futures or sell his put options? Or if the futures market trend seems favourable, should he perhaps wait a few days?

On the OTC market, producers can obtain tools that may overcome some of the weaknesses or impracticalities of directly using the organized markets. In particular:

- Nowadays, it is not easy to open a credit line with a broker and start trading on the London or New York exchange. Stringent Know Your Customer (KYC) rules have been introduced in recent years. Brokers who wish to enter into a commercial relationship with a new client (and for that matter, banks which wish to enter into an OTC transaction) have no choice but to meet all the KYC rules of their jurisdiction, and this brings high fixed costs. They can never recuperate this for a client that will trade less than a few million dollars a year. So while in the mid-1990s, a coffee trader from Burundi was able to deposit £ 5,000 with a London broker and start managing the risks of his operation, now only the large companies in developing countries have access to developed country brokers. And for a number of reasons (including, until fairly recently, currency controls in most developing countries) there are not many brokers based in developing countries that can offer access to western exchanges.
- OTC markets allow bilateral negotiations on margin deposits and margin calls. As noted above, users of futures markets have to pay an initial deposit, and additional margin calls when their position moves against them. Such margin calls may have to be made within hours, if not the client’s position is forcibly closed out. This can be problematic. If a producer has sold futures to protect the price of the coffee that he expects to harvest a few months hence, and futures prices increase, then the value of the coffee “on the tree” increases. Unfortunately, his increased wealth does not give him the cash needed to cover the losses on the futures position. With an OTC transaction, one can negotiate a different margining system—e.g., payment of margins only once every three months. As an alternative, a producer could use PTBF contracts with traders which allow a producer to do the same as he could do with futures, but without any obligations in terms of deposits or margins.

- Options require the up-front payment of a premium which may be relatively high. Premium costs can be reduced, from a producer's perspective, if the product supplied provides insurance against average prices over a marketing season, rather than the possibility to benefit from day-to-day price movements. OTC providers can supply such "average price" options (also called Asian options).
- So called "zero cost options," also offered on the OTC market, make it possible for producers to get protection against the risk of falling prices, in return for giving up (whole or in part) the potential to benefit from price increases. This eliminates the need to worry about premium payments, and (in the case of cooperatives) the worry about being blamed for having "wasted" these premiums when prices move favourably.

OTC markets also offer other, more complex instruments which for some reason may suit a producer's or cooperative's conditions. These generally combine various types of options, and in order not to overpay the producer/cooperative needs to have a strong understanding of the pricing of such products.

What the OTC market for coffee does *not* offer, for the time being, is long-term instruments for the management of price risk (and this is different from the case of metals or energy products, where one may be able to enter into 25-year risk management transactions). In the coffee sector, transactions that provide a price risk management instrument for a period of more than two years have been extremely rare (one such rare exception is long-term coffee-price-linked debt provided in the early 1990s to traders and roasters in Guatemala), and even two years is unlikely to be available for most producers, given the credit risks involved for the OTC provider. So, logically, market-based price risk management cannot provide any protection against long-term declining prices. Indeed, the instruments are not meant for that: rather, they provide the producer, or other user, with certainty over a limited time period (e.g., a production season), which allows him to improve his planning and resource allocation and, in case prices are declining, with a longer period to adapt to the new market realities.

Access to the OTC market for risk management tools is largely restricted to large producers (plantations) and well-organized cooperatives—and even for these groups, the market has only seen the introduction of more innovative tools in the last few years; in the 1990s, only fairly simple products were on offer. There may, however, be a good business potential for those who manage to develop a "fortune at the bottom of the pyramid" approach that can reach the large masses of small producers in an effective manner. For example, why not package put options in the form of vouchers, like lottery tickets that give a payout if coffee prices fall below a certain level, and retail it in the same way that lottery tickets are now distributed, or alongside farmers' inputs, or even as a premium that a bank may give to a coffee farmer who opens an account?

2.2 Experiences with price risk management for coffee farmers

Exporters from developing countries regularly use futures and options markets—such use has been reported for all Latin American countries (including Cuba), as well as for Burundi, China, India, Indonesia and Uganda. But coffee producers so far only rarely manage their price risks directly on local or international futures markets.²¹ More commonly, futures

²¹ It should be noted, however, that in the past, coffee-producing countries have tried to play an active role on coffee futures markets. In particular, in 1978 a group of Latin American countries came together in a group

markets have been accessed through the price clauses in physical contracts—in particular, through the price-to-be-fixed (PTBF) contracts that have become standard in international coffee trade.

In a PTBF contract, the trader (generally, a large exporter or international trading house) acts as a pass-through from the producer to the international futures market (no such use of national futures markets has been reported so far). Concretely, the seller is given the time between the signing of the contract and the delivery to fix the prices of his product (sometimes, the seller can convince the buyer to extend the period of price fixation until after delivery, but as this has in the past given rise to major losses by traders this has become somewhat unpopular). For example, the contract is signed in March for delivery in June. The contract's pricing clause will read something like "the price is July New York Arabica futures minus five cents per pound". The seller will now make a point of observing the prices of the July delivery futures contract in New York, and at opportune moments, call or e-mail the trader to fix the price for part of his delivery. Used judiciously, PTBF contracts can allow sellers to obtain the average price over a period rather than being exposed to day-to-day price fluctuations; and they can allow a cooperative to manage its price risk on a back-to-back basis.

In practice, however, the vast majority of producers do not have access to PTBF contracts. They are too small, or traders do not have sufficient confidence in them to offer such price clauses. While PTBF contracts are common at the level of traders, as far as producers go, they are limited to large plantations and cooperatives, mostly in Latin America and to a lesser extent, Indonesia and Vietnam. They are often linked to more extensive arrangements between producers and traders, e.g., with the latter providing inputs on credit. There is little incentive for traders to offer much wider access to PTBF contracts to small producers, and indeed, much to discourage them from doing so (the credit risk inherent in PTBF contracts is too high compared to the easier option of buying for immediate delivery at fixed prices).

Given the extent and importance of price risk for all coffee farmers, this is clearly not a desirable situation from a development perspective. So several attempts have been made to create alternative gateways to intermediate between the small farmers and risk management markets ("Local Transmission Mechanisms," in the language of the World Bank's International Task Force on Commodity Risk Management in Developing Countries). Many obstacles complicate use of these markets by small farmers (lack of skills and institutional capacity, lack of creditworthiness, poor connectivity, contract specifications that do not meet small farmers' needs, etc.), and these attempts had to deal with all these obstacles.

The following sections describe some of country experiences in dealing with coffee price risk.

