

ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN



**FUTURES MARKETS AS A RISK MANAGEMENT TOOL  
FOR LATIN AMERICAN COMMODITY EXPORTS:  
SOME PENDING ISSUES \***

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## I. INTRODUCTION

Most developing countries, including those of Latin America and the Caribbean, still rely heavily on primary commodity exports as a major source of national income, and many depend on exports of a limited number of commodities for a substantial share of their foreign exchange earnings; close to 70% (40% if petroleum and its products are excluded) of the region's total merchandise exports consist of primary commodities. Consequently, the level and stability of commodity prices and revenues have been a matter of major concern to these countries. Given the high degree of price volatility experienced during the last two decades, improved commodity price management at the macro and micro levels should substantially reduce their balance-of-payments uncertainties.

The use of futures markets by developing-country exporters has been suggested as a means of stabilizing or increasing export earnings. As is frequently pointed out, futures markets are not only valuable sources of price and stock information but also indispensable instruments for price-risk transfer. These markets are also said to give exporters greater flexibility in pricing and marketing decisions, and facilitate intra- and inter-temporal marketing (carrying stocks through and over marketing years). Furthermore, they can be used by exporters to support commodity prices, either directly through futures trading or indirectly via better management of inter-temporal price relationships and stock availability.

Over the years, many intergovernmental efforts to regulate prices of primary commodities or to stabilize earnings on their exports have originated in the negotiations related to the Integrated Programme for Commodities (IPC), under the auspices of UNCTAD. There are also other non-market schemes, such as the compensatory financing operated by the European Union (i.e., STABEX) and domestic price stabilization programmes, practised by many individual developing countries. In spite of arduous efforts made in this regard, the results have been discouraging. Today, with some exceptions, commodity risk management emphasizes "market" solutions rather than those based on state "intervention".<sup>1</sup> The ongoing reduction of the State's role in the management of price risk, the liberalization of trade and the deregulation of foreign exchange operations are thought to make futures markets and other such instruments an increasingly viable option for the Latin American and Caribbean countries as a mechanism for managing risk. Therefore, trading in futures is often viewed as an effective alternative to the conventional mechanisms for stabilizing or enhancing export revenues, under an economic regime of liberalization and deregulation.

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<sup>1</sup> Schemes such as buffer stocks and export quotas are aimed at reducing price variability. Those "non-market" strategies have met with limited success because of insufficient participation on the part of exporting and importing countries, inadequate financial reserves of participating exporters, and frequently inadequate management of the domestic supply side of the revenue variability under those strategies (World Bank, 1994).

The low participation of developing-country agencies in the commodity exchanges can be attributed in part to a lack of familiarity with the operations of the markets. However, they also hold different views from those of the developed countries on the benefits and costs that futures markets entail, and they frequently reject the neutrality of the functioning of the exchanges. In principle, these institutions operate as "free" and "efficient" markets where prices are determined by continuous auctioning. However, developing countries often maintain that in practice, various constraints and distortions (e.g., the representativeness of the prices generated on these markets for developing-country exports, the large transaction costs involved, foreign exchange risks, the imperfect match in risk transfer between markets in the North and South, national legislation, the trading practices of the leading multinational firms) tend to make the exchanges inaccessible on equal terms and not as beneficial as they could be in theory. Though the following discussions are also applicable to imports,<sup>2</sup> this paper reviews the existing literature to address questions and discuss considerations pertaining to the efficiency of futures market use by developing-country exporters.

Instruments for managing commodity price risks are varied and include: i) stabilization programmes and funds (at the national or company level); ii) marketing strategies involving the timing of sales and purchases; iii) long-term contracts with fixed prices; iv) forward contracts; v) the use of futures or options to hedge prices through commodity exchanges; vi) over-the-counter markets;<sup>3</sup> and vii) swaps and commodity-linked loans and bonds. Swaps between intermediaries and producers, and commodity-linked loans and bonds, are instruments combining elements of price hedging with financial deals; swaps may be used to combine price hedging with securitization of investment, whereas the primary aim of commodity-linked loans and bonds is to raise commodity-linked finance. Though the use of one instrument does not preclude the use of another, exchange-based futures and options in particular are believed to play an important role in price discovery and price formation mechanisms and insurance for commodities. For this reason the discussion below mainly deals with these two operations, which are in a sense interrelated, since a successful option for a given commodity requires a sufficiently liquid underlying futures market.

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<sup>2</sup> On the import side, failure to lock in a low price by buying futures contracts under advantageous market conditions often leads to higher import bills. While instability in world food prices has focused attention on security aspects, there is now an increasing awareness of issues related to market efficiency. Given that even perfectly efficient markets do not eliminate price volatility, and to the extent that many developing countries continue to rely on world markets for food and other essential imports, understanding and/or utilizing futures markets might become strategically important in the secure, yet economical, procurement of basic products.

<sup>3</sup> In the case of commodity exchanges, "standardized" contracts are offered, which stipulate a specific quality, volume, delivery times and procedures for a given commodity. In the case of the over-the-counter markets, risk management contracts are tailor-made by a range of trading houses and financial institutions and are traded directly between two parties. Therefore, they are used only when trading partners have confidence in each other.

## II. MAJOR FEATURES OF COMMODITY EXCHANGE OPERATIONS<sup>4</sup>

### 1. Recent developments in commodity exchanges

The last two decades have witnessed spectacular growth in trading, in both conventional futures and a variety of financial instruments, not only in the United States but also worldwide. World futures and options contracts traded in 1993 amounted to 1.039 billion; roughly half of them were transacted outside the United States. The Latin American share is believed to be about 5% of that total (Futures Industry, 1994). The rapid expansion in futures trading is reflected by the fact that total contracts traded on all United States futures markets rose from 3.9 million in 1960 to 43 million in 1977 and 339 million in 1993, when total futures contracts traded outside the United States reached 413 million. Thus, the number of futures contracts outside the United States already exceeds the number traded inside the country (see the following table). The futures and options traded annually in the United States at the end of 1980s were close to US\$ 30 trillion in value (ECLAC, 1990).

To be sure, most of the growth in the past few years has occurred in the financial and options areas. Data on worldwide futures contracts by commodity group indicate that financial futures (interest rate, equity indexes, foreign currency/index) account for an increasing share of the total; by the end of 1993, more than 74% of all futures contracts traded worldwide fell into these categories. In the United States, these three categories accounted for 65% of all futures contracts traded in the same year, while agricultural commodities, energy products, precious metals and non-precious metals represented 17%, 14%, 4% and 0.6% respectively (various monthly reports of FIA).<sup>5</sup>

Similar observations can be made about options contracts. The number of contracts traded in the United States increased from slightly over 20 million in 1985 to over 82 million in 1993. By commodity group, in 1993 close to two thirds of the contracts traded corresponded to financial instruments, with interest rate-related transactions representing by far the largest share. As in the case of futures, agricultural commodities constitute a sizeable share, while the proportion of energy products has increased rapidly. Total options traded outside the United States reached 105 million in 1993, of which 87% corresponded to the three categories of financial instruments. These exclude options on securities, the volume of which reached 100 million contracts in 1993.

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<sup>4</sup> For some basic information on the operation of these markets, see GEPLACEA (1990), UNCTAD (1993a; 1993b) and ITC (1987).

<sup>5</sup> Data on the value of futures contracts traded in London (Liffe, London Commodity Exchange and London Metal Exchange) by commodity group suggest that the majority (70%) of futures traded in the United Kingdom are financial instruments. Non-precious metals accounted for 28% of the total traded (see FIA, International Report, 1994).

The growth of futures activity in commodities since the 1970s has been in part a response to changed economic conditions. The 1973-1975 boom and bust in many commodity prices coincided with high domestic inflation and the move to floating exchange rates. Much greater price volatility for commodities stimulated interest on the part of producers, consumers, processors and traders in the use of futures trading as a way of moderating this exposure to price fluctuations. At the same time, price volatility gave an important boost to futures speculation, which enhanced the liquidity of leading markets and made them all the more attractive to speculators.

**WORLD FUTURES AND OPTIONS TRADING IN 1992 AND 1993**  
(Millions of contracts)

Year	1992	1993	Change(%)
<b>World trading volume</b>			
Futures	594.3	751.7	26.5
Options	253.8	287.2	13.2
<b>Total</b>	<b>848.1</b>	<b>1,038.9</b>	<b>22.5</b>
<b>Futures and options</b>			
United States	460.3	521.3	13.3
Outside United States	387.8	517.6	33.5
<b>Total</b>	<b>848.1</b>	<b>1,038.9</b>	<b>22.5</b>
<b>Futures only</b>			
United States	295.3	339.1	14.8
Outside United States	299.0	412.6	38.0
<b>Total</b>	<b>594.3</b>	<b>751.7</b>	<b>26.5</b>
<b>World futures and options</b>			
Financials	635.3	774.3	21.9
Non-financials	212.8	264.6	24.3
<b>Total</b>	<b>848.1</b>	<b>1,038.9</b>	<b>22.5</b>

Source: Futures Industry, Futures Industry Association, January/February 1994.



Another important consequence of the great price swings was that it became increasingly difficult for producers to maintain long-established systems of administered producer prices on world markets, not only in the case of petroleum<sup>6</sup> but also for aluminum, nickel and copper. The movement away from producer pricing led to a corresponding increase in the importance of prices determined on commodity exchanges.

