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Chapter II

THE FINANCIALIZATION OF COMMODITY MARKETS

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Chapter II

THE FINANCIALIZATION OF COMMODITY MARKETS

A. Introduction

The build-up and eruption of the current global financial crisis was paralleled by an unusually sharp increase and subsequent strong reversal in the prices of internationally traded primary commodities. Recent developments in commodity prices have been exceptional in many ways. The price boom between 2002 and mid-2008 was the most pronounced in several decades – in magnitude, duration and breadth. It placed a heavy burden on many developing countries that rely on food and energy imports, and contributed to food crises in a number of countries in 2007–2008 (*TDR 2008*, chap. II, section C). The price decline since mid-2008 stands out both for its sharpness and for the number of commodity groups affected. It was one of the main channels through which the dramatic slowdown of economic and financial activity in the major industrialized countries was transmitted to the developing world.

The strong and sustained increase in primary commodity prices between 2002 and mid-2008 was accompanied by the growing presence of financial investors on commodity futures exchanges. This financialization of commodity markets has caused concern that much of the recent commodity price developments – and especially the steep increase in 2007–2008 and the subsequent strong reversal – was largely driven by financial investors' use of commodities as an asset class.

Over the 78 months from early 2002 to mid-2008 the IMF's overall commodity price index rose steadily and nominal prices more than quadrupled. During the same period, UNCTAD's non-fuel commodity index tripled in nominal terms and increased by about 50 per cent in real terms. After peaking in July 2008, oil prices plunged by about 70 per cent within six months (which represents the largest percentage decline ever experienced over such a short period), while non-fuel prices fell by about 35 per cent from their peak in April 2008. Although considerable, this reversal corresponds to only about one seventh of the previous six-year increase, so that commodity prices have remained well above their levels of the first half of this decade. Although the timing differed from one commodity to another, both the surge in prices and their subsequent sharp correction occurred in all major commodity categories.

Much of the recent commodity price developments have been attributed to changes in fundamental supply and demand relationships (see chapter I, section A.2). However, the extreme scale of the recent changes in primary commodity prices, and the fact that prices increased and subsequently declined across all major categories of commodities, suggests that, beyond the specific functioning of commodity markets, broader macroeconomic and financial factors

that operate across a large number of markets need to be considered to fully understand recent commodity price developments. The depreciation of the dollar was clearly one general, albeit minor, cause of the surge in commodity prices. But a major new element in commodity trading over the past few years is the greater presence on commodity futures exchanges of financial investors that treat commodities as an asset class. The fact that these market participants do not trade on the basis of fundamental supply and demand relationships, and that they hold, on average, very large positions in commodity markets, implies that they can exert considerable influence on commodity price developments.

This chapter aims at enhancing understanding of how the speculative activities of financial investors that are active in both financial and commodity markets can influence price movements to higher or lower levels than those dictated by market fundamentals. Section B shows how commodity futures trading has come to be increasingly influenced by the participation of financial investors that have no interest in the physical delivery of primary commodities. Section C discusses the determinants of financial investors' investment decisions, while sections D and E address the effects of their growing involvement on price developments, and the higher costs to commercial users of hedging against commodity price risk. Section F suggests the need for broadening and strengthening supervision and regulation of commodity markets so as to improve the informational value of commodity price developments for producers and consumers, and section G concludes.