(later formalized as a company, PanCafé S.A.) which had as an explicit objective the intervention in the London and New York futures markets—price defence in the eyes of some; market manipulation in the eyes of others. PanCafé took large futures positions in 1979, which initially gave it large paper profits (over US\$200 million), but which ultimately led to more than 2 million bags of physical deliveries in early 1980. But while PanCafé did continue trying to keep up prices through further purchases of futures, prices started falling. PanCafé was unable to raise the funds necessary to pay its margin calls other than through liquidation of part of its stocks, which created a further downward pressure on prices. PanCafé was liquidated in 1981, having lost a bit more than half of its estimated US\$600 million working capital. Later efforts of groups of Brazilian and Colombian exporters (in these cases, mostly private companies), in cahoots with one or two major international trading houses, to defend/manipulate coffee prices were similarly unsuccessful.

2.2.1 Brazil

Brazil's local coffee futures and option contracts, offered on the Bolsa de Mercadorias & Futuros (BM&F), are to some extent used directly by the country's producers, and in particular many of the large plantations. But mostly, coffee producers make use of price risk management tools incorporated into physical trade transactions, and to a lesser extent, the OTC market for at times complex risk management products (floor prices, price participation contracts, and so on).

Of all the coffee-producing countries, Brazil is probably the one where farmers use market-based risk management instruments most. This has been made possible by two factors. First, medium-sized farms and large plantations account for a large share of production—the average farm size in Brazil is nine hectares. Second, Brazil's government has promoted the development of so-called Cédulas de Produto Rural (CPRs), bonds issued by producers (farmers and cooperatives) which confer title on future production. CPRs can then be used to raise finance, and this is often used to make forward contracts and risk management possible. In a survey among coffee farmers in 1999, it was found that 48 per cent of farmers issued CPRs with as their main objective the obtaining of crop finance, and 28 per cent had as their main objective the obtaining of a price guarantee; and for 22 per cent, the CPR was used to obtain both objectives.²²

2.2.2 Colombia

Colombia's coffee growers are organized in the National Coffee Growers Federation of Colombia (Federacafé). Federacafé buys from producers, processes the coffee, sells it to the domestic market, and acts as an exporter (in competition with private traders). Among its major objectives is to protect coffee producers' incomes through guaranteeing the price paid to producers. It protects domestic price levels through a stabilization fund, the National Coffee Fund, a public fund which, under a regularly renewed contract, is administrated by Federacafé. The fund operates at the level of exports, covering both Federacafé and private sector exporters. Financial resources accumulated during times of high world prices are used to support domestic prices when world prices are low.

During the period of sustained low coffee prices starting in the late 1990s, when domestic prices had to be revised downwards every few weeks in order to keep the FNC afloat, Federacafé considered the possibility of using futures and options contracts to ensure that FNC funds would not be depleted. But an upturn of coffee prices has led to such discussions being put on the backburner for the time being.

2.2.3 Costa Rica

Costa Rica has a rather particular marketing system for coffee. Growers do not sell their coffee, but rather, deliver it to millers who are to process and sell it on their behalf; the revenue is shared. As part of the system, growers receive pre-financing, already months before delivery of their coffee to the mills. Millers pay another part on delivery, and the remainder (traditionally as much as 40 per cent) after exports. Most of the millers are privately-owned, but the second largest milling group is in the hands of the Federation of Cooperatives of Coffee Growers.

²² Bernardo Celso Gonzales and Pedro Valentim Marques, *The CPR of coffee as an instrument of financing and hedging*, paper presented at the IAMA 1999 Agribusiness Forum, Florence, Italy.

This effectively gives growers a minimum price. It also makes it very attractive for millers to use options in order to lock in their minimum sales price: they can use this in order to offer a higher minimum price to producers and thus attract their patronage (the milling sector in Costa Rica is highly competitive)—and to avoid the risk that if prices collapse, they are left with large losses. Options have thus been used quite widely since the early 1990s.

2.2.4 Guatemala

Guatemala has relatively high levels of producer hedging because of a long-standing training and capacity-building program by the country's National Coffee Growers' Federation (Anacafé), a private non-profit organization. In 1994, it introduced a coffee credit system aiming to improve the access of coffee producers to commercial bank financing. Use of risk management instruments is a prerequisite for participation in the credit program. It considerably reduces the risk to the banks, allowing them to provide credit to coffee farmers at lower interest rates (according to Anacafé's estimates, this led to interest rate savings for farmers of over 10 per cent of the loan value—some US\$2 million per year). Farmers normally hedge their price risk through an exporter with whom they negotiate a pricing formula. In interviews in the early years of this decade, when coffee prices had reached historic lows, farmers stated that their hedging policy has been crucial for their survival.²³

In the early 1990s, Guatemala had also used a commodity price-linked loan. Anacafé had issued a bond in the United States capital market, the revenue of which was lent to the country's coffee exporters who had been hard hit by the collapse of the coffee market in the late 1980s. Reimbursement by the exporters was made a direct function of world coffee prices.

2.2.5 India

Coffee (Arabica as well as Robusta) is produced in India's southern states, by smallholders as well as medium-sized plantations. A few of the plantations have used both the London and New York futures markets, mostly indirectly through PTBF contracts. This possibility has not been available for smallholders. Nevertheless, many of these smallholders (especially those in Kerala, India's most literate state) have a good understanding of futures markets as they traditionally grow coffee in conjunction with pepper, and India has had a vibrant pepper futures market for a long time.

On this basis, there have been a number of efforts to set up a local coffee futures market in the past 10 years. These efforts have so far not been fully successful (the currently largest contract, for Robusta coffee at the Multi Commodity Exchange of India, has had a total turnover of 145,000 contracts from its inception in late January 2007 to the end of April). Among the difficulties encountered are that it is difficult to move those using the international markets to a local platform; there has been active resistance from some, but not all, of the larger traders (commodity exchanges provide transparency and make it easier for smaller players to be competitive, neither of which suits the interests of some of the traditional trading houses); it has been difficult to set appropriate grading standards; and local speculative interest has not been attracted to these markets because, at least in the period that the large national exchanges have been initiating these contracts, coffee prices have been relatively stable. Nevertheless, efforts continue.

²³ See for more details UNCTAD, *Farmers and farmers' associations in developing countries and their use of modern financial instruments*, 2002.

2.2.6 Mexico

Mexico has a government organization, Aserca, which among its activities has the function of acting as intermediary between Mexican smallholders and processors and the U.S. futures markets, in particular for the purchase of options. In the initial years, it also subsidized part of the option costs.

In the beginning (Aserca was set up in 1994 as a tool to facilitate liberalization of the agricultural sector), the program was targeted at the cotton and maize sectors, but in 1999, coffee was added (but without any subsidies for option premiums). So far, uptake by coffee producers has been small. One important reason for this has been that while there are many producers, they tend to be poorly organized, and overall levels of education are low.

2.2.7 Nicaragua

Coffee is Nicaragua's major cash crop, most of it produced by some 30,000 smallholders. The country was one of the coffee producers targeted by the International Task Force on Commodity Risk Management, and one where a pilot transaction was successfully implemented. The initial transaction, signed in October 2002, involved the direct purchase of put options by a group of some 250 farmers just before the harvest to cover their price exposure during the sales period later in the crop year. This made it possible for farmers to avoid having to sell immediately following harvest time. Instead, they were able to time their sales better throughout the crop year. The options were over-the-counter, provided by a Swiss coffee trading company.