Also, since the second half of the 1970s, with high liquidity in major advanced countries and an increase in the role of the services industry, portfolio investment by institutional investors such as investment banks and insurance firms has expanded. Accordingly, primary commodities are increasingly viewed as financial assets and as part of a portfolio with other liquid assets (such as stocks, bonds, foreign currencies and pension funds), and, at least in the short run, their prices are influenced not only by market demand and supply conditions (market fundamentals), but also by unpredictable new information on macroeconomic variables in the principal industrialized countries, which affect the terms on which traders are prepared to hold title to commodity futures contracts.<sup>7</sup> The more commodity markets have become integrated in overall financial operations, the more volatile in their prices have been (for a summary of various studies on these issues, see Ghura, 1990; Kuchiki, 1989).<sup>8</sup> Therefore, the utilization of such markets has become a more complex undertaking for relatively inexperienced traders, such as those in Latin America and the Caribbean.

Commodity risk management instruments offered by the exchanges with maturities of more than one year are difficult to come by. Many commodity futures are not very liquid, especially after a maturity of six months (UNCTAD, 1993a). Options trade is also for short maturities, with few transactions extending beyond one year (UNCTAD, 1993c). With an

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<sup>6</sup> The rise in futures trading in oil has been impressive. In effect, the most relevant price of oil in much of the world is no longer the OPEC price but the New York Mercantile Exchange (NYMEX) price—a market which did not even exist before March 1983. Increased price volatility, high interest rates and storage costs in the late 1970s and early 1980s, and the emergence of surplus crude afterwards, called for short-term trading arrangements and hedging instruments, in contrast to the earlier years when long-term contractual relationships between producers, principally those of OPEC, and major oil companies dictated the market price. By the end of 1985, virtually all crude moved at some sort of market-related pricing, and oil companies were acquiring anywhere from 30% to 50% of their supplies on a spot, non-contract basis. In short, the rise of the futures market is both a cause and an effect of the erosion of OPEC market dominance.

<sup>7</sup> A good example is commodity funds. These funds invest in commodities the way investment trust funds invest in stocks and bonds. The funds collect investment capital from individuals, corporations and institutions and these investors must commit their funds for five to eight years. The fund managers then use this capital to buy and sell United States commodity futures, and return the profits to the investors.

<sup>8</sup> Kuchiki argues that owing to these changes, one can observe three important transformations in commodity price movements: i) the cyclical periods of commodity prices have become shorter, and the amplitudes of the cycles have intensified; ii) primary commodity markets have become linked to financial markets, though the relationships have time differentials (leads and lags); the price of crude oil leads other commodity markets, including the financial markets; and iii) the prices of crude oil, gold, T-bills and stocks show the same cyclical periods.

increasing need for longer-term instruments, and with the trend towards securitization of loans and investments on the one hand, and deregulation of financial markets coupled with the introduction of new techniques in financial risk-management markets on the other, commodity swaps<sup>9</sup> started to increase in number during the second half of the 1980s. It is estimated that just under 100 commodity swaps were being completed each year until 1991; late in that year some US\$ 40 billion was outstanding (UNCTAD, 1993a; UNCTAD, 1993c). The maturity of most commodity swaps is between one and seven years, and shorter-term swaps can be arranged when futures or forward markets do not exist to hedge the exposure. Though the overwhelming share of the swaps have been related to petroleum, there have been others consisting of non-ferrous metals and agricultural commodities (UNCTAD, 1993a). In a general swap agreement, two prices are involved: one is variable, usually expressed in relation to a published price such as the price of a futures contract; while the other is fixed at the time of the agreement. Therefore, prices generated at the exchanges play a determinant role in assessing the benefits and costs of the deal.

Commodity swaps are often part of a transaction which involves commodity-price-linked loans and bonds. A commodity loan combines a conventional bank loan with a commodity swap. In effect, instead of being reimbursed with variable interest-rate payments, the loan is reimbursed with the value equivalents (using a reference price) of fixed amounts of a commodity. A commodity bond is, in turn, a security whose return --interest and/or redemption value-- varies with the price of a commodity. The objective of issuing such bonds is to enable the parties concerned to hedge the risk of commodity price fluctuations and, at the same time, raise investment funds or pay off or reschedule debts.<sup>10</sup> The aim is to ensure a positive correlation between all debt service obligations and commodity prices, which reduces the overall risk to the producer of the commodity in question. As in the case of swaps, exchange-related quotations figure as the major reference prices; how representative these prices are in relation to the underlying physical market therefore becomes a crucial question.

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<sup>9</sup> A "swap" is an agreement made directly with a bank or large trading company to fix the price of a specified volume of commodity for specified cash flows. With this mechanism, producers can lock in the prices they receive over the medium to long term, while consumers can fix the prices they have to pay. No delivery of the commodity is involved and thus the mechanism is purely financial. Swaps are often attractive to lenders or investors, because they provide security for the cash flow of the company to whom they are lending finance, and thus improve the ability of the company to repay a loan or to pay a dividend by providing a long-term tailor-made hedge.

<sup>10</sup> Some examples include the receipts by banks, under the Brady Plan, of new 30-year bonds from the Governments of Mexico and Venezuela in exchange for lower principal or interest payments on the existing loans, with the right to receive supplementary payments tied to oil export prices; the Commodity Futures Trading Commission's decision to allow Uruguay to issue notes in the United States equivalent to commodity options, giving the holders the possibility of receiving payments based on favourable changes in the prices of the major export and import items (beef, wool, rice and petroleum), as part of a debt rescheduling plan; the use in the early 1980s by Mexico's state-owned oil company, PEMEX, of oil-price-linked bonds, denominated in pesos, to raise funds on domestic capital markets; and the issue by CVRD, Brazil's biggest mining company, of two- to four-year bonds tied to gold prices (UNCTAD, 1993a).

The expansion of commodity-related activities has involved the successful launching of new markets away from the traditional commercial centres in the United States and the United Kingdom, including some that are located in developing areas. The world's most influential exchanges are those located in the United States -Chicago Board of Trade (CBOT), New York Mercantile Exchange (NYMEX), Coffee, Sugar and Cocoa Exchange (CSCE), New York Cotton Exchange, New York Commodity Exchange (NYCE) and Midamerica Commodity Exchange-, the three United Kingdom exchanges- London Metal Exchange (LME), International Petroleum Exchange (IPE) and London Commodity Exchange- and MATIF in Paris, as well as those in Japan.

Though much more modest in coverage and scope, commodity exchanges also exist in a number of developing countries. The best-known ones in Asia include the Singapore International Monetary Exchange (SIMEX), which offers contracts in different fuels and gold (most contracts are related to Eurodollar and Nikkei Stock Average), the Rubber Association of Singapore Commodity Exchange (RASCE) in rubber futures, the Kuala Lumpur Commodity Exchange (KLCE) in non-fuel products such as palm oil, cocoa and tin, and the Manila International Futures Exchange (MIFEX), with contracts in sugar, soybeans, coffee and copra, all in local currency. Another important exchange is the Bolsa de Mercadorias & Futuros (BM&F) in Brazil, where since May 1991, United States dollar-denominated coffee, cotton, soybeans and livestock contracts have been traded along with several other contracts denominated in local currency.<sup>11</sup> To these should be added Argentina's MERFOX, minor grain and livestock futures and options markets (FIA monthly reports).

Among the commodity-linked futures and options contracts transacted worldwide, trading in fuels is by far the largest, followed by aluminum, copper, gold and silver. The contract volume traded for agricultural commodities, particularly "soft commodities" such as coffee, cocoa, cotton and sugar, is much smaller and the number of contracts traded varies widely from year to year (UNCTAD, 1993a). Options on futures are traded actively for oil, gold, silver, coffee, cocoa, sugar, soybeans, cotton, aluminum and copper (UNCTAD, 1993c).

## **2. Characteristics of products traded on futures markets**

Futures markets exist for many of the commodities exported by developing countries; i.e., for seven out of the 10 "core" products of UNCTAD (cocoa, coffee, cotton and cotton yarn, rubber, sugar, copper and tin), the exceptions being hard fibres, jute and tea. Since the Second World War, new futures contracts which have been introduced successfully in the United States include aluminum, live cattle and hogs, frozen pork bellies, fresh eggs, frozen concentrated orange juice, plywood and lumber. Contracts for molasses, dressed beef, frozen shrimps and broilers were also introduced but failed. With developing-country government involvement, it is theoretically possible for other commodities of interest to developing countries to be introduced as futures and options.

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<sup>11</sup> At this exchange also, the major categories by the number of contracts are financials, Bovespa (Bolsa de Valores de Estado de Sao Paulo) stock index futures and interest rate.

However, not all products are tradable or appropriate for a futures or option market. Manufactured products, particularly those for direct consumption, are not likely to be traded on the exchanges because of their higher degree of price stability and a certain flexibility that allows them to absorb price variability through mark-ups. Among commodities, the most suitable products are those which can satisfy some minimum conditions such as: i) large supply and demand; ii) homogeneity and fungibility; and iii) storability. Supply and demand should be large enough to assure the free interplay of market forces with little intervention, and extensive enough to attract and sustain a large body of traders so that the liquidity of the market and the continuity of trading can be maintained. The commodity must also have a certain degree of homogeneity so as to permit interchangeability between production sources, with a possible system of premiums and discounts to compensate for the differences over or under the agreed specification. Additionally, futures contracts may call for delivery many months in the future. Consequently, the commodity must be capable of being stored for considerable periods, as its contract provides for a market of last resort when the product is delivered or sold. Perishable commodities such as bananas do not meet this requirement.