B. The growing interdependence of financial and commodity markets

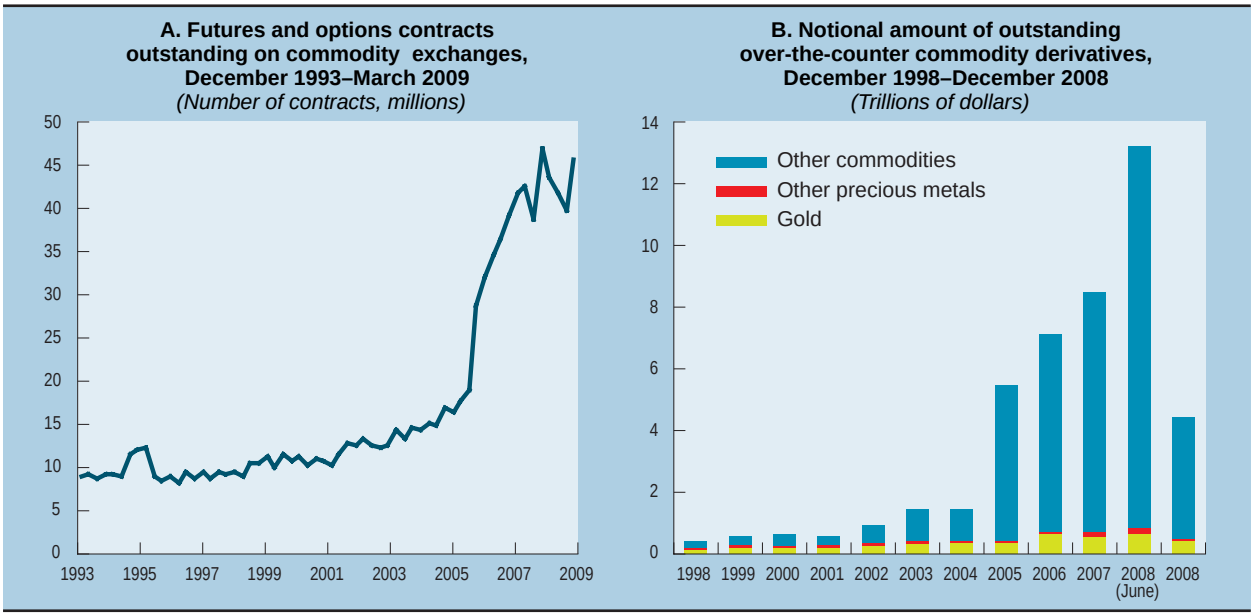
Commodity futures markets play an important role in price discovery and in the transfer of price risk from market participants that have an interest in the physical commodities (i.e. producers and consumers) to other agents that, driven by speculative motives, are prepared to assume the price risk. Traditionally, speculation relating to commodities has been based on information about demand and supply developments. The behaviour of market participants has been based on their perception of changes in these fundamental factors. However, in recent years an increasing number of financial investors have entered commodity futures markets. Motivated by portfolio diversification considerations that are largely unrelated to commodity market fundamentals, they regard commodities as an investment alternative to asset classes such as equities, bonds or real estate. They take positions in commodities as a group, based on their assessment of the risk-return properties of portfolios that contain a proportion of commodity futures relative to portfolios that contain only traditional asset classes.

The behaviour of financial investors on commodity markets is motivated by considerations that are largely unrelated to commodity market fundamentals.

One way financial investors can gain exposure on commodity markets is through spot market activities (i.e. buying and accumulating physical commodities in inventories). This strategy has probably contributed to the price increases in the relatively small markets for precious metals such as gold and silver (Koh, 2007). However, it is more difficult to pursue this physical market strategy for other commodities, especially because of the greater storage costs they entail.

Chart 2.1

FINANCIAL INVESTMENT IN COMMODITIES



Source: BIS, *Quarterly Review*, June 2009.

Another way investors gain exposure on commodity markets is by engaging in the markets for futures contracts or options. In futures contracts, the trader commits to buying or selling a commodity at a future date and at a pre-established price (the futures price). This contract may be traded later, so that the trader would not have to actually receive or deliver the commodity at the fixed time. Instead, the commitment would be transferred to other agents, who would then make a gain or loss depending on the changes in futures prices that may have occurred. When agents buy options, they gain the right (but not the obligation) to buy or sell a commodity at a future date and at a pre-established price, and they pay a premium to the agents who make the opposite commitment.

Trading volumes on commodity exchanges increased considerably during the recent period of substantial rises in commodity prices. The number of futures and options contracts outstanding on commodity exchanges worldwide rose more than threefold between 2002 and mid-2008 (chart 2.1A). During the same period, the notional value[1] of commodity-related contracts traded over the counter (OTC) (i.e. contracts traded bilaterally, and not listed on any exchange) increased more than 14-fold, to $13 trillion (chart 2.1B).[2] However, financial investments in commodities fell sharply starting in mid-2008. Some observers have taken this parallel development of commodity prices and financial investments in commodities as *prima facie* evidence of the role of large-scale speculative activity in driving commodity prices first up and then down.