2.2.8 Tanzania

Early efforts to bring price risk management to coffee producers in Tanzania and Uganda had little sustained success. A regional bank, the Eastern and Southern African Trade and Development Bank (PTA Bank) started a "Price Guarantee Contract Facility" in 1994, under which it built price risk management into its coffee and cotton trade finance operations (which mostly focused on the post-harvest phase and were structured around warehouse receipts). Many seminars were held in eight of its member countries, and a number of exporters and processors signed up, as did one or two farmers' cooperatives. But the price guarantee program faded away in the second half of the 1990s.

As one of the pilot projects initiated by the International Task Force on Commodity Risk Management, the country's largest cooperative, the Kilimanjaro Native Cooperative Union (KNCU), with several thousand members, was assisted in 2000-2002 in developing a price risk management program. As a result, in 2002 it bought put options for 700 tons of coffee. These were average price options, provided by a Dutch bank through a local bank, the Cooperative Rural Development Bank (CRDB). This allowed the cooperative to maintain its practice of guaranteeing a minimum price to its farmers and make subsequent payments if prices turned out to be higher after harvest. The minimum price guaranteed by the cooperative to its members turned out to be higher than the price the cooperative realized when it sold all its coffee. This led to the decision of the cooperative to hedge for the following crop year. In addition, the local bank that was financing the cooperative strongly encouraged the cooperative to seek price protection for its 2002-2003 crop.

But KNCU did not hedge its exposure in all the following years. Changes in the management of the cooperative did play a role, as did an opportunistic approach—cooperative

management did not believe prices would fall, so why pay money for option premiums? CRDB, however, has made the provision of price risk management a part of its operations, and at least one other coffee cooperative has recently followed KNCU's example.

2.3 Lessons

In the 1990s, the feeling among many in the international development community was that cooperatives would have to play a critical role in intermediating between farmers and risk management markets. To a certain extent, this was understandable—after all, most individual farmers produce too little for efficient risk management, and some form of aggregation is necessary. However, as a first lesson from experience, this view in practice has proven not very helpful, for two reasons. Firstly, the large majority of developing country's farmers—and this is no different for coffee farmers—are not organized in efficient and effective cooperatives. Secondly, even well-organized cooperatives often have internal dynamics (e.g., managers are elected and rotate regularly; decision-making is bureaucratic) which prevent proper use of risk management markets.

Experience has shown that while farmers' associations can play an important role, the critical factor lies in the interface between such associations (formal ones like cooperatives, and informal ones like marketing groups) on the one hand, and an outside agency (likely to be a bank, possibly a government agency). The dynamics between the two can drive the adoption of a risk management strategy, and make it sustainable.

A second lesson is that KYC rules now are such that for all means and purposes, direct access to developed country futures exchanges by farmers' associations in developing countries is virtually impossible. Farmers will need either local exchanges, or local aggregators who have the commercial size and savvy to open trading accounts with brokers or banks in the developed world.

A third lesson is that there are many benefits of combining risk management and finance. Financiers can act as a gateway to risk management (in particular as they already have the necessary relationships with the international financial community), and provide the necessary funding for paying option premiums or even covering margin calls. From the financier's perspective, this reduces credit risk and adds a useful new revenue stream.

A fourth lesson is that there is no "one size fits all" risk management solution. Even within a group, farmers like to be given an array of solutions from which to choose. Risk perceptions and the willingness to pay, or give up a part of future upside potential, for managing risks is different from farmer to farmer. Schemes that work well are those that provide such choice.

Finally, experience has shown one important positive lesson: the concept of market-based risk management instruments such as futures, options and their derived over-the-counter products is not difficult to grasp for most farmers. In fact, they will readily understand these instruments well enough to make opportunistic choices about their use. As farmers tend to be optimistic—farmers anywhere in the world tend to systematically underestimate risks—this implies, for example, that they are more likely to want to lock in future prices at times of high prices; while if prices are low, they consider it likely that prices will increase so and see no need to cover the downside risk. So, after a knowledgeable cooperative has one year done a successful risk management strategy, it may not wish to repeat the experience the next year. In other words, risk management providers should not expect a stable client base.

3. Moving Forward: Enhancing access to coffee price risk management markets

Coffee farmers are exposed to major price risks. They are well-aware of this, and by and large, they try to manage these risks through a series of traditional risk management methods such as diversification and reduction of use of inputs. This is not irrational behaviour; they know that such behaviour reduces their expected earnings, but they are even more aware of the large risks that they would run if they were to put all their efforts in coffee production. Not surprisingly, then, there is a real appetite among developing country farmers for modern risk management tools, and a willingness to pay for them—and to pay a realistic price. A study in Uganda finds, for example, that even though farmers tend to underestimate the degree of price variability, “the majority of farmers would demand insurance [options] at actuarially fair premiums.”²⁴ The World Bank’s work in Nicaragua similarly found (in 2001, when coffee prices were at a very low level) that more than half of farmers were willing to pay realistic option prices.²⁵ Once farmers learn about tools such as futures and options, they are generally keen to find ways to use them. In practice, though, the problem lies not in farmers’ interest or their willingness to pay, but rather, in the practicalities of linking farmers to risk management markets (among other difficulties, the quantity produced by most coffee farmers is much below that of the standard contract size on futures markets), and their ability to pay (a cash flow problem).

Willingness to pay is somewhat opportunistic and depends on the overall market conditions, but generally, many farmers are willing (but not necessarily able) to pay 5–15 per cent of the price that they receive (or 2–8 per cent of the world market price) if this strongly reduces their price risk exposure. This is normally enough to buy out-of-the-money “price insurance” for the period from when decisions on inputs and labour are made to the harvest period. But who will offer them such “price insurance”?

The experiences discussed in Section 2.2 show that there are a number of possible risk intermediaries. But despite efforts from a number of organizations, the large majority of farmers are not yet reached through such intermediaries. How can one move forward?

The first way to move forward is simple enough: learn from the lessons of experience, and intensify efforts to replicate “best practices”. This implies that development agencies and national governments should do much more to educate local banks and help them to build up sustainable relationships with viable cooperatives and other farmers’ associations (a strategy that would not necessarily limit itself to coffee—a bank’s efforts will be much more sustainable if it can provide a broad range of risk management services). As the experience of Tanzania shows, a local bank not only has the field presence necessary for the continuing interaction with an ever-changing pool of cooperative managers, but can also reduce the costs of risk management by passing on part of its own benefits in terms of reduced default risk. An additional benefit of having a local bank as the provider of risk management instruments is that such a bank already has commercial relationships with international banks (in other words, it has already met these banks’ KYC requirements) and it can build on these relationships to provide a gateway to international risk management markets.

²⁴ Ruth Vargas Hill, *Coffee price risk in the market: exporter, trader and producer—data from Uganda*, Global Poverty Research Group, January 2006.