Futures seem to develop where those producing, handling, trading or processing raw materials need protection against price fluctuation. For the majority of commodities, the share of raw materials in the final product price is high and this produces a higher risk, thereby inducing a higher level of intermediation. On the other hand, when there is a protective umbrella against rising prices which allows increases in raw material costs to be passed on to the final product price without too much difficulty, it is not always necessary to resort to a risk-reduction mechanism such as a commodity exchange.<sup>12</sup>

For these reasons, the greatest use of futures for hedging is made by institutions whose earnings are highly sensitive to small variations in the underlying commodity prices. Thus, commodity traders are usually the most active hedgers of all, as they attempt to protect their small margins from being wiped out by small swings in commodity quotations. The next most important group of users of these markets consists of processors and fabricators of raw materials. Often, as in the grinding of cocoa beans, the roasting of green coffee or the milling of grains, the value added in the processing stage is small in relation to raw material costs, leaving processors vulnerable to price swings unless they take steps to hedge their raw material purchases.

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<sup>12</sup> For instance, the share of bauxite in the final price of aluminum is very low, so that a large increase in the price of bauxite will have little effect on the final price of aluminum. While it would be possible to set up a futures market for bauxite, it remains to be seen whether that market will be sufficiently needed and used.

### **3. Market participants in the exchanges**

Not everybody is allowed to trade directly on the exchanges. One can become a member *per se* (the system at the LME, London Commodity Exchange and KLCE),<sup>13</sup> or buy one or more seats and thus become a member (the system of most other exchanges). If seats are sold, the number is limited (e.g., 816 on NYMEX, 772 on COMEX, 527 on CSCE, 125 on IPE). Buying a seat can be expensive, easily costing between US\$ 80,000 and US\$ 200,000 on the large United States exchanges (UNCTAD, 1993a). Furthermore, on many exchanges, the number of floor trading firms is rather limited.

Recently the membership of several exchanges has changed considerably, owing mainly to an erosion of commission fees, which has made it less costly to trade through a broker, and to a decline in the number of trade houses that are members of exchanges. Meanwhile, the number of brokerage firms and banks that are members has increased.<sup>14</sup> These brokerage and banking firms have become very important for commodity futures trade, not only as intermediaries for hedgers and speculators, but also for offsetting swap contracts (UNCTAD, 1993a).

Measurement of the involvement of different market participants are difficult to come by, but it is known that the balance between commercial interests (hedgers) and non-commercial interests (speculators) varies considerably from market to market. None the less, the figures on a number of United States exchanges indicate that non-commercial interests account for a significant share (UNCTAD, 1993a).<sup>15</sup> While those users who have a commercial interest in the underlying commodity are often hedging their price risks, they also speculate on a fairly large scale. Also, those who do not have a commercial interest may be speculators or firms representing clients who are speculators or hedgers; or they may be market makers, arbitrating futures and options positions. Developed-country companies still account for the lion's share of commodity exchange futures activity, be it speculative or for hedging purposes.

Use by developing countries directly or through intermediaries is rather limited, but it is on the increase. A small number of developing-country firms and other institutions are members of developed-country exchanges. On the LME, Chile's national copper corporation (CODELCO),

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<sup>13</sup> In the case of the LME, for instance, there are a limited number (18 in 1992) of so-called "ring-dealing" members who can operate in the rings and control the directorate. There are also associate broker clearing members and associate trade clearing members, who cannot operate directly in the rings but are members of the clearing house. Then there are the categories of associate broker and associate trade member, which do not entail operative privileges but permit participation in the administration of the Exchange. Finally, there are the individual and honorary members.

<sup>14</sup> For example, on the LME, while the number of ring-dealing members declined from 31 in 1980 to 18 in 1992, banking firms such as Barclays, Crédit Lyonnais and Mase Westpac, and the brokerage companies Refco and Shearson Lehman Brothers, became new members.

<sup>15</sup> A large proportion of total transactions are opened and closed the same day. The above conclusion is derived by looking at the distribution of open interest (that is, the remaining open positions at the end of the day) between "non-commercial" and "commercial" interests and taking into account non-reportable positions which, to a large extent, relate to small-scale speculators.

Zambia's copper marketing company (MEMACO) and Zaire's Gecamines are associate members; on COMEX, the Banco Nacional de México, active in silver trade, is a member. In most cases, brokers, banks and other intermediaries are used to undertake activities on the futures markets. Some companies, such as Brazil's and Mexico's oil firms, have a representative office in London and New York responsible for futures and options operations.

With respect to activity among developing-country agents for soft commodities, Latin American and Caribbean producers are among the major developing-country users, who hedge, via brokers, about a quarter of the region's cocoa, coffee and sugar exports on the CSCE in New York (López Huebe, 1990). Latin American exporters of cereals and soybeans also hedge on the United States exchanges (Regúnaga, 1990a). For metals, Latin American exporters are the most active users of the exchanges. The region's copper producers and processors of semi-finished copper products in Chile,<sup>16</sup> Peru, Mexico and Brazil have regularly used the LME and COMEX (Bande and Mardones, 1990). On the fuels markets, it is reported that the Mexican and Brazilian authorities participated actively in oil futures and options in the past.

Using commodity futures and options exchanges directly or through intermediaries can be costly. To participate directly, in addition to obtaining a seat or membership in an exchange and usually an office in the city where the exchange is located, it is necessary to abide by not only capital adequacy standards to ensure that each participating trader is credit-worthy, but also an accountancy system that allows compliance with audit and reporting requirements. These costs tend to work to the detriment of less capitalized firms. Indirect participation through intermediaries also involves costs such as margin deposits and margin calls,<sup>17</sup> commission fees<sup>18</sup> and organizational costs (i.e., an adequate accountancy system, personnel training and access to daily information). These explicit costs must be weighed against the benefits and costs of using exchange operations; this aspect will be examined in the following sections.

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<sup>16</sup> CODELCO has increased its presence on the metal exchanges since the beginning of the 1980s, and recently formed a subsidiary in the United Kingdom, the function of which is to centralize the hedging operations of its European affiliates and to expand its operations towards the trading field. Likewise, Chile's National Mining Corporation (ENAMI), an independent refinery, buys minerals and concentrates from small and medium-sized producers, processes them and later sells the metals on the international market. ENAMI has accumulated great experience in futures markets for copper (Bande and Mardones, 1990).

<sup>17</sup> Initial margins constitute around 5% to 10% of the value of the underlying commodity. For example, if a country wishes to hedge sugar exports of 100,000 metric tons, it must deposit an initial margin of roughly US\$ 2 million. Margin calls depend on price movements; in this example, for every cent the sugar price increases, the country must pay in a margin call of another US\$ 2 million, in either cash or securities.

<sup>18</sup> In the case of grain, brokers' commissions range from US\$ 15 to US\$ 100 per contract (for 500 bushels), depending on the size of the client firm; in most cases, the commission is around US\$ 20 to US\$ 25, and represents a very small percentage of the value of the contract (0.1%-0.2%). For tropical products, the commissions charged in the New York exchanges also vary from one client and brokerage house to another, but the highest is equivalent to less than 0.3% of the value of the contract. On the LME, the size of the commission also varies and is negotiated between the broker and the client: usually it is not more than 0.5% of the traded value for copper, aluminum, nickel and silver and not more than 0.75% for lead and zinc, but in most cases it is equivalent to 0.25% of the contract (Regúnaga, 1990b).

### III. THE ECONOMIC OPPORTUNITIES PROVIDED BY FUTURES AND OPTIONS MARKETS TO DEVELOPING-COUNTRY EXPORTERS

This section focuses on illustrating, in general terms, the economic opportunities provided by futures and options markets and the limitations on their use. Before going into specific cases, however, some general comments are in order.

Commodity exchanges perform four main roles for users: hedging, speculation, price fixing and arbitrage. The exhaustive literature on these functions makes it unnecessary to provide here a detailed description of their mechanics and possible benefits to users. The advantages of commodity exchanges for producers, traders and consumers under a market economy system are also well known, and can be summarized as follows: i) reduction of the price risks inherent in commodity ownership; ii) easier and cheaper finance, known as "leverage";<sup>19</sup> iii) improved knowledge of market conditions; and iv) guaranteed fulfilment of futures contracts.

Some analysts maintain that developing countries reap other "spillover" benefits from futures markets which are neither immediate nor direct but rather important in the medium and long term. They include increased integration of developing countries' pricing systems into world markets, a broadening of competition and reduction of monopsonistic power, and a dissipation of the domestic risk load to the broader world economy (Power and Tosini, 1977). Also, as suggested by Hirshleifer (1988), in the absence of futures markets, there will be greater incentives for growers/producers to integrate vertically to offset the negatively correlated payoffs which exist between them. This could be achieved by combining assets under single ownership or by forward contracting between the producer and the processor. Establishing/participating in a futures market provides an alternative means by which these groups can transfer risks individually. Organized futures trading therefore can act as a substitute for vertical integration or share contracting as a means of diversification, while at the same time encouraging a greater degree of product

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<sup>19</sup> Leverage is a major attraction of futures trading for investors: since a futures transaction does not require full advance payment for the commodity (only a "margin" deposit which serves as good-faith money), the buyer of a futures contract which increases in value -or the seller of a futures contract which decreases in value- can realize a profit, which can be substantial in relation to the small commitment of capital.