Most financial investors in commodities take positions related to a commodity index. Two common indexes are the Standard & Poor's Goldman Sachs Commodity Index (S&P GSCI) and the Dow Jones-Union Bank of Switzerland Commodity Index (DJ-UBSCI) (previously called the Dow Jones-American International Group Commodity Index (DJ-AIGCI)).[3] These indexes are composites of futures contracts on a broad range of commodities (including energy products, agricultural products and metals) traded on commodity exchanges.[4] Several variables determine the returns on investments in commodity indexes (see box 2.1).

Financial investors engage in commodity futures markets for portfolio reasons. This is based on the belief that adding commodity futures contracts to

Box 2.1

FINANCIAL INVESTMENT IN COMMODITY INDEXES AND THE RELATIONSHIP BETWEEN FUTURES AND SPOT PRICES

Financial investment in commodity indexes is undertaken as part of a passive investment strategy (i.e. there is no attempt to distinguish between the good and bad performance of individual commodities). Financial investors gain exposure in commodity indexes by entering into a bilateral financial agreement, usually a swap, with a bank. They purchase parts in a commodity index from the bank, which in turn hedges its exposure resulting from the swap agreement through commodities futures contracts on a commodity exchange.

Financial investment in commodity indexes involves only "long" positions (i.e. pledges to buy commodities) and relates to forward positions (i.e. no physical ownership of commodities is involved at any time). Index funds buy forward positions often relating to futures contracts with a remaining maturity of about 75 working days (i.e. roughly three calendar months), which they sell as expiry approaches, at about 25 working days (or roughly one calendar month) prior to expiry of the contract, and use the proceeds from this sale to buy forward positions again. This means that investors that own, say, the November crude oil contract, will sell that contract and buy the December contract before delivery begins on the November contract. Then they will later "roll" from December into January, and so on. This process – known as "rolling" – is profitable when the prices of futures contracts are progressively lower in the distant delivery months (i.e. in a "backwardated" market) and negative when the prices of futures contracts with longer maturities are progressively higher (i.e. in a "contango" market).

Four variables determine the total return earned by financial investors in commodity indexes: spot return + roll yield + collateral return + recomposition yield, where the spot return reflects the spot price movements of the underlying commodities, the collateral return is the interest on the collateral[a] that the investors have to set aside as margin for investments in commodity futures positions, the recomposition yield arises from a periodic redefinition of the basket of commodities underlying a portfolio, and the roll yield is obtained from selling futures contracts that have an expiry date the month prior to the delivery month and using the proceeds to buy futures contracts with a longer maturity.

The roll yield is similar to the risk premium that speculators expect to earn by taking an opposite position to that of commodity producers that seek to hedge the price risk of their output. This risk premium corresponds to the difference between the current futures price and the expected future spot price at the time the position is taken. If the futures price is set below the expected future spot price, a purchaser of futures contracts (speculator) will generally earn the risk premium; by contrast, if the futures price is higher than the expected future spot price, a seller of futures contracts (hedger) will earn the premium. Assuming hedgers outnumber speculators, Keynes (1930) and Hicks (1939) – in their theory of "normal backwardation" – expected that, in general, the futures price would be lower than the expected future spot price, so that the risk premium would normally accrue to speculators.

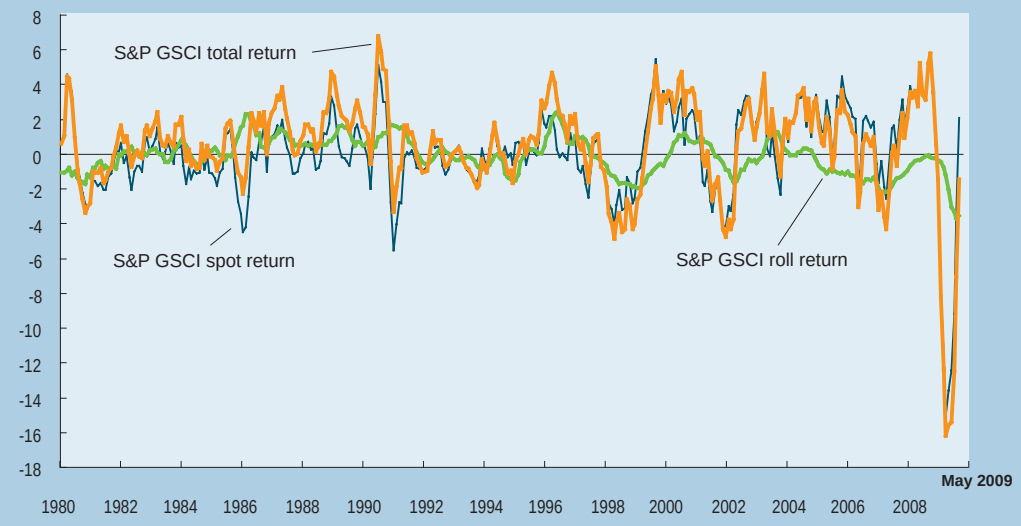
The roll yield differs slightly from this kind of risk premium because index traders do not hold futures contracts until their expiry. When the price of futures contracts depreciates near the delivery date, the roll yield is negative. Roll returns were positive during much of the 1980s and 1990s, but since 2002 they have mostly been negative. However, given the large spot returns during the commodity price hikes between 2002 and mid-2008, the total return was nonetheless positive during most of this period (see chart).