²⁵ ITF, *Nicaragua: Coffee Price Risk Management – Phase II Report*, The World Bank, February 2002.

A second way to move forward is continuing financial innovation. There is much scope in developing countries for new financial instruments that can directly address farmers' risk management needs. For example, input providers can sell inputs to coffee farmers with a "risk management voucher" attached—such a voucher could be, for example, the OTC equivalent of an European option, which gives the holder a pay-out if, at expiry, the reference coffee price is below a certain level. No one needs to take a price risk. Such vouchers can be packaged by a local bank which provides them to the input providers—something similar has been done with weather derivatives in India. Farmers could hold on to these vouchers (giving them insurance against price risk), or they could sell them in a secondary market (there is enough market savvy in most developing countries to enable the development of such markets even without any development agency support). Also, independent warehouse operators could offer those who deposit their coffee with them "price insurance" on the value of their stocks, given them more flexibility in deciding when to sell and enhancing the value of the stocks as collateral for loans. New futures markets can be created in developing countries, offering smaller contracts in local currency.

While not the main subject of this paper, this latter possibility of new developing country futures exchanges merits some more discussion. Until very recently, such localized exchanges were only impractical ideals—calls have been made for them as far back as the mid-1970s, but the costs of setting up such exchanges and the difficulties in envisaging ways to create enough liquidity to make them viable proved too much of an obstacle. But with the onset of electronic trading (rather than the traditional open outcry system) in the late 1990s, this has changed. An evident impact of this development is that it has become cheaper to set up a localized exchange—although the need remains for an exchange to build up a sound support system comprising grading services and warehousing capacity, and it would be a mistake to set up an exchange "on the cheap" on the assumption that one just needs to build a platform and then users will come. But at least equally important is the capacity of electronic trade to provide a "liquidity gateway" which can seamlessly blend local liquidity and the much larger depth of an international marketplace.

An increasing number of financial players are willing to provide arbitrage between local markets, with tailored contracts which may be in local currency, and international ones. At the same time, there is a process of international realignment among the world's major commodity exchanges (the globalization process is now even coming to the Chinese exchanges), and the quest for territorial footprints is likely to lead to new initiatives that will bring futures markets much closer to many farmers. Local futures exchanges, when structured properly, not only bring risk management tools much closer to the farmers (and others in the local economy), but they also create a transparent marketplace, and act as a catalyst for the improvement of physical market infrastructure and practices. The development of such local futures exchanges (which of course may just be the local representation of a regional or international exchange, offering products tailored to the local market) thus deserves support from governments and the international community. Organizations such as the African Union have recognized the importance of this issue, but development agencies have yet to move from their current phase of supporting pure donor-driven initiatives towards the promotion of commercially viable commodity exchange projects.²⁶

²⁶ So far, the major organization involved in promoting viable exchange initiatives has been UNCTAD, which has been involved in country-level work in this domain since 1992 (and from 1975 onwards, had regularly included the development of developing country commodity exchanges among its policy recommendations). Some of the exchanges promoted by UNCTAD now count among the world's largest, but UNCTAD has never been successful in obtaining donor support—over the years, total official development assistance

A third way to move forward—and which can coincide with financial innovation—is to make full use of the power of information and communications technology to retail price risk management to the farmers. A choice of options could be added, for example, to the marketing choices given through a village-level Internet system such as India's e-choupals. There are many other ways in which Internet and mobile phone technology, smart cards and other technologies could be used to overcome the “last mile” problem in distributing financial services, and including price risk management is no exception. Work on several such ideas (although not in the coffee sector) is ongoing in various countries, including India and Kenya.

Box 3: India's e-choupals: how technology can help cross the “last mile”

Agricultural marketing in India has for a long time been rather disorganized, with a long chain of intermediaries making it difficult for agricultural processors or supermarkets to procure the quality of goods that they desire, and reducing the share of the final consumer price that is received by the Indian farmer to a percentage considerably below that of other countries.

To change this situation, one of India's largest agro-corporates, ITC Ltd., started in June 2000 setting up a network of rural internet kiosks, known as e-choupals. Five years later, these kiosks already reached well over a million farmers. The e-choupals are managed by local farmers, selected from among the community. They act not only as a procurement platform for ITC, but also allow farmers to order inputs and obtain information on specific topics, including through a number of crop-specific Web sites in local languages (and also Web sites on issues such as aquaculture).

The e-choupal initiative has been very successful, and is starting to be replicated not only in India, but also other parts of the world. The empowerment that the technology provides to farmers helps them to make better decisions, and from ITC's perspective, the system allows it to procure the high-quality product that it needs for its operations. The trained farmers who maintain the system earn a good living, and in terms of recurrent costs, the system is already sustainable.

A platform of this nature is well-suited to act as a vehicle for the provision of financial services—something that, indeed, ITC is now looking at. Price risk management may then follow soon.

A fourth way to move forward is to make risk transfer a more common part of physical marketing contracts—in other words, build further on the strength of existing supply chains. For international traders, and even for many of the larger exporters, managing price risk is no problem as they have easy access to futures and over-the-counter markets. So why could they not absorb more systematically all price risks through the contracts that they sign with suppliers for whom such access is much more problematic? After all, they already do so in many of their contracts, so why not make this a general practice? The obstacles are twofold.

accounted to a few hundred thousand dollars from the World Bank for work in India, and to a few tens of thousands for all the work in other countries. Some donors, such as the European Community, have supported initiatives that went under the commodity exchange banner, but these initiatives were largely donor driven and show little potential for commercial uptake—at best, they have become subsidized price information schemes.

One obstacle is that if they had the choice, most producers would prefer to make individual, opportunistic choices about their risk management practices rather than having a certain choice imposed on them. Having a fixed price imposed on them is likely to be unpopular (and which fixed price would this be? A different price for each seller, as a function of the day that the sale is made? Or a pooled price, with the buyer in some way spreading out total costs and revenue across all the sellers?). A minimum price would be more easily accepted, but what minimum price? Not only do futures contracts fluctuate from minute to minute, there is also a wide choice of minimum prices available, all at different costs.

A second problem is that when a buyer builds a risk management component into a physical component, he is taking a credit risk on the seller. If the contract contains an element related to a minimum price, he risks losing the premium. If the contract assumes that the seller will receive a fixed price, the buyer has to manage the resultant risk by selling futures contracts; if prices then increase and the seller decides to default on his delivery, the buyer is not only left without goods, but also with a loss on the futures market. In order to provide such risk management services, then, the buyer either needs to have a strong trust in the seller, or he needs a way to mitigate the credit risk. In practice, the only efficient mechanism that would allow for this is a constriction point in the marketing chain: for example, all produce in a certain area will normally be sold through one processor, or a group of processors who cooperate; or all produce is sold through one central marketing agency (e.g., an auction). The buyers' and sellers' obligations can then be registered with this constriction point, and the revenues generated through the constriction point can be allocated to ensure that the obligations are met. In coffee, this can be difficult, except in the few African countries where auctions still exist: farmers generally have a wide variety of potential buyers of their produce. But price risk management transmission to farmers through processors has been used successfully in the cotton, palm oil and sugar sectors.