To illustrate how it works, the following simplified case may be useful: assume a sugar futures contract representing 112,000 pounds (Coffee, Sugar and Cocoa Exchange sugar contracts are based on 50 long tons, equal to 112,000 pounds, but are quoted in cents per pound) can be bought with a margin deposit of US\$ 1,500. Therefore, if an investor bought one contract at a price of, say, 12 cents a pound and the sugar futures price increased to 15 cents a pound, he would realize a profit (less commissions) of 3 cents a pound times 112,000 pounds: US\$ 3,300. And of course, his initial margin deposit of US\$ 1,500 would be returned to him. But that leverage can work both ways. If the futures prices were to move in the opposite direction from that anticipated, an investor could lose his entire margin deposit and furthermore, he would be called on for additional funds to promptly and fully cover any additional losses; that is, he receives margin calls.

specialization.<sup>20</sup> In this manner, futures markets can facilitate various marketing strategies of independent producers of developing countries in the less integrated, yet vertical industrial structures still prevalent in the primary commodity sector.

### 1. Futures

A futures contract is a contract between two parties (a buyer and a seller) involving a particular quantity of a given commodity and a specific time and place of delivery. The price agreed upon by both parties is established in the marketplace at the time they enter into a contract. One of the major purposes of resorting to the futures market is to hedge the risk involved in maintaining or requiring the physical merchandise in the future. Hedging might be defined as taking a position in a futures market opposite to the position held in the physical market to minimize the risk of financial loss from an adverse price change for which no commercial insurance is available.

The main characteristics of a hedge (in the case that follows, "selling") can be illustrated by means of an example. Suppose that on 30 April, an exporter has 10,000 tons of raw sugar in warehouse, which he intends to export in August. At that time, the August position in the London Exchange is quoted at US\$ 210 per metric ton, which the exporter considers "good". If he were to find a buyer for his product, he would of course sell at that price and would not need to carry out any hedging operation. However, he cannot find a buyer and he fears that the price might fall and he will lose the chance to sell his sugar at the price currently quoted for August. Therefore, he decides to order his broker to sell 10,000 tons of the August position. On 15 July three alternative situations may have arisen with regard to the sugar price:

i) If the price has declined, he will try to find a buyer for his physical merchandise. Let us assume that he finds one and that he is able to sell his sugar at US\$ 202. He immediately orders his broker to buy the August positions at US\$ 202. Since the August position is now spot price, and the prices of the two markets -that is, physicals and futures -are assumed to be linked, he will most likely be able to purchase his futures at US\$ 202. In the futures market operations he makes a profit of US\$ 80,000:  $(10,000 * 210) - (10,000 * 202) = 80,000$ . In the physical market, the lower than-expected price was offset by a profit, with a final outcome of US\$ 210 per metric ton  $((2,020,000 + 80,000) / 10,000)$ ;

ii) If the sugar price has gone up, he can sell the physical merchandise at the higher price, say US\$ 215, but he will have to buy his futures at this higher price, too. In the futures market, there is a loss of US\$ 50,000. However, this loss is totally recovered by a higher price in the physical market, with the same final price of US\$ 210 per ton  $((2,150,000 - 50,000) / 10,000)$ ; and

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<sup>20</sup> For example, farming cooperatives for wheat in the United States historically have owned a significant share of the wheat elevators business. The rise of the oil futures markets occurred in the 1970s, when the rise of OPEC segregated the production stages of oil extraction from refining in what had been a highly vertically integrated industry. A similar observation can be made about the aluminum industry, where the appearance of futures markets was correlated with the emergence of independent, non-integrated producers, including those from the developing countries.



iii) If the price is the same on 15 July as it was on 30 April, he would liquidate his futures position without a loss or profit, except for commissions, and sell his sugar at US\$ 210.

As this example shows, once the hedging has been carried out, the final outcome is that the exporter will receive the hedged price for his sugar, regardless of what happens on the market. Thus, the exporter is insured against a fall in the market, but also loses any possibility of making an additional profit if the market goes up. If the exporter liquidates his position in the futures market by buying the same number of futures contracts that he had sold before, and if the net change in the price of his physical is equal to the net change in the price of his futures -that is to say, if there has been a parallel movement of prices in both markets-, the gain he enjoys in one market offsets the loss in the other and the hedge is said to be "perfect". If prices do not move in parallel, he ends up with a residual capital gain or loss, depending on the change in the price spread between the price of futures contracts and the price of actual commodity in the physical market, or the so-called "basis".

The attraction of futures trading over the spot transaction from the viewpoint of developing countries lies in futures markets' capability of promoting: i) anticipatory hedging (forward pricing); ii) inventory hedging; iii) flexibility in pricing; and iv) support for commodity prices. Added to these, of course, is the frequently mentioned market information function: commodity exchanges provide information with regard to price behaviour in light of existing and expected market supply/demand conditions for purposes of making production and marketing decisions (for more details, see ECLAC, 1990).

In addition, futures contracts are often used to facilitate physical trade through distinct price-fixing formulas, the major instruments being: i) spot prices with profit or loss sharing;<sup>21</sup> ii) average pricing;<sup>22</sup> iii) price calls;<sup>23</sup> and iv) executable orders<sup>24</sup> (for more information on these methods, see UNCTAD, 1993a). The prices in these types of contracts are expressed as a

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<sup>21</sup> In this type of transaction, the reference price is set at a predetermined level; depending on the final settlement above or below that level, the buyer and seller share in the profit or loss.

<sup>22</sup> In this case, the price finally paid is the average level of a reference price during a specific period, usually one month and often the month before shipment. Export prices of major metals are now the average of LME prices in the month of shipment, plus a fixed premium or minus a discount. This formula is also common in fuel exports.

<sup>23</sup> In this case, the seller (or buyer) has the right to choose for a certain tonnage (for example, a fixed part of the total contract, or a variable part of it) the settlement price of the previous day's exchange trading of a specified futures contract.

<sup>24</sup> The major objective of this is to establish a price-fixing formula with which a sale can be partially or totally executed between the date of the physical sale and the date of shipment. After agreeing on the quantity of lots, the positions and the premium/discount in relation to the futures price, the seller fixes the price of the physicals by giving orders to the broker who executes them on the exchange on his own account. Executable orders are attractive to sellers when they expect prices to increase because this method gives them a sales contract without having to lock in prices, while a sales contract establishes access to government pre-export finance.

function of specified future price quotations, or reference prices, which, in turn, are based on prices of futures contracts. These techniques make it easier to agree on a sales or purchase transaction by establishing the volume and the price formula, but not the settlement price. Price calls and executable orders are mainly used for trade in agricultural products, while a system of average prices is generally applied to fuels and metals; profit or loss sharing clauses are used for both agricultural and metal products.

**a. Anticipatory hedging**

Anticipatory hedging is the buying or selling of futures contracts in anticipation of a commodity purchase or sale. It is basically a price-fixing decision: prices look "good" today for the commodity that must eventually be bought or sold. Most producer hedging, some processor hedging and most potential importer hedging fall into this category. For instance, farmers can, at any time during the year, sell their intended output which will be available only at harvest. Futures markets provide a continuous pricing and sales opportunity for an otherwise discontinuous production operation. In the case of a processor, he will typically have relatively small on-site storage capacity, and thus be unable to buy his annual input requirements in the cash market in a single operation. But if the processor judged that prices were low, he could secure his entire annual requirements today by buying futures.

The opportunities arising from forward pricing in a liquid futures market may be of special interest to the developing-country exporter whose timing of export sales is vital to foreign exchange management. By this method, the exporter can sell fractions of intended export sales in futures over intervals denominated by contract months. Benefits can be substantial for export firms, cooperatives and State trading companies that systematically obtain the product from the local market and later export it. By closely monitoring on the market, these institutions can decide when to hedge well in advance of actual sales or harvest, or without the presence of habitual consumers.

Thus, when futures markets are used for forward pricing, they serve essentially the same function as cash forward markets. The differences between them<sup>25</sup> include the ease of entry and exit and the practice of "marking-to-the-market" (daily account crediting and debiting)<sup>26</sup> in futures, and the ability to "roll over" sales in futures from one delivery period to a later maturity.<sup>27</sup> At least in theory, forward pricing effected in this manner, reduces uncertainty regarding export price levels. These differences are coupled with futures markets' higher liquidity

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<sup>25</sup> On the differences between cash forward and futures markets, see Nelson (1985).

<sup>26</sup> If the futures price moves in a direction unfavourable to a holder of a futures contract, every day the latter is obliged to pay a "margin call", a sum equivalent to the value of the adverse movement, to the clearing-house. This is intended to keep users of the market from carrying large losses over a period.

<sup>27</sup> Many commodity futures and options contracts are not very liquid after a six-month period. The reduced liquidity often makes it necessary to adapt a series of hedging: for instance, instead of buying a contract for 12 months forward, buying one for six months, selling it at the end of that time and buying a new contract to cover the remaining period.

-commensurate with trading volume-, while in forward markets there is almost no fungibility of contracts. Futures markets are supposed to provide a higher level of contract integrity guaranteed by the exchange's clearing-house operations.

By nature, anticipatory hedging is speculative: the participant selects determined moments to buy or sell, based on his judgment about the prevailing futures market prices. The operation involves a decision to lock in a price considered "good," on the basis of a market analysis or certain criteria regarding his commercial operations (this decision is similar to the one taken by the speculator in the exchange), or on the basis of the relative prices of inputs used in production. In addition to this speculative character, anticipatory hedging, like other types of hedging, does not totally eliminate uncertainty in the net price eventually received by the exporter, owing to the basis variability. This, together with other factors (discussed in section IV), tends to limit the possibility of taking full advantage of potential economic opportunities.