The above implies that the total return on investment in commodity indexes partly depends on the intertemporal relationship between futures and spot prices on commodity exchanges. This relationship is known from financial markets, but the difference is that commodity futures markets trade contracts on assets that incur storage and interest costs – often called "cost of carry". This cost implies that in order to

Box 2.1 (continued)

SPOT AND ROLL RETURNS ON COMMODITY INDEX INVESTMENTS, JANUARY 1980–MAY 2009

(Per cent)



Source: UNCTAD secretariat calculations, based on Bloomberg.

Note: The roll return is the discount or premium obtained by "rolling" positions in futures contracts forward as they approach delivery. The numbers shown in the figure approximate the roll return (calculated as the difference between excess and spot returns of the S&P GSCI) and are expressed as six-month moving averages. The excess return reflects the return on commodity futures price movements, while the spot return reflects changes in spot prices.

induce storage, futures prices and expected future spot prices must increase more than the cost of carry to compensate inventory holders for the costs associated with storage. However, the cost of storage must be weighed against the so-called "convenience yield" (i.e. the *a priori* unmeasurable utility of physically owning a particular commodity or the premium when the inventory is sold). Inventory holders have the option to sell commodities on the spot markets when market conditions tighten, or to dispose of a secure supply of the commodity, thus insuring themselves against the costs associated with supply disruption. The convenience yield tends to be higher when inventories are lower, as tighter market conditions confer greater benefits for the physical ownership of a commodity. It will increase sharply when inventories fall below the level of short-term consumption requirements.

The above elements can be combined to determine the term structure of commodity prices. The difference between contemporaneous spot and futures prices – often called "basis" – depends on the relative size of the cost of carry and the convenience yield. The negative of the basis can be expressed as follows:

$$F_{t,T} - S_t = Int_t + w_t - c_t$$

where $F_{t,T}$ is the futures price at date t for delivery at time T, S_t is the spot price at time t, Int_t is the interest cost, w_t is the storage cost, and c_t is the convenience yield. An upward sloping futures curve, a phenomenon known as "contango", implies that inventory holders are rewarded for the cost of carrying inventories. A downward sloping futures curve, a phenomenon known as "backwardation", indicates that the convenience yield exceeds the cost of carry.

It should be noted that the notion of backwardation, which relates to the comparison of contemporaneous spot and futures prices, differs from the concept of "normal backwardation" (mentioned above), which

Box 2.1 (concluded)

compares futures prices with expected future spot prices. From the latter perspective, the basis is determined by a risk premium, $\pi_{t,T}$, which corresponds to the difference between futures prices and expected future spot prices, and the expected appreciation or depreciation of the future spot price, $[E_t(S_T) - S_t]$. It can be expressed as:

$$F_{t,T} - S_t = [E_t(S_T) - S_t] - \pi_{t,T}$$

The risk premium will be positive, thus attracting more speculators to the market, to the extent that hedgers have net short positions and offer a risk premium to speculators with net long positions, and to the extent that hedging demand exceeds the net long positions of speculators. Moreover, the risk premium – and thus the gap between spot and futures prices – can be expected to rise when low inventories heighten the risk of price volatility.[b] Changes in traders' positions will usually indicate changes in expected future spot prices with attendant effects on the term structure of contemporaneous spot and futures prices.