Both these problems can actually be managed more easily if the farmer is a buyer rather than the seller. In other words, it may well be feasible to build risk management into the physical contracts for the supply of inputs. For example, a farmer could be offered a choice between paying \$10 for fertilizers now, or paying \$12 six months later, with the proviso that if at that time the reference coffee price is below US\$1/lb, his loan is forgiven. The input supplier can cover the price risk by buying, say at a cost of US\$1, an OTC option (called binary or digital option) which gives him a US\$12 pay-out when the coffee price is below US\$1/lb. So, at the end, either the price is poor and the supplier gets paid by the seller of the OTC instrument; or the price is good, and the farmer has a good enough revenue to pay the input supplier (if he does not, he will lose access to the program next year). This type of schemes is win-win—the input supplier makes an easier sale, the farmer only needs to pay for the inputs if the price for his production is good, and the OTC provider is able to sell an option for a premium paid up-front. Default risk for such win-win products is relatively low.

Finally, there are some possible products or methods that, while attractive at first sight, are unlikely to do much to make price risk management more easily accessible to coffee smallholders. One such product is the “mini contract,” contracts which are for quantities of commodities much smaller than those of conventional futures contracts (e.g., five tons instead of 25; 100 barrels instead of a thousand). Mini contracts for metals and energy contracts have been successful, but they have largely been picked up by small-scale speculators rather than small-scale hedgers. If the established western exchanges were to promote mini-contracts for coffee (such as the mini-“C” Arabica coffee contract introduced by the NYBOT), this is unlikely to have a different impact. The systems on these western exchanges are simply not set up to facilitate access by developing country farmers—contract

size is only the smallest of the problems. If a developing country exchange introduces contracts, they of course should be adapted to the conditions of the country, and then it may make sense to tailor the contract size to the needs of the local coffee sector.

Another option that looks attractive on paper is organizing farmers so that they can reach a cumulative volume that is sufficiently large to be hedged efficiently on a risk management market. Unfortunately, it has proven very difficult to organize farmers through outside intervention. When farmers are organized, whether in a formal cooperative or in a seasonal marketing group, offering them access to risk management markets can add value to their organization and act as an added incentive towards cooperation. Adding price risk management as a service can effectively be an attractive point for an NGO or other agency, or indeed, for a commercial buyer that is trying to help farmers to organize themselves. But when farmers are not organized, just offering access to a risk management market will not be enough of a catalyst to get them to do so. In effect, any program aiming to improve access to risk management markets through farmers' organizations becomes primarily a program to organize farmers—tantamount to drilling a small well by building a huge road infrastructure to reach the intended well site.

Ultimately, it has to be kept in mind that demand elasticity for coffee is low. Price risk management will help increase an individual farmer's income by allowing him to move up the efficiency curve in his production of coffee. But if the majority of farmers do the same thing, the result will be higher production which in turn will depress market prices. This can of course be said for any scheme that allows farmers to improve their coffee production: agricultural research, extension, some Fair Trade schemes, etc. Indeed, just on the basis of the econometrics of price elasticity alone, the most effective way to improve farmers' revenue is to systematically destroy part of their crop (while such schemes resurface time and again in the discussions of governments and NGOs, it has in effect been tried already,²⁷ and experience has abundantly demonstrated that trying to get producing countries to act collectively towards this purpose is a futile exercise—there are too many incentives and loopholes for free-riders). Should one conclude then that while it is in the interest of individual farmers to manage price risk, for their collective good it is better to deprive them of such instruments? And for good measure, stop agronomical research? While this is a point that can be argued, it does underline the need for coffee producers (and the producers of many other crops with similarly low elasticities) to diversify out of the coffee sector. To some extent, allowing coffee farmers access to risk management markets will help them to diversify: the cash flow thus secured is often used to send their children to school, and improved access to finance can help to start new activities. But clearly, a stand-alone program to promote access to risk management will have only limited benefits; it would have much more of a multiplier effect if it comes as part of a wider program for rural development.

²⁷ Many of these efforts were far from timid. For example, between 1931 and 1944, Brazil destroyed some 78 million bags of coffee, more than a year's worth of world production. In the 1960s, Brazil reduced its coffee acreage by half.

4. Recommendations

*For farmers' associations*²⁸

- Farmers' associations, and in particular their organizations at the national level, should advocate the benefits of market-based price risk management instruments among government decision-makers, and lobby local banks to make such instruments available in the country
- Farmers' associations should help provide their members access to relevant commodity exchange prices.
- Farmers' associations can act as aggregator and broker, providing their members with access to futures and options.
- Farmers' associations should cooperate with expert entities to organize training workshops on market-based price risk management instruments.
- Farmers' associations that are actively involved in providing inputs or credit, or in the marketing or processing of their members' produce, should evaluate their own exposure to price risk, and consider appropriate measures to manage it.
- Farmers' associations should give active support to the creation of local commodity exchanges wherever such initiatives are economically viable.

For coffee millers and roasters

- Coffee millers and roasters should consider whether, by incorporating price risk management elements in their procurement policies, they can enhance their competitiveness.

For local traders

- Often, local traders only operate hand-to-mouth—they try to manage all their price risks through back-to-back purchase and sales transactions. But this considerably reduces their flexibility and their opportunities to benefit from market developments. They should consider how price risk management instruments can help them become more competitive.

For local banks

- Local banks should consider how they can reduce their financing costs by incorporating price risk management instruments into their credits (either side-by-side, or through the denomination of the principal and/or interest rate on their loans), and thus, both encourage and enable the use of risk management tools by the country's producers.
- Local banks should invest in enhancing their understanding of structured financing mechanisms, which can, among other things, facilitate price risk management by its clients by giving them access to long-term credit lines.²⁹

²⁸ For a detailed discussion and set of recommendations, see UNCTAD, *Farmers and farmers' associations in developing countries and their use of modern financial instruments*, 2002.

²⁹ For a detailed discussion and set of recommendations, see UNCTAD, *Potential applications of structured commodity financing techniques for banks in developing countries*, 2001.

- Local banks should use their access to the international banking system to provide a pass-through to the international risk management markets for those in their countries who, for various reasons, are unable to access these markets directly.
- Local banks should consider setting up risk management advisory services.
- Local banks should help organize training and awareness-raising programs on market-based price risk management, targeting all those involved in the commodity sector (including government agencies and the donor community)

For international traders

- International traders already commonly offer futures-price-referenced contracts to their suppliers in developing countries. They should consider enlarging the range of such offerings, e.g., to replicate the wide choice that is available to a typical U.S. farmer.