**b. Inventory hedging**

Futures markets constitute a valuable source of market information, and careful monitoring of prices leads to efficient export pricing and marketing. In particular, the relationship between futures prices for different maturities provides the market-determined price of "commodity storage." A good understanding of this concept can sometimes determine the degree of success of the hedge.

As an illustration, in January, a Colombian exporter may find the US\$ 1.25 per pound price of July coffee (coffee to be delivered in July) quoted on the Coffee, Sugar and Cocoa Exchange to be favourable. The exporter sells a number of July futures contracts equal to the amount he wishes to sell at US\$ 1.25. If the exporter waits and sells his coffee in July on the cash market, he will receive US\$ 1.25, because cash and futures market prices converge in the delivery month. In contrast, if he decides to sell his current stock of coffee on the cash market before July, he may receive a net return for his coffee somewhat greater or less than US\$ 1.25. For instance, if he sells his coffee in March, July coffee futures may be selling for US\$ 1.40 per pound in March while cash market coffee prices may be US\$ 1.50. In this case, the exporter makes a net return of US\$ 1.35 per pound (US\$ 1.50 cash price less US\$ 0.15 futures market loss). If the cash and futures prices in March were reversed, the exporter would receive a US\$ 1.15 net return. Moreover, if he decides to sell on the cash market after July -say, in September-, he may do so by "rolling over", or closing out his July position while simultaneously opening a short (sell) position in September.

The difference in price between futures contracts for different maturities is a signal of the availability of stocks to the markets: large price spreads indicate an abundance of stocks and an incentive to store, whereas small or negative price spreads point to a tightness in stocks and an incentive to release them to the market. Returns to storage, known as "carrying charges", are normally greatest between contract months immediately following harvest and smallest between those immediately preceding it. That is to say, when stocks available to the market are plentiful, positive carrying charges will exist between different contract months. In contrast, small or

negative carrying charges will result when stocks are low.<sup>28</sup> The exporter who understands the significance of futures price spreads can use this information to his benefit in the timing of export sales even without engaging in futures contract trading. The examination of these price relationships reveals current market conditions as well as implicit future market expectations.

Futures price spreads, therefore, will signal to the exporter when to store and when to sell. With this information, the exporter might store the product by hedging stocks in futures markets against possible adverse price changes. When a carrying charge is positive, the exporter can earn a return to storage by simultaneously purchasing the cash commodity and selling futures. Upon the expiration of the near futures, the exporter can continue to earn a return to storage by rolling over his futures position into the next future, as long as a positive carrying charge is maintained. The exporter can repeat the process until price spreads become negative, and then close out his futures position and release his stocks on the cash market.

As mentioned earlier, the liquidity for further-out months is not high. The viability of the long-term hedge will depend on the ability to "roll" contracts forward every time the backwardation disappears or becomes small. However, futures contracts for crude oil, non-precious metals, livestock and raw sugar are usually in backwardation, while contracts for cotton and grain are in that situation only occasionally. Only a limited number of contracts, such as those for gold, silver, soybeans, arabica coffee and cocoa, systematically show a contango (UNCTAD, 1993a). Therefore, the price paid for a nearby contract by the holder of a contract which is in backwardation would be higher than the price at which he sells the further-out contract. This results in a loss and clearly kills the incentive to hedge. By any measure, risk management of long-term exposure requires advanced skills in trading.

As in the case of anticipatory hedging, the degree of success in inventory hedging by exporters depends on the basis risk. Normally, one would expect the difference between futures and the spot price (i.e., the basis) to increase for the more distant contract months, reflecting the incidence of increases in the carrying charges of the commodity stocks. But, as might be expected, the return to storage may be reduced or increased by changes in the exporter's product quality. It will also be affected if stocks are released from storage before the expiration of the futures contract. Benefits accruing from inventory hedging also depend on the stockholding behaviour of principal cash market participants: the availability of stocks to the market relative to current demand largely determines carrying charges, and the stockholding behaviour of a major producer or group of producers, and the location of the futures market, have an important bearing on them. It is known, for example, that carrying charges in grain, soybean and cotton futures are determined by stockholding behaviour in the United States, where the major futures markets for these products are located (Regúnaga, 1990a).

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<sup>28</sup> In a perfect situation, the prices of further-out futures contracts are higher than the prices of nearby contracts, to reflect interest charges and storage costs; if this is the case, the market is said to be in contango. In the commodity markets, however, many futures contracts show the opposite pattern -that is to say, nearby futures prices are higher than further-out ones. This is called backwardation, a situation which usually indicates a scarcity of the product in question.

In theory, the mechanisms employed in inventory hedging should encourage not only intra-temporal (within a harvest year), but also inter-temporal (year-to-year), price stability by promoting stock releases in times of shortage and stock accumulation in times of abundance. However, these gains could be substantially reduced by the application of price stabilization schemes or other trade/production incentives which tend to regulate stock availability contrary to futures market signals.

**c. Flexibility in pricing**

Another important modality of hedging which could be useful to developing-country exporters is the mechanism of the so-called "basis-priced contract". The parties to this contract agree to two separate components in pricing the export sale: i) the choice of the futures contract, which later determines the absolute price of the export sale; and ii) the basis, or the amount above or below the relevant futures price, which the exporter will earn for making the sale. The basis consists of transportation costs between the futures market and the delivery location and of premiums or discounts for quality differences with respect to the commodity specified in the futures contract. This practice is common in the worldwide grain industry, including the major Latin American grain exporters. Basis-priced contracts allow the exporter, as in the case of the importer, to fix one dimension (the basis) of an export sale in advance, but at the same time to maintain flexibility in the other dimension (price). By definition, forward contracts fix both dimensions, while cash market sales fix neither.<sup>29</sup>

In a typical basis-priced contract, the exporter and the importer agree on a sale/purchase of the commodity after having specified the basis. The futures contract used for this purpose by both the exporter and the importer is the one whose expiration is closest to the delivery time agreed upon in the export contract. The price at which the exporter sells and the importer buys futures does not have to be the same. Both exporter and importer, according to their judgment, speculate on price levels by waiting to take a futures position. Once a trader establishes a price by taking a futures position, he can establish a new price by rolling over, if he so wishes. Thus, the risks in a basis-priced contract lie in the very flexibility it offers in determining a price level and the risk that the agreed upon basis will not cover exporting costs.

None the less, the basis (in this case, the premium or discount) changes over time because factors that influence prices at each delivery point also tend to change. These variables include transport costs, carrying charges, quality differences, margins and taxes associated with fobbing,

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<sup>29</sup> As an example, if an importer of corn is using New Orleans as a loading point for the May shipment, the "price" fixed in the contract might be FOB-New Orleans, US\$ 0.20 over the May future. In addition, the contract would include a specification such as "buyer's option" or "to be priced by the buyer", which allows the buyer to establish the price level at any time between the contracting date and the first day of May. To complete the transaction -that is, to fix the price itself-, the importer simply buys futures (in this case May futures) at a time he deems convenient.

and especially supply and demand conditions in each location. Identifying an "appropriate" level of premium is not an easy task, and involves expertise and constant follow-ups.<sup>30</sup>

**d. Support of commodity prices**

From the point of view of developing countries, there is an additional issue to be addressed: whether futures trading by the private sector or by official intervention in these markets can bring about the results expected under commodity price stabilization schemes, mainly practised under the international commodity agreements. Instead of using futures markets on an individual basis for conventional pricing and stock-carrying purposes, exporters may attempt to affect/support cash market prices by trading futures collectively. The basic strategy would involve purchasing futures contracts while holding a sufficient amount of the cash commodity to exert upward pressure on futures and cash market prices. In this manner, taking long positions in futures markets could be a substitute for taking long cash market positions, which is basically the aim of buffer-stock holdings. The appeal of this type of action is based on the market leverage provided in futures trading. Exporters do not need immediately to restrict exports, nor do they have to store stocks in their own countries. What is required, however, is the necessary margin capital to take and hold onto the futures positions.

The explicit objective of buffer-stock programmes is to decrease price variability and possibly income variability. These operations also seem to have the implicit goal of stabilizing prices at levels that are, on average, higher than those of long-term equilibrium. The use of buffer stocks to achieve price levels higher than those which would have been established by market forces alone, as in the case of the tin crisis at the beginning of the 1980s,<sup>31</sup> tends to encourage over-production and to leave the buffer-stock authority as the buyer of last resort, with an ever-growing stockpile of the commodity. In order to sustain futures prices above their long-term equilibrium level, the authority would normally be holding net long positions and taking losses on these contracts as they near maturity. Furthermore, such price-supporting activities would make it necessary to take delivery on futures contracts.

In addition to being considered as "manipulative" and running the risk of regulatory action on the part of the exchange itself or the governmental regulatory agency,<sup>32</sup> this type of market

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<sup>30</sup> In the case of grains, for instance, there may be an oversupply in the Gulf, with the result that premiums fall in relation to those corresponding to Chicago delivery points and vice versa, and the premium is, therefore, subject to fluctuation (Regúnaga, 1990a). This fluctuation tends to reduce the effectiveness of hedging by a developing-country agent in the United States.

<sup>31</sup> For details on this crisis, see Bande and Mardones (1990).