A major purpose of futures contracts traded on commodity exchanges is to provide a way for hedgers to insure themselves against unfavourable movements in the future values of spot prices. To serve this purpose, speculators who take positions opposite to those of hedgers must collect information on the likely future movements of spot prices, so that the value of the futures contract is an unbiased estimate of the value of the spot price on the delivery date specified in the futures contract. Policymakers, especially central bankers, commonly base part of their decisions on this feature, as they use the price of commodity futures contracts as a proxy for the market's expectations of future commodity spot prices (Svensson, 2005; Greenspan, 2004).

By contrast, the value of futures contracts will not serve this price discovery purpose (i) if those taking speculative positions base their activities on information unrelated to the underlying supply and demand fundamentals on commodity markets, or (ii) if the size of their position is substantially larger than that of hedgers so that the weight of their position determines prices. Empirical evidence generally indicates that futures prices are less accurate forecasts than simple alternative models such as a random walk without drift (i.e. expecting no change from current spot prices). Indeed, Bernanke (2008) has highlighted the difficulty in arriving at a reasonable estimate of future commodity price movements based on signals emanating from commodity futures markets. He therefore emphasizes the importance of finding alternative approaches to forecasting commodity market movements. Thus, empirical evidence indicates that mechanisms that would prevent prices from moving away from levels determined by fundamental supply and demand factors – the efficient absorption of commodity-related information and sufficiently strong price elasticity of supply and demand – may be relatively weak on commodity markets.

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[a] Collateral is a position set aside by traders to ensure that they are able to fulfil their contractual commitments. During the lifetime of a futures contract, the clearing house of the concerned commodity exchange issues margin calls to adjust the amount of collateral so as to reflect changes in the notional value of traders' contractual commitments.

[b] Falling inventories signal the scarcity of the commodity for immediate delivery, which will cause spot prices to increase. Futures prices will also increase, but not by as much, because of expectations that inventories will be restored over time and spot prices will return to normal levels, and perhaps also because the risk premium rises. However, if inventories are slow to adjust, past demand and supply shocks will persist in current inventory levels.

their portfolio improves its overall risk-return characteristics: these contracts exhibit the same average return as investments in equities, but over the business cycle their return is negatively correlated with that on equities and bonds. Moreover, the returns on commodities are less volatile than those on equities or bonds, because the pairwise correlations between returns on futures contracts for various commodities (e.g. oil and copper, or oil and maize) traditionally have been relatively low (Gorton and Rouwenhorst, 2006).

Financial investors invest in commodity markets with a view to broadening their portfolios in order to diversify risk.

Contrary to equities and bonds, commodity futures contracts also have good hedging properties against inflation (i.e. their return is positively correlated with inflation). This is because commodity futures contracts represent a bet on commodity prices, such as those of energy and food products that have a strong weight in the goods baskets used for measuring current price levels. Also, futures prices reflect information about expected changes in commodity prices, so that they rise and fall in line with deviations from expected inflation. Furthermore, investing in commodity futures contracts tends to provide a hedge against changes in the exchange rate of the dollar. One reason for this may be the fact that most commodities are traded in dollars. Given that a depreciation of the dollar exchange rate reduces the purchasing power of commodity exports, exporters may attempt to increase commodity prices in dollar terms to compensate for any depreciation-related shortfalls in earnings. Commodity exporters may also diversify their reserve holdings by changing dollars into euros in order to reduce the exchange-rate risk associated with foreign-exchange reserves. This could explain why, between 2006 and 2008, the turning points in oil prices frequently mirrored those in the exchange rate of the dollar vis-à-vis the euro (Till, 2008: 33).

C. Problems with the financialization of commodity futures trading

Establishing a link between speculation and commodity price developments often meets with scepticism. This scepticism is based partly on the argument that financial investors only participate in futures and related derivative markets, and that they will affect spot prices only if they take delivery and hold the physical commodities in inventories. In relation to oil prices, for example, Krugman (2008) argues that speculative activity that drives prices above fundamental equilibrium prices will cause market imbalances and excess supply, which eventually must result in inventory accumulation. However, no inventory accumulation was observed during the sharp increase in oil prices in 2007–2008, so that, according to this reasoning, speculation cannot have played a role in the oil price hike.