For international commodity exchanges

- International commodity exchanges should work with their regulatory agencies to lighten the burden of Know Your Customer and anti-money laundering rules for developing country farmers' associations, particularly for such agencies to accept self-certification by the banks or brokers who set up risk management credit lines for such associations, and certification by reputable bodies such as Fair Trade organizations.
- They should allow and perhaps even encourage national and regional exchanges to host localized versions of their contracts; the latter exchange then acts as aggregator and pass-through for those unable to use the international market.

For governments

- Governments need to review their own rules, regulations, policies and practices with a view of modifying those which unduly restrict the ability of their coffee sector to manage price risk—including those which unnecessarily complicate commodity sector financing. These various issues have been extensively analyzed by UNCTAD, and concrete, detailed policy recommendations are readily available.³⁰
- Government should encourage the development of local commodity exchanges with spot and forward trading, and warehouse receipts systems.
- Government can consider whether they can act as a portal for commodity price risk management—in the case of the coffee sector, this could be through the creation of a program such as Mexico's Aserca, which as part of its support services, sells options to Mexican farmers.
- Where a government is directly exposed to price risk (e.g., through its tax revenue, or its underwriting of a price stabilization program) it should consider how market-based instruments can help reach its objectives more effectively, at a lower cost and with a lower risk. Among the instruments that it should consider in this respect are commodity linked bonds and loans—it can convert, for example, some of its loans

³⁰ For a detailed discussion and set of recommendations, see N. Budd. *Legal and regulatory aspects of financing commodity exporters*, UNCTAD, 1995; and UNCTAD. *Government policies affecting the use of commodity price risk management and access to commodity finance in developing countries*, 1998.

with the World Bank Group so that reimbursement obligations for these loans are directly linked to key commodity prices.

For the international community

- The international community should support all the above efforts.
- Organizations with domain expertise (UNCTAD, World Bank) should continue and expand their long-standing efforts (from awareness-raising, training and advocacy to institution-building and policy advice) to familiarize developing country entities with modern price risk management markets, and to overcome market access barriers; the donor community should much expand their support to this work.
- International organizations should support further applied research on innovative risk mitigation tools, such as weather risk, disaster risk and ways to securitize risks on the capital market.
- International organizations should examine to what extent the success of their own interventions are dependent on commodity price risk, and take the necessary measures to manage this exposure *ex ante*, rather than after the fact.

Annex: An overview of market-based commodity price risk management instruments and their uses

The simplest way to describe the difference between market-based price risk management instruments and non-market instruments is that the former externalize risk—they transfer risk from one party to another. In contrast; the latter depend on asset reallocation within a group (e.g., from the general government budget to farmers’ subsidies, or from the IMF’s account to one of its member countries) or over time (stabilization funds, savings funds, self-insurance and the like).

Coffee futures markets provide large benefits to the coffee community. They provide price transparency (futures market prices are widely available, including to producers, and act as a benchmark for negotiating physical prices); ensure price discovery (allowing information to flow efficiently to the market as a whole, ensuring that most of the time, prices are as close as possible to a true reflection of the supply/demand balance and eliminating most of the information asymmetries that prevail in commodity markets where no futures exchange exists); and make it possible to transfer risk. Contrary to insurance markets, risk transfer on futures exchanges, at least in the case of liquid futures contracts, is very efficient: many studies have shown that there is no “risk premium” transferred from hedgers, as a group, to speculators (in other words, if one abstracts from the impact of risk management on a hedger’s wider business operations, other than a slight brokerage costs, average income is not affected by risk management—whether with futures or with options—so improved price certainty is achieved at little or no cost).

Do speculators distort futures market prices?

Users of commodity futures markets include not only those involved in physical trade, but also non-trade users—commonly (though misleadingly) known as speculators. A natural question, then, is whether the participation by such speculators distorts the prices generated on an exchange. After all, speculators’ behaviour is at least partly determined by developments outside of the coffee sector.

A first point to be made here is that even if speculators were to distort commodity futures prices, those involved in physical trade and active on the exchange would be able to arbitrage between the physical and futures markets and make risk-free profits. But this admittedly would not help the many producers and others who are not using the markets but are affected by their prices.

So how much price distortion is caused by speculators? On balance, relatively little. First, they often have a market stabilizing function. Large investors generally have extensive research operations. This allows them, for example, to take positions against market manipulation efforts by large trading houses. Second, their decision-making models vary widely—when some see reason to enter into the market, others will exit. Third, the large investment funds restrict their involvement in each individual market so that they will have no difficulty exiting their position. But it is true that with active speculators on a market, prices react very fast to new information, and often overreact—short-term price volatility (within a day) increases, making it more difficult for hedgers to manage their futures positions properly.

Markets are versatile, and not surprisingly, there is a very wide range of market-based price risk management instruments available. This annex describes the principal ones, categorized by the way in which they reach the customer: are they used on a stand-alone basis, or built into some other transaction?

Stand-alone instruments

Stand-alone price risk management instruments are available on the organized futures market as well as the over-the-counter market.

Organized futures markets offer two products: futures and options. By using futures contracts, producers can lock in certain price levels independent of their physical trading operations. For example, by selling futures contracts when prices are attractive, they can lock in these prices even if they do not yet have any product to deliver, or they have them in storage but are not yet ready to sell. If by the time that the producer is ready to sell prices have fallen, the low price he will receive for his produce will be compensated by a profit on his futures position (realized by buying futures to offset the earlier sale). However, the use of futures markets for risk management purposes is only useful if the prices of the markets for one's physical products and the futures prices are well-correlated. In the case of coffee, this is not always so: premium grades generally have poor correlation. Using futures contracts can also be cumbersome: timing decisions are difficult to make, and cash flow requirements (to pay upfront margin deposits as well as later margin calls) can be demanding.

Options give the buyer the right, but not the obligation, to buy or sell an underlying asset (usually a futures contract) at a certain fixed price. This right expires at a certain date (the maturity date) and in order to procure this right, the buyer has to pay a premium. An option which gives the right to buy is called a call, and an option which gives the right to sell a put. Buyers can have this conversion right at any time until the option's maturity (in this case, the option is called "American"), or he could have the right to convert only at maturity (a "European" option). Options on futures contracts are easier to use than futures. From the perspective of a producer, they are similar to an insurance contract: he pays a premium to buy put options, and the "insurance" pays out when prices fall. Indeed, options can be used to replicate the price guarantee schemes abolished in recent years by many developing country governments. There are no margining requirements, and operational requirements are not overly cumbersome.

The over-the-counter market offers a wide array of tools (instruments are basically made on demand by a bank or trading company, and tailored to the needs and conditions of the client). Many of these instruments are inaccessible to producers—for example, swaps (which lock in the prices that one receives over the medium- to long-term) require high volumes, as they can be cumbersome to set up.³¹ But there are some simpler instruments available that can be of use.

What will market-based weather risk management have to offer?