<sup>32</sup> For instance, the long futures positions assumed on a large scale by Central American coffee producers in the late 1970s, under the Pancafé Group, were alleged by the CFTC of the United States to be manipulative, and this trading was suspended (see Menjívar, 1983).

operation to support cash prices entails high risks. The participants will eventually face the problem of what to do with stocks acquired by standing for delivery on their long positions. As noted earlier, unless the overhanging stocks are effectively removed from the market, any temporary price increases will be short-lived. On the other hand, in order for the price-support activity to be effective, the mechanism for transmitting price changes from the futures to the spot markets must be strong enough so that intervention in one market can be considered as a good substitute in the other. The futures market in question, therefore, must possess the depth, breadth and resiliency to withstand official intervention and to transmit price changes predictably to the spot market. Experience shows that these conditions are not always met.

## 2. Options

An option gives the purchaser the right, but not the obligation, to buy (call) or sell (put) a commodity at a given price (called the strike price) during a given period of time. In contrast, a futures contract is an agreement to purchase or sell a commodity at a given price during a given period of time. A futures contract obliges both parties to fulfil the contract, while a purchaser of an option can walk away from the contract if he deems it appropriate. It should be recalled that the purchaser of a call option is not the opposite party to a purchaser of a put: the opposite party to a purchaser of a call is the grantor or writer of the call. Similarly, the opposite party to a purchaser of a put is the grantor of the put. Options are not free: their price is called the premium and is determined in the marketplace. When options are traded on an exchange, their premiums and the price of futures move together through arbitrage. In fact, most people who write options hedge them with futures so that there is a net addition to futures liquidity. In this sense, an option must have an underlying liquid futures market in order to be successful. The rapid increase in cocoa, coffee and sugar options in the United States can therefore be attributed to a large extent to their underlying futures markets.

Producer/exporter uses of options are diverse but can be divided into four categories: i) price protection; ii) quantity risk management; iii) risk management in bids; and iv) income generation. With respect to the last, as obvious as it might seem, for every purchase of an option at a particular time and price, there is also the sale of an option at the same time and same price -the point being that just as there are investors who find it advantageous to buy options, there are others who find it advantageous to write options. Indeed, there may well be occasions and situations in which investment objectives can best be served by strategies that involve writing rather than buying options on futures contracts. These strategies, however, should be considered only by those investors who fully understand the risks involved and who are financially willing and able to assume them. The potential for loss is large, whereas potential profit is limited to the premium received. Considering the financial and expertise constraints faced by producers/exporters in developing countries, it seems that these strategies cannot serve their immediate interests.

**a. Price protection**

Like futures, options can be used to shift the risk of price change. By way of illustration, we can see how the price risk is shifted in the case of grain farmers using futures and options. Usually the farmer has the alternatives of selling the grain immediately or storing it in anticipation of higher prices later in the season. The second option is often attractive because grain prices tend to be at their seasonal low right after harvest. However, it is also highly risky, since grain prices may fall rather than rise, owing to unforeseen circumstances. As seen earlier, anticipatory hedging in futures markets allows such a producer to shift the risk of adverse movements in his inventory.

Instead of entering into a selling (short) position in futures, the farmer could purchase a put with a strike price near today's futures price. If the price subsequently rises, the farmer can leave the option or, if it still has some value,<sup>33</sup> offset it and sell his grain in the cash market. If, however, prices subsequently fall, the farmer can exercise the option and receive a short futures position which can be offset for a gain or settled by delivery. It is clear that the put option acts as a price floor, allowing the producer to profit from price increases, while the futures hedge allows him to lock in a price.

Another suggested use of options in this category is as insurance against catastrophic price movements, not an uncommon problem faced by developing-country producers/exporters. A producer may be willing to assume a certain degree of risk under normal circumstances, but may desire to protect himself from major price shifts. In that case, he might purchase an "out-of-the-money" put option in which the strike price is substantially less than the current market price of the underlying futures contract. In view of the smaller probability that such a put will be profitable compared to one with a strike price equal to the current price, its premium will be low. In this way, out-of-the-money puts could provide relatively cheap mechanisms to insure against catastrophic price changes.

**b. Managing quantity risk**

A second purpose for which producers use options by producers is to deal with quantity risk. An illustrative case is that of a producer who tries to hedge "expected" production at planting time. In this case, the producer faces not only price risk but also quantity risk because the exact yield is not yet known. Using futures, a prudent producer could hedge less-than-expected production, making sure that he is not overhedged. In contrast, a put option allows a producer to hedge expected production fully because this option does not have to be exercised.

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<sup>33</sup> An option's value consists of two parts: intrinsic and time values. Intrinsic value is based on the dollars-and-cents difference between its strike price and the current futures price. If an option is currently profitable to exercise, it is said to have intrinsic value. A particular option's premium will usually equal or exceed whatever, if any, intrinsic value the option currently has. Thus, if an option is "in the money" (has intrinsic value) by, say, US\$ 2,000 (1.79 cents for the 112,000-pound contract in the case of sugar), its premium will normally be US\$ 2,000 or higher. In addition, even if an option does not have intrinsic value, it may have time value. The premium for an "out-of-the-money" option is entirely a reflection of its time value. This is the amount buyers are willing to pay for the option on the chance that, at some time prior to expiration, it will become profitable to exercise.



c. **Options and bids**

Options make it possible to reduce risks in transactions where the bidding system is used. A processor who desires to cover the price risk involved in a bid whose bidding rules will be announced afterwards can buy a call option for the quantity necessary to meet the order. In this way, he fixes the price, avoiding the risk that the price of the commodity may increase in the meantime. If the bid is lost, and in addition the price moves against him, he loses only the option premium. If the price moves in his favour, he makes a profit, whether he wins or loses the bid. A futures contract is not useful in this case, since it obliges the bidder to accept delivery even if the bid is lost. The opposite case, in which the buyer obtains the product in a bid using an option, can also be envisaged.

The foregoing shows that as a flexible risk management tool, options provide several advantages to both futures hedgers and unhedged positions: i) options buyers enjoy limited risk with unlimited profit potential (they can never lose more than the premium paid); ii) contracts can be closed out prior to expiration; iii) users can fix their prices at various levels, in effect using options as price insurance; iv) option buyers are not subject to margin calls, so that no open-ended credit line is needed; and v) options make significant new pricing strategies available. On the other hand, certain disadvantages may make the use of options less appropriate in certain circumstances. For example: i) since options values diminish over time, holders may suffer a daily erosion in their time value; ii) options premiums must be paid in full at the time of purchase; iii) sellers must meet margin requirements at all times; and iv) options strategies and premium determinations are complicated. Evaluating each advantage and disadvantage can only be done on an individual basis, depending on the degree of exposure, capital and willingness to accept risks.

The Latin American countries' participation in options markets is still limited owing to their lack of familiarity with these markets and to the high premiums and other costs involved in these operations, especially in the case of United States options. Whether or not commodity buyers and sellers will consider it worthwhile to incur these costs largely depends on their locations, the size of their trade deals and the frequency with which they need to resort to these markets. Generally speaking, they engage in options trading only in specific situations in which they need to set a firm price for a longer period than permitted by futures contracts. Such operations tend to be part of more comprehensive risk management strategies, in combination with futures or financial instruments.

#### IV. CONSTRAINTS ON THE USEFULNESS OF FUTURE MARKETS FOR DEVELOPING-COUNTRY COMMODITY EXPORTS

##### 1. Are futures markets a good predictor of future spot prices?

One of the criticisms frequently voiced by producers and manufacturers -for whom reference prices are long-term equilibrium prices- is that the prices quoted on the exchanges are not representative of the supply and demand conditions prevailing on physical markets. They argue that the exchanges do not express, or only partially reflect, factors relating to the production, consumption and inventory levels of each product (the fundamentals), sending wrong signals to the market.

In fact, a growing number of empirical studies tend to reject the idea that futures prices are unbiased predictors of future spot rates (for a summary on the subject, see Choe, 1990). Typically, commodity futures prices under-forecast the subsequent spot prices, during either to market inefficiency or irrational expectations, or to the existence of risk premiums for risk-averse investors (Thompson, 1983; Choe, 1990). If there is a downward bias -that is, if prices have a tendency to rise as the delivery month approaches-, on average, buyers profit and sellers lose. Prospective hedgers should be wary of biased prices because the net price they receive through hedging may, on average, be lower than the price they would have received without hedging. Furthermore, since futures prices are widely used as reference prices for products traded internationally, this downward bias tends to underprice commodity exports.

The exchanges are also said to be partially responsible for the increase in commodity price volatility (Thompson, 1983). Futures markets tend to lose much of their hedging function when the price of the futures contract is too volatile. Excessive short-term volatility in futures markets may cause the relationship between physical and futures market prices to change frequently, thus exposing hedgers to large basis risks (the risk that price developments on the futures market may diverge from those on the physical market of relevance for the hedger) and higher transaction costs. For developing-country exporters, who are particularly risk-averse to variability in export revenues, the endorsement of futures prices, even as only a reference for subsequent transactions, might involve high uncertainty and costs.

Critics cite two main reasons why commodity-exchange prices are unrepresentative: i) the effects of speculation; and ii) the operational characteristics of the exchanges, which permit market distortions. The latter include manipulation of the market (distinct from speculation), unequal availability of and access to information, and the fact that the specifications of futures contracts may not closely match those of the underlying physical markets.