However, arbitrage forces may change spot prices following a change in futures prices, without a significant increase in actual transactions. Since the short-run price elasticity of commodity supply and demand is extremely low, only very sharp and lasting price changes can be expected to trigger significant supply and demand responses and related changes in inventories. Moreover, the financialization of commodity trading appears to have led to greater price

volatility (see below), which is known to increase precautionary demand. This in turn implies that an increase in spot prices should not necessarily be associated with a decline in market demand and a resulting accumulation of inventories. Rather, the accumulation of inventories will occur only gradually and spot prices will overshoot during this process. This means that during periods of increased precautionary demand "there is no reason to expect a positive contemporaneous correlation between inventories and the precautionary demand component of the spot price" (Alquist and Kilian, 2007: 37).

Arbitrage forces may change spot prices following a change in futures prices, without a significant increase in actual transactions.

Finally, as noted by the IMF (2008a: 89), "data on commodity inventories are poor and lack global coverage". Inventory data suffer from at least three shortcomings: (i) the absence of a common database that would include comprehensive data for all commodities; (ii) conceptual questions relating to the definition of relevant inventories, given that, currently, data are available only for inventories held at delivery points (e.g. for industrial metals, in warehouses at the London Metal Exchange (LME), and for oil, in Cushing, Oklahoma), while there are no data for inventories that are held off exchange but could be made available economically at the delivery point at short notice; and (iii) information about inventories is often published with a time lag and subsequently revised (Gorton, Hayashi and Rouwenhorst (2007: 11). Overall, existing official inventory data are not reliable indicators in the debate on the relative impact of fundamentals and of financial investors on commodity prices.

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More fundamental scepticism with regard to the link between speculation and commodity price developments is based on the "efficient market" hypothesis. According to this view, prices perfectly and instantaneously respond to all available information relevant to a freely operating market. Market participants continuously update their expectations from inflowing public and private information. This means that prices will move either when new information becomes publicly available (e.g. when harvest forecasts or changes in oil production are announced), or when private information is reflected in prices through transactions.

There are at least two reasons why the efficient market hypothesis may fail in relation to commodity markets, at least in the short run. First, changes in market positions may occur in response to factors other than information about market fundamentals. Second, individual market participants may take position changes that are so large relative to the size of the market that they move prices (the so-called "weight-of-money" effect).

To examine how different sorts of information may influence market positions, it is useful to group market participants into three categories based on differences in their rationale for position taking: informed traders, uninformed traders and noise traders.

Informed traders rely on information about current market fundamentals and on forecasts of future market conditions. However, making an informed market assessment faces two difficulties: (i) medium- and longer-term commodity supply and demand conditions are subject to considerable uncertainty (for example because of unknown depletion rates of non-renewable resources and unknown effects of climate change on agricultural production); and (ii) inventory data, which provide valuable signals for short-term price expectations, suffer from significant measurement errors, as already mentioned, and data on current global commodity supply and demand conditions are published with large time lags and are frequently revised. Therefore, informed traders must formulate price expectations on the basis of partial and uncertain data. This may lead them to focus on a small number of available signals, with the attendant risk of herding and copying the behaviour of others. Alternatively, it may cause traders to consider past price movements themselves as a good guide to future developments.

Noise traders trade for broader strategic reasons, and make position changes irrespective of prevailing conditions on commodity markets. On commodity markets, index traders behave like noise traders: they change their total positions in commodities based on information relating to other asset markets but which has no relevance for commodity markets. In addition, they tend to change the composition of their positions in commodities in response to different price changes for different commodities with a view to maintaining a specific commodity's predetermined weight in a commodity index. This makes it difficult for other traders to judge whether market prices are changing because of the position changes of the noise traders or as a response to new information about market fundamentals.

Uninformed traders, who glean information on future price developments from current and past price movements, are particularly exposed to such situations. They follow what may be called "momentum strategies" – buying commodities that have experienced rising prices and selling those that have underperformed. Uninformed traders observe price movements but are unable to identify whether price changes were caused by informed or noise trading. Hence, they risk misinterpreting a noise trader's position change as a genuine price signal and, by incorporating this signal into their trading strategy, perpetuate the "informational" value of this signal across the market. Given that uninformed traders often use similar trend identification techniques, they run the risk of collectively generating the trends that they then individually identify and follow. On commodity markets, money managers, such as pension funds, behave like momentum traders.