Weather risk management instruments—futures, options and a range of over-the-counter products—provide coverage for a series of weather-related risks: rainfall, temperature, wind

³¹ Deals of this nature can of course be used at the government level. For example, a leading investment bank offered at least one East African coffee producer in the early 1990s the possibility to lock in for a period of several years a price slightly below the (then, historically high) prevailing coffee price in return for giving up part of its potential revenue from further price increases. This offer did not lead to any deal.

strength, cold days, number of hours of sunlight, etc.. In all these cases, an index is made available (e.g., number of millimetres of rainfall in location X), and people can take a position in this index. Payouts, then, will follow the development of the index. For example, if a farmer sells rainfall futures, and rainfall falls below the index, he will receive X amount for each mm that the rainfall has fallen. Presumably, this will compensate him for all or part of the production loss that he suffered as a result of the rainfall deficit.

In principle, weather risk management instruments can allow farmers to obtain coverage against much of the “quantity” part of their revenue (revenue = quantity produced x price obtained), complementing their price risk coverage. But these markets are only just emerging, and even in the most developed market, in the United States, possibilities are still limited. Even if a market exists in a country, the problem of basis risk remains large: how well correlated are the production of a farmer in location Y and rainfall data in location X?

At least in the near future, as far as developing country agriculture is concerned, weather risk management is most likely to be used by those who are exposed to aggregate risk. For example, in India a micro-finance organization with an active agricultural loan portfolio, Basix, has used weather derivatives to manage the credit risk of its overall portfolio in a drought-prone region. Other than banks that wish to better manage their lending risks, input suppliers such as fertilizer companies or processors who depend on supply from a certain region could also act as aggregators, and lay off the aggregate weather risk on a futures or over-the-counter market.

The principal such tool is the average price option, also called Asian option. One would normally expect that such options fit best with the farmers’ pattern of sales: relatively small quantities spread out over a period of several weeks or a few months. A cooperative may bundle farmers’ deliveries for sale to traders, but the price is then normally based on an average of recent prices, not just the day’s price. Asian options are cheaper than exchange-traded options.

There are many other tools, some of which may well fit with a farmers’ association’s price exposure. Zero cost options combine the purchase of put options with the sale of call options, which implies that the producer is paying for the price insurance by giving up their potential gain from price increases above a certain level. In a modified version of this, participation options, he has some of the potential upside. Knock-out options, which are options that automatically disappear once a certain price level is reached, could be a possibility for cooperatives with a well-established reputation on international markets, who are able to sell forward long before the start of the harvest. For input supply programs, binary (digital) options can be a good fit (they provide for a single payment once a certain price level has been breached—so a fertilizer distributor could use it as a marketing ploy, selling on credit but with the proviso that the farmer does not need to reimburse if coffee prices fall below a certain level).

Price risk management can also be retailed under the guise of vouchers—similar, in a way, to lottery tickets. They could be sold on a stand-alone basis, or packaged together with other goods or services—for example, fertilizers. If such vouchers are distributed regularly, it is possible that an active secondary market is created, making it possible for farmers to choose themselves their optimal level of price risk management.

Price risk management tools embedded into physical trade

There are many ways to embed price risk management into physical trading contracts. As an illustration, in the United States Cargill offers 19 different pricing formulas to cereal growers and elevators.³² Contracts can include clauses guaranteeing floor prices, price increase sharing agreements, etc.. The major advantage of this from the producer's perspective is that his buyer will take care of margin deposits, margin calls, execution of transactions and administration; also, the credit risk aspect of risk management can be dealt with as part of the underlying physical contract. The major disadvantage is that the cost of the risk management component is not transparent.

The principal way of incorporating a risk management instrument in a physical contract is the fixed-price forward contract, which specifies delivery of certain quantities at certain times, at a fixed price. The buyer (who may have to resell the coffee after delivery has been made) is likely to manage his price risk on the futures market. The seller thus has indirect access, without having to deal with any of the practical issues involved in dealing with an organized commodity exchange. Note that forward contracts do not eliminate price risk: if the producer is unable to deliver and market prices have fallen, the producer will be asked to make a compensatory payment.

Much used in the coffee market (although generally not reaching down to farmers) is another form of forward contract, the so-called price-to-be-fixed (PTBF) contract. This is a forward contract, specifying delivery of fixed quantities during one or more periods in the future, and using a futures market price as a reference. Until delivery takes place, the seller can fix the price at his convenience. From the seller's perspective, a PTBF contract gives him access to the futures market without having to pay margins or margin calls. How the seller uses this access—for risk management or for speculation—is his decision.

It is also possible to embed options into physical contracts, e.g., in the form of minimum-price forward contracts. This would seem ideal from the seller's point of view: he gets price insurance, is able to benefit from price improvements, and does not have to make any upfront premium payments. However, one would need to ensure that the implicit pricing of the options is not exorbitant.

Price risk management incorporated into finance

Banks can insist that as part of their loan package, the producer engages in a parallel risk management program, with the bank having control over the related bank and brokerage accounts. Alternatively, banks could manage price risks themselves, and pass on the effects in commodity-price indexed loans.

Commodity loans specify the repayment of principal and/or interest as linked to commodity prices, either in a direct manner, or as an option. They have been mostly used in the gold sector, but their use for coffee is feasible (in the early 1980s, a cotton plantation in Zimbabwe was financed using a cotton-price linked loan).

Commodity bonds are similar in scope, although here, the finance is provided by investors rather than a bank. While traditionally such bonds have been mostly used in oil and metals market, use in agricultural is possible (the first commodity bond was cotton-price-linked,

³² See <http://www.cargillaghorizons.com/cah/cahpublic.nsf>, under "Performance Marketing / U.S."

issued in the 19th century by the Confederate States of America), and has been expanding in recent years. Currently, they are being used to finance a range of tree crops in Australia and Chile.³³

Other mixed products

Price risk management can be incorporated into many other offerings. For example, a large aluminium refinery could buy fire insurance wherein its deductible is a direct function of energy and aluminium prices: if there is a large fire and a pay-out is to come from the insurance company, if energy prices are high and aluminium prices low (and thus, the refinery's cash flows are under pressure), the deductible is low; and when its profit margin is high, its deductible is high. Such fire insurance fits better the needs of the refinery than the traditional contracts with a fixed deductible, and thus give better value for the money. Or another insurance example: one could try to develop revenue insurance (still in its infancy in developed countries, and requiring large subsidies to elicit potential buyers' interest).

While one conceptually could envisage similar complex instruments for coffee producers—and it may be possible to incorporate some of such instruments in government support packages for the coffee sector—we are likely to be still far from a possible implementation. One mixed product that may be feasible though (although still untried) is that warehouse operators offer those storing coffee the choice between taking the coffee back, or (before a certain period) just leave it with the warehouse operator and receive a pre-agreed price. This is similar to one of the programs used in the U.S. (for sugar) to give growers a minimum support price (called a “loan rate”). Warehouse keepers can manage their risks by buying call options, and they can include the related premiums into their warehousing charges. If this is considered a socially beneficial operation, governments could subsidize the option premiums.