In theory, futures prices are **not** forecasts of expected future prices any more than is today's cash price. The simultaneously quoted prices -cash and futures- must be interpreted as reflections of one basic price level and a series of prices for storage and other costs over several time periods. In the extreme case, with absolutely rational expectations, the price incorporates any

information immediately. But in practice, apart from the problems related to access to and availability of information, new information may appear with the passage of time and the evaluation of existing information may change.

The "excessive" presence of speculators would weaken the relation between futures prices and the physical market. To the extent that the transaction of "papers" predominated in them, the cash price would be based on a reduced number of transactions and the functions of the exchanges as sources of physical supply would be minimal. Though it is difficult to ascertain the degree of speculation, a study on copper (CRU, 1985), for example, shows that speculation -measured by the long and short open-interest positions established by speculators- pushes exchange quotations away from the price levels that would be indicated by a model based solely on the fundamental factors. Moreover, the volume of trade in practically all commodity futures and options contracts, especially for further-out months, is not very high. The daily turnover on most commodity futures is such that the capacity of these markets would be strained if, for example, a small number of large-scale participants decided to use futures over a short period of time to manage the price risk of a substantial proportion of their output. This tends to reduce the efficiency of hedging operations and affects the representativeness of prices.

In some cases, such as that of seasonal non-perishable farm products, the existence of futures contracts can reduce the seasonal volatility of commodity prices, but will probably increase short-term price volatility.<sup>34</sup> In other markets, however, expectations concerning the future of the fundamental variables, or even future price movements, are the predominant elements. In these markets, typically those in precious metals, existing inventories are much more important than the reaction that production and consumption may register in response to price movements, the anchor having little influence. In base metals, speculative strategies based on the "fundamental analysis" have a sufficiently long-term rationality for the anchor effect to manifest itself. Because of high uncertainty concerning the duration of trends and cycles in the raw-materials markets and the high financial costs involved in medium- and long-term positions, few agents take very long-term positions based on the fundamental analysis.

Regarding inter-temporal price stability, there is another dimension to consider in the mineral sector. In effect, the owner of the mine has most of his inventory in the form of reserves. As such, his assets are exposed to the risk of price variability, depending on the price at which the reserves are to be extracted. In consequence, the producer is exposed to risk with respect not only to the refined metal inventory, or production during the period in question, but also to the stock of raw material for a much longer-term production horizon (Bande and Mardones, 1990). Thus, excessive price variability negatively affects the objective of income stabilization not only through the fluctuation in output and stocks at present and in the near future, but also through uncertainty regarding about decisions to undertake large-scale projects with a long gestation period.

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<sup>34</sup> The participation of speculators who purchase futures at harvest time helps to increase the price during the harvest and to lower it during the rest of the business cycle. The price that balances production and consumption in the long run is, therefore, an "anchor" towards which the price tends to return.

Many speculators operate on the basis of a "technical analysis", which is founded on a hypothesis as to the behaviour of market agents and prices. Based on information about prices, trading volumes, open-interest positions and other indicators, these speculators take positions in the market; when a large number of them make the same sort of decision, their activity tends to bear out their short-run forecasts. They are said to prompt price movements which run counter to trends in the fundamentals, thereby distorting the market's long-term signals to industry. The distorting effects have probably increased in recent years, owing to the greater incidence of institutional speculators, who often resort to technical factors.<sup>35</sup> These speculators take their decisions by comparing the risk and return that are offered by various instruments, and their reference is eminently short-term. The waves of product purchase or sale from this type of reaction would exaggerate price fluctuations not correlated with market fundamentals, and would also increase volatility. On the other hand, since price elasticities of commodities are low in the short run, and supply and demand are thus slow to adjust to changes in the fundamentals, any change which occurs in the market in the interim can cause commodity prices to deviate from a trend towards long-term equilibrium.

Buyers' and sellers' confidence in using futures contracts for hedging and price discovery depends on the fulfilment of several conditions: i) the futures and options contracts traded must reflect the specificities of the underlying physical market, such as quality specifications and delivery conditions (timing, location, etc.); ii) these markets should involve a diversity of market participants on both sides -that is to say, sufficient participation by non-commercial interests, though not to the point of dominating commercial interests; and iii) they must be transparent and reliable so as to limit the possibility of market distortions.

## **2. Other constraints and limitations**

In evaluating potential benefits in a real-world situation, in addition to the foregoing, several other caveats should be kept in mind. As pointed out repeatedly, the **basis risk** is important to the effectiveness of a futures transaction, especially from the point of view of a developing-country producer or exporter (for a more complete analysis of this aspect, see ECLAC, 1990). In a theoretical hedging operation, if the price at the physical sale is lower than the price in the futures contract, the loss on the physical market is offset by the higher price on the futures contract. Similarly, if the price in the physical market is higher than the one in the futures contract, the gain on the physical market is offset by the loss on the repurchase of the futures contract.

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<sup>35</sup> A large majority (over 80%) of the institutions that work with investment funds, which have increased markedly in recent years, rely on technical analysis for their investment decisions (UNCTAD, 1993c).

However, in practice, there is no guarantee that the profit or loss on futures contracts will fully offset the loss or profit on physical transactions. This is referred to as the basis risk, and derives from the fact that the price movement for the specific physical commodity which the user of futures wishes differs from that for the standardized futures contract. The markets to which a company exports are not necessarily the same as those where the futures markets are located. Price developments on the customer market can be substantially different from those on the futures exchange. The product specifications and price movements can also be different. Furthermore, the basis relationship can be temporarily disturbed, inter alia by attempts at manipulation. The exporter's actual margin will depend on how well the relevant basis is anticipated. This, in turn, calls for sophisticated knowledge of basis relationships. For a risk-averse hedger, as a developing-country exporter is likely to be, this basis variability can be very undesirable.

In the case of grain trading, for example, one of the main obstacles to greater participation by the countries of the region is the dissimilarity of price trends on the exchanges of the developed market economy countries and in local markets. Market interference stemming from the trade policies of some exporting countries causes price distortions, and the other factors that influence supply and demand in each competitor country are different. A temporary imbalance in the supply and demand for grain in the main producing countries can lead to competition between local consumption and exports, which will be reflected more markedly in FOB prices than on the Chicago Board of Trade. The cross-seasonality of the northern and southern hemispheres can also cause unpredictable variations in premiums (Regúnaga, 1990a).

In addition, the performance of futures markets with respect to products exported by developing countries, such as cocoa and coffee, might differ from their performance in relation to products such as cotton and sugar, which are produced and exported by both developed and developing countries and are residual markets (i.e., international trade in these products represents only a fraction of world production). Thompson (1983) argues that cotton futures price spreads are indicative of United States cotton stock availability rather than world stock availability. In the case of cocoa futures, however, price spreads appear to represent world stock availability, probably because most cocoa stocks are held in importing developed countries where stockholders are likely to hedge on futures markets or at least pay attention to futures price signals.

One factor which affects the basis risk is **quality variation**. The desire to achieve high liquidity by attracting a sufficient number of speculators to the futures markets can result in contract specifications that are less strict than those sought by the industrial concerns which produce the materials and/or use them as inputs. Indeed, to rectify this type of discrepancy, the copper contracts of the LME and COMEX were modified in order to reflect the industry's interests more fully. Although standardized premiums and discounts are taken into account for other grades of metals, such standardized compensatory mechanisms could underestimate the premiums and overstate the discounts actually paid in the physical market (Bande and Mardones, 1990).

Similarly, **origin and delivery specifications** can influence the degree to which futures prices are representative of those in the physical market. The contracts on developed-country commodity futures exchanges are primarily intended to meet the demands of the economic agents located there. For instance, of the main commodity contracts, only sugar can be delivered from developing-country ports. All other commodity futures contracts specify delivery in a developed-country consumer market. For instance, the most salient feature of the No.2 cotton futures contract is its specification that only cotton grown in the United States may be delivered. As such, foreign cotton traders are somewhat limited in their use of the New York cotton market because they cannot deliver foreign-grown cotton. However, New York cotton futures may still be used effectively for hedging by foreign traders as long as cotton prices in New York are highly correlated with cotton prices at terminal locations outside the United States. This lack of correlation between supply and demand conditions in a market and the conditions on the relevant exchange introduces large basis risks and thus complicates hedging decisions.<sup>36</sup>

**Exchange rate instability** is another cause of discrepancies between local and international prices. Theoretically, the market can be used for currency hedging. However, an efficient reduction of exchange risk depends on the degree of interdependence between commodity price risk and exchange rate movements. This interaction can give rise to differentials between the risk associated with the maintenance of stocks and the risk entailed by futures contracts. Similarly, it can also produce differences between foreign hedgers and their national counterparts in terms of how they perceive the variation of the basis. In general, a stable currency unit for price determination is necessary in order for local futures markets to operate efficiently. The complicated method of daily adjustments in the value of trading positions in relation to changes in the official exchange rate between foreign currencies and the local money hampers futures transactions.