One effect of momentum trading that uses statistical analysis tools is that the resulting changes in positions can be anticipated by other market participants. Thus, it provides continued arbitrage possibilities. Speculators will try to benefit from such profit opportunities. Traders working for financial institutions will do this in order to meet their institutions' short-term performance targets or reporting requirements, even if doing so implies going against signals from long-term fundamental supply and demand factors (de Long et al., 1990). This can lead to speculative bubbles. The same kind of snowball effect can be created by commodity trading by financial investors when they react to signals from other, non-commodity markets. This can occur if the price changes stemming from their position changes feed into momentum trading strategies. Momentum trading on commodity markets is not a new phenomenon. However, the trend towards greater financialization of commodity trading is likely to have increased the number and relative size of price changes that are unrelated to market fundamentals.

It is highly probable that these mechanisms, which lead to speculative bubbles, have been at work on commodity futures exchanges, given the correlation between the trading activities of index traders and those of momentum-trading money managers. Such a correlation during the period January 2005–August 2008 has been documented for agricultural markets such as cotton, maize, soybeans and wheat. On the other hand, the market presence of these trader categories in natural gas and crude oil markets has displayed an inverse relationship (Informa Economics, 2009).[5]

Financialization of commodity trading appears to have increased price changes that are unrelated to market fundamentals.

This difference between agricultural and energy markets also occurs with respect to the correlation between price volatility and the market presence of these two trader categories. For all the examined agricultural products, except soybeans, the trading activity of both these trader categories was observed to be positively correlated with price volatility, while the presence of index traders in the gas and oil markets was seen to be inversely correlated with price volatility. Given that price volatility was significantly higher in the oil and gas markets than in the agricultural markets (Informa Economics, 2009, Part 3: 5–12), and that these energy markets are generally much more liquid than agricultural markets, this finding suggests that on energy markets money managers could rely on a larger number of, and stronger, price signals, and were therefore less exposed to "wrong" signals coming from index traders. Hence, the impact of position taking by index traders on momentum trading has most likely been concentrated in agricultural markets.

A second reason why the efficient market hypothesis may fail on commodity markets relates to

the fact that the number of counterparties (especially those with an interest in physical commodities) and the size of their positions are less than perfectly price elastic. Thus, large orders may face short-term liquidity constraints and cause significant price shifts. This implies the possibility of a temporary, or even persistent, "weight-of-money" effect, which is particularly high in commodity markets where the short-run price elasticity of both production and consumption is very low, and hence the physical adjustment mechanisms of markets are weak. As a result, in tight markets with minimum inventory levels, the relevance of expectations based on longer-term fundamental factors sharply declines, which makes it difficult to determine a market price solely on the basis of fundamentals. "This indeterminacy allows weight of the speculative money to determine the level of prices" (Gilbert, 2008a: 19).

The weight-of-money effect relates primarily to index-based investment. One reason for their relatively large size relates to the fact that index traders take positions across many commodities in proportions that depend only on the weighting formula of the particular index, independent of the specific market conditions for the individual commodities contained in the index. Hence, large positions taken by index traders implies a significant risk that the weight-of-money effect will exacerbate the price impact of trading in response to factors other than information about commodity market fundamentals.

The impact of index traders on momentum trading seems to have been concentrated in agricultural markets.

The analytical distinction between informed, uninformed and noise traders (table 2.1) is difficult to apply in practice. The Commodity Futures Trading Commission (CFTC) – the institution mandated to regulate and oversee commodity futures trading in the United States – publishes trading positions in anonymous and summary form in its weekly *Commitments of Traders* (COT) reports. The CFTC classifies market participants as "commercial" if they are hedging an existing exposure, and as "non-commercial" if they are not.[6] However, it is widely perceived that, as a consequence of the growing diversity of futures market participants and the greater complexity of their activities, the COT data may fail to fully represent futures market activity (CFTC, 2006a). This is because those hedging, and therefore defined as commercial market participants, have normally been considered entities involved in the production, processing or merchandising of commodities. However, many market participants who report positions as hedges, and who therefore fall under the "commercial" category, are in fact commodity swap dealers, such as commodity index traders, who have no interest in the physical commodities. If their underlying positions were held directly as commodity futures contracts (rather than being intermediated through OTC swap agreements), they would be categorized as "non-commercial".