Conclusion: What instruments are most feasible for farmers and their associations?

A wide range of instruments for risk transfer is available on the market, and all have been developed to meet the legitimate business needs of certain enterprises. There is no reason to assume that under all circumstances there is only one instrument which is best for everyone. All instruments have their benefits and drawbacks.

In the case of options, the principal drawback is the upfront cost. In the case of futures, they are difficult to use when there is both output and price uncertainty: one cannot use futures for uncertain production (and the same applies to over-the-counter strategies such as collars or participating options). Moreover, futures have large “contingent cash requirements”: those using them need ready access to cash.

From a practical perspective, it would seem advisable to use option-based strategies as a starting point for farmers' associations—probably through the over-the-counter market or embedded in physical or financial transactions. Once such associations have built up skills and have strengthened their links with banks, instruments that are more difficult to deal in, from a cash flow, operational and managerial perspective, can be considered.

How can governments of coffee-exporting countries use market-based instruments to manage price risk?

³³ See for a discussion UNCTAD, *New sources of commodity sector finance: innovative ways of tapping into the capital market*, June 2006.

Some of the instruments available on the over-the-counter market are perfect for governments that desire to insure their country's price risk exposure, either on their own account (e.g., to protect against the risk of declining tax revenue when export prices fall), or in order to pass on price insurance to their country's producers or consumers (e.g., as a back-up for a price stabilization fund, to ensure that such a fund will continue operating even in times of prolonged unfavourable prices).

Quite a few government entities in developed countries do indeed use market-based price risk management for these purposes. For example, in the United States, this is the case for some of the states that rely heavily on taxes on oil production; for many public transport companies; and even for many city-level programs that provide fuel subsidies to low-income households. But similar use in developing countries is rare—and in the case of coffee, limited to an experience in Guatemala, discussed in the main text. Governments of other coffee-producing countries, e.g., in East Africa, have been offered risk management products, either to lock in minimum export prices in return for giving up part of the potential of price increases; or to fix the number of pounds of coffee necessary to pay for one barrel of oil imports but this has not led to any transactions.

This lack of use is largely due to lack of awareness within these governments on the potential use of market-based risk management instruments, coupled with fear about a possible political backlash if a hedging decision were, with hindsight, turn out to be “wrong” (a not unrealistic fear: for example, in Ecuador, when the Central Bank had bought put options to protect the national budget against the risk of oil price falls, and oil prices did not fall, there were calls in the country's Parliament for an investigation of the Central Bank's “waste” of government funds). Even if some parts of the government machinery are aware, the critical mass necessary to make hedging decisions has not been reached. There are no access problems at this level. Many countries can probably directly access the market, and in any case, any country that borrows from the World Bank can incorporate price risk management tools within its loans (irrespective of the purpose of a loan); officially, this facility is now available only for IBRD countries (that is, the richer World Bank members), but indications are that if an IDA country is interested, this service will be made available by the Bank's Treasury Department.

Literature

This report is partly based on the authors' visits to and discussions with key coffee sector participants in Brazil, Cameroon, Colombia, Costa Rica, Côte d'Ivoire, Guatemala, India, Indonesia, Kenya, Tanzania and Uganda. Statistical data come from various publications of the International Coffee Organization. While a large body of literature on commodity risk management has informed the discussion in this report, the following publications have been of particular relevance:

Nicomed Bohay, *Lessons Learned from Introducing Commodity Hedging through a Local Bank*, CRDB Bank Ltd. Tanzania, presentation at the Annual Meeting of the International Task Force on Commodity Risk Management, Pretoria, May 2006.

Stijn Claessens and Ronald C. Duncan (eds.), *Managing Commodity Price Risk in Developing Countries*, The World Bank, 1993.

Dan Day-Robinson and Lamon Rutten, *Emerging market commodity risk management*, Day Robinson International Consulting Ltd, 2001.

Christopher Gilbert, *The long run impact of the ending of coffee control*, Second World Coffee Conference, Bahia (Brazil), September 2005.

Peter Hazell, *Could futures markets help growers better manage coffee price risks in Costa Rica?*, International Food Policy Research Institute, 2000.

Ulrich Hess, Erin Bryla and John Nash, *Rural Finance Innovations: Topics and Case Studies*, The World Bank, April 2005.

International Coffee Organization (ICO), *Impact of the coffee crisis on poverty in producing countries*, September 2003.

ICO, *Lessons from the world coffee crisis: a serious problem for sustainable development*, June 2004.

International Task Force on Commodity Risk Management in Developing Countries (ITF), *Dealing with Commodity Price Volatility in Developing Countries: A Proposal for a Market-Based Approach*, The World Bank, 1999.

ITF, *Delivering commodity price insurance: lessons learned from four case studies*, The World Bank, 2001.

ITF, *Dominican Republic: Price Risk Management for Coffee and Cocoa*, The World Bank, 2002.

ITF, *Nicaragua: Coffee Price Risk Management – Phase II Report*, The World Bank, February 2002.

Bryan Lewin, Daniele Giovannucci and Panos Varangis, *Coffee Markets - New Paradigms in Global Supply and Demand*, The World Bank, March 2004.

OXFAM, *Bitter coffee: how the poor are paying for the slump in coffee prices*, May 2001.

OXFAM, *Mugged: poverty in your coffee cup*, November 2003.

Nigel Scott (ed.), *Agribusiness and Commodity Risk: Strategies and Management*, Risk Books, 2003.

UNCTAD, *National institution building to facilitate access to risk management markets for small producers and traders particularly from developing countries and countries in transition: Issues involved and possible ways to overcome them*, 1994.

UNCTAD, *An integrated approach to the management of production and marketing risks in the primary sector of the developing countries*, 1997.

UNCTAD, *A survey of commodity risk management instruments*, 1998.

UNCTAD, *Government policies affecting the use of commodity price risk management and access to commodity finance in developing countries*, 1998.

UNCTAD, *Examination of the effectiveness and usefulness for commodity-dependent countries of the new tools in commodity markets: risk management and collateralized finance*, 1999.

UNCTAD, *Farmers and farmers' associations in developing countries and their use of modern financial instruments*, 2002.

Ruth Vargas Hill, *An analysis of abandonment and investment in coffee trees*, Oxford University, mimeo, 2005.

Ruth Vargas Hill, *The role of risk in shaping production decisions: an application to coffee farmers in Uganda*, University of Oxford, mimeo, 2005.

Ruth Vargas Hill, *Coffee price risk in the market: exporter, trader and producer – data from Uganda*, Global Poverty Research Group, January 2006.

Wouter Zant, Kees Burger, Christopher Gilbert and Jan ter Wengel, *Coffee price risk in East Africa: the feasibility of intermediating price risk management to coffee farmers and coffee cooperatives in Ethiopia, Kenya, Uganda, Tanzania and Zimbabwe*, Common Fund for Commodities, 2001.