Commodity futures help reduce the participants' exposure to price risks and improve price transparency. However, they do not necessarily stabilize **export earnings**. These instruments are a means of increasing the predictability of a company's future cash flow rather than a means of stabilizing commodity prices as such. If the relationship between the average price and the variation in income is such that a lower rate of variability is achieved at the cost of projected earnings, then the benefits of hedging might be lessened. If futures operations cannot moderate the variation in export earnings due to swings in output, then the optimum level of hedging can be considerably lower than the projected level of output when the exchange rate risk and the uncertainties related to production are evident. In most cases, companies consider the quantity to be hedged as a crucial decision variable, instead of always assuming completely hedged positions. Under such circumstances, completely eliminating uncertainty with respect to their earnings is an

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<sup>36</sup> Another example is that in 1991, the CBOT proposed to ban foreign grain (wheat, maize and soybeans) for delivery against futures contracts. While United States exporters supported this proposal, some large grain trading companies opposed it on the grounds that the exchange would be retreating from its goal of serving as global marketplace. It was finally decided that grains of United States and non-United States origin would be stocked separately in warehouses, and that processors could take delivery of both but exporters could take delivery of United States grain only (UNCTAD, 1993b).

extremely difficult, if not impossible, task. In particular, large producers have much greater difficulty than the smaller ones, since production disturbances of their own affect the international price of the commodity concerned. Finding a forward position that is optimal for their own circumstances can be complicated.

As noted earlier, a great advantage of futures markets is the high leverage potential, which enables participants to make voluminous transactions with relatively small margins. In turn, **margin deposits** are most often cited as the major barrier to the use of futures markets by developing countries. The practice of daily account crediting and debiting, the so-called "marking-to-the-market," often results in large unexpected interim profits or losses for the trader holding a futures position. The uncertainty about the size of margin deposits during the life of a contract, therefore, calls for extremely liquid financial resources. These reserves must be highly liquid, since a trader must be ready to meet margin calls immediately. Margins are often called in the domestic currencies of developing countries or in interest-bearing government securities, certain kinds of equity stocks, letters of credit and bank guarantees and, in some cases, warehouse warrants. However, this does not reduce the great constraints on potential participants from countries where foreign exchange is limited or its availability is constrained by lengthy bureaucratic procedures.

Futures markets may be used as a last resort for direct commodity marketing. If they wish, exporters can sell futures contracts with the intention to deliver the commodity to an official delivery point upon the contract's expiration. For some exporters, this option may be attractive because it solves the problem of finding and contracting with buyers. With this option, the exporter is assured of a market and an established price. However, in practice, the delivery points are usually in consuming regions, so that the exporter must arrange to transport the commodity to an authorized delivery point. Besides, heavy use of this delivery mechanism is likely to depress the price of a futures contract, thereby making the contract less attractive to prospective traders. The overuse of this practice might also lead to an even lower supply elasticity, by reducing the urgency of regulating production in accordance with changes in demand. Under these circumstances, futures prices may reflect market conditions only at consumer-oriented delivery points; prices in producing regions need not move with futures prices. Thus, futures prices are used more often by traders who face little basis risk; that is, those that transact in cash markets which are well integrated with futures market delivery points.

## V. CONCLUSIONS AND RECOMMENDATIONS

In so far as futures markets can lower risk and price stability, they have an important role to play for commodity producers and exporters. Their growing use by economic agents in developing countries indicates that these actors see significant benefits to be reaped from participation in the markets. Clearly, however, futures and options markets have not completely resolved the problem of risk (actually, they only help to partially reduce short-term risks), and in some instances they may even exacerbate it. Much more work of an institutional type is required to improve the operation of the markets, and economic agents in developing countries need to increase their knowledge of the markets' functioning in order to decide whether to participate.

Regardless of whether economic agents use the markets directly or indirectly, the spot prices of the majority of commodities are determined by, or are related to, those generated at the exchanges. In this sense, it is a priority task for the relevant agents to familiarize themselves with the operations of the exchanges and to assess the real benefits to be derived from using them for purposes of risk management. To that end, it is important to make the analysis of futures markets a regular activity in the public, commercial and academic circles of the region and to promote the dissemination of the resulting information by the press.

Futures and options markets can be of varying value for individual commodities as a tool for price discovery and insurance purposes, either because some of the markets are better suited to forecasting prices than others or because they more closely approximate national conditions than those worldwide. Typically, commodity futures prices are reported to underforecast the future spot prices, thereby underpricing commodity export earnings. The usefulness of exchanges as part of the commercial strategies of developing countries is undermined by the lack of correlation between the prices on the different markets. For some products and countries, the basis risk is greater than the price risk as a result of market interference from the trade policies of certain exporting countries, or because the factors influencing supply and demand in each competing country differ. There is always a problem relating to the "quality" difference: that is, it is not always feasible to reconcile the interests of producers and consumers (contract specificity) with those of speculators (contract standardization). Instability of exchange rates is another cause of discrepancies between local and international prices. Though the developed economies have numerous tools with which to deal with exchange rate risks, this is not the case for Latin America and the Caribbean. It follows that there is a great need for studies on the behaviour of local markets and their relationship to markets in the developed economies. It is especially important to quantify basis risk and identify the determinants of basis from the perspective of developing-country exporters.

Should Latin American countries aspire to increase their participation in the markets, it is essential for traders authorized to operate in futures markets to have the full confidence of the Government, the Central Bank and the public in order to be able to operate freely and expeditiously with skill and discretion, but without being subject to unwarranted criticism. In countries where each and every transaction must be defended, or where access to foreign exchange is not immediate, the success of futures trading may be quite reduced. Of course, this



does not mean lack of oversight; as the case of CODELCO attests,<sup>37</sup> there might also be a need to employ qualified and experienced audit personnel who are independent from the marketing entities, to analyse the market intelligence and to objectively judge the performance of government or private traders, though without too much day-to-day intervention. In many cases, additional terms or conditions imposed by the Government add to the final cost of export/import transactions. It may also be desirable to allow private firms to compete along with quasi-government institutions, and whichever entity furnishes a better mix of prices, credit and other terms should handle the transaction.

An important area of endeavour, therefore, is the training of the technical teams in charge of trading operations, the staff responsible for designing comprehensive strategies and the executive-level personnel who approve them. As has already been done in some Latin American countries, training and advisory activities can be undertaken in cooperation with exchange officials, brokerage houses and institutional users, in conjunction with the competent international bodies. In this context, it is very important to take advantage of technical assistance programmes such as that of the World Bank, whose purpose is to assess the desirability and feasibility of a commodity-risk hedging scheme (World Bank, 1994, p.66). At a later stage, it will be necessary to form national or subregional core groups to promote, organize and carry out the corresponding technical assistance activities.

Options on many futures contracts have been introduced in recent years and are gaining importance in futures trade. Considering the important benefits which they could provide to the countries of the Latin American region, the ideas underlying this instrument must be widely diffused among potential users. Given the complexities of options strategies and premium determinations, however, training courses should be organized in conjunction with the exchanges themselves and other organizations competent in this area.

It is sometimes argued that the exchanges should be located near the area of production, on the grounds that this proximity would facilitate deliveries and yield greater benefits to the producers. The exchanges, however, mainly deal in "paper" transactions, not in physical commodities, and for them there would be little advantage in being near the production site. Moreover, most of the countries in the region do not fulfil the prerequisites for the proper functioning of an exchange, which include: a fast and efficient communications network; foreign currency convertibility at reasonably low cost and risk, and a financial system capable of supporting capital transfer, short-term credits and special types of debt instruments; well-established transport and storage systems; moderate taxation of profits; a legal system which recognizes and enforces the rights and duties embodied in contracts; etc. For most developing countries, the opening of new exchanges cannot be regarded as viable unless strong and efficient physical exchange markets exist; this is another important prerequisite for sustainable futures markets. Otherwise, there is always the risk that business will be spread too thin to allow any one market to do well.

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<sup>37</sup> In late 1993, the company suffered losses of more than US\$ 200 million from speculative transactions in copper and other metals.

Margin requirements are often cited as one of the major constraints on developing-country agents' participation at the exchange, owing to the unpredictability of amounts, frequency and timing. Even though the size and timing of margin calls are inherently unpredictable, the worst case of all would be for support for margin calls to be withdrawn halfway through a hedging operation. To alleviate the problem, access to credit lines could be improved, for instance, by developing locally-based warehouses which can issue warehouse receipts, or by liberalizing foreign exchange, while refraining from direct subsidies. It would be important for international financial agencies to increasingly amplify the capacity to provide the necessary guarantees that would enable producers and traders in the region to hedge their positions on the existing exchanges. For example, the International Finance Corporation, a member of the World Bank group, has guaranteed commodity swaps involving developing-country corporations (World Bank, 1994, p.66).

It sometimes happens that in order to achieve the greatest potential trading interest ("liquidity") for futures contracts and to facilitate actual delivery at the determined locations, the commodities accepted for delivery against futures contracts are materials of significantly less commercial value than those supplied by an exporter. Any exporter/importer using futures must take care not only to understand the complex system of premiums and discounts, but also to see to it that the best interests of the industry are reflected in the contract specifications, delivery rules, trading hours and other institutional matters of exchange operations. In this sense, it would be advisable to make sure that the industry's interests are well represented to the board and committees of the exchanges.

One reason why so few producers in developing countries hedge their futures sales has to do in part with the fact that the usual size of the futures contract unit is more than the entire output of most individual producers. Any significant reduction in the size of that unit would probably make the costs of trading in futures too high. This is surely the case of the agricultural sector, but is not totally inapplicable to the mineral sector, where some small and medium-size firms refrain from futures trading because of these costs. On the other hand, the average costs of these operations are known to decline quite steeply with the volume of transactions. These features, taken together, suggest that to enable their individual producers to reduce risk via hedging, Governments should take advantage of schemes of cooperative hedging or encourage the private sector to hedge on their behalf. Large companies with worldwide credit-worthiness, for instance, should take full advantage of the flexibilities offered by dealing with a variety of brokers. The likelihood of their obtaining more credit lines at lower rates through diversified brokers could be passed on to smaller companies.

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