Responding to these concerns, in 2007 the CFTC started to issue supplementary data on the positions of commodity index traders for 12 agricultural commodities (CFTC, 2006b).[7] The index trader positions include both pension funds, previously classified as non-commercial traders, and swap dealers, that had been classified as commercial traders. According to the CFTC (2009), commodity index traders generally replicate a commodity index, but may belong to either the commercial or non-commercial category.

A primary concern often expressed with respect to the financialization of commodity trading relates to the magnitude of index trader activity, combined with the fact that such traders tend to take only long positions. Table 2.2 provides evidence of the relative share of both long and short positions held by different trader categories in those agricultural markets for which the CFTC has been publishing disaggregated data for January 2006 onwards.[8] The data clearly show that index funds are present almost exclusively in long positions,[9] and that they account for a large portion of the open interest in some food commodity markets.[10] Indeed, over the period 2006–2008, the relative shares of index traders in total long positions in cotton, live cattle, feeder cattle, lean hogs and wheat were significantly larger than the positions of commercial traders in those commodities, while they were roughly of equal size for maize, soybeans and soybean oil.

While the number of index traders is relatively small, their average long position is very large (middle panel of table 2.2), sometimes more than 10 times the size of an average long position held by either

Table 2.1

COMMODITY FUTURES TRADING BEHAVIOUR: TRADITIONAL SPECULATORS, MANAGED FUNDS AND INDEX TRADERS

	Traditional speculators	*Managed funds*	*Index traders*
General market position	Active positions on both sides of the market; able to benefit in both rising and declining markets	Active, often large, positions on both sides of market; able to benefit in both rising and declining markets; relatively opaque positions	Passive, large and long-only positions in swap agreements with banks, which in turn hold futures contracts to offset their short positions; able to benefit only in rising or backwardated (spot price>forward price) markets; transparent positions
Position taking behaviour	React to changes in commodity market fundamentals (supply, demand, inventories); mostly trade in one or two commodities of which they have intimate knowledge; leveraged positions	Some (e.g. hedge funds) conduct research on commodity-market fundamentals and thus react to changes in those fundamentals. Others (e.g. commodity trading advisers) mostly use statistical analyses (trend identification and extrapolation, automatic computerized trading), which extract information from price movements. They thereby risk misinterpreting noise trader position taking for genuine price information, engaging in herd behaviour and causing snowball effects; leveraged positions	Not interested in fundamentals of specific commodity markets but may have views on commodities as a whole; relative size of positions in individual commodities determined by an index weighting formula; idiosyncratic position taking such as rolling at predetermined dates; position changes are relatively easy to predict; fully collateralized positions
Impact on liquidity	Improve liquidity	Active, large positions can improve liquidity and make hedging easier for large commercial users. In periods of rapid and sharp price changes, large positions are a "liquidity sponge", making it difficult for hedgers with commercial interests to place orders	Passive, large positions act as a "liquidity sponge"
Reaction to sharp price changes	May be taken by surprise if price changes are unrelated to fundamentals; can be forced out of the market if they lack liquidity to meet margin calls triggered by sharp price increases	Taking and closing positions are often automatically triggered by computer programs; risk of causing a snowball effect	Different price developments for individual commodities require recomposition of relative investment positions to preserve a predetermined index weight pattern; sharp price declines may cause disinvestment
Reaction to changes on other markets	Operate only in commodity markets; normally concentrate on one or a few commodities, and thus react little to developments in other markets	Operate across different asset classes. Commodities tend to have a fixed weight in managed fund portfolios, so that price movements in other markets can lead to position changes in commodity markets	Operate across different asset classes. Potentially strong links between commodity futures market activity and developments on equity and bond markets, in two ways: (i) risk-return combinations in other asset classes can become more attractive, causing a withdrawal from commodity markets; (ii) margin calls on other investments can trigger closing of positions in commodities and accelerate contagion across asset classes
Classification in CFTC Commitment of Traders Reports	Non-commercial user category	Mostly in non-commercial user category	Mostly in commercial user category

Source: UNCTAD secretariat.

Table 2.2

FUTURES AND OPTIONS MARKET POSITIONS, BY TRADER GROUP, SELECTED AGRICULTURAL COMMODITIES, JANUARY 2006–DECEMBER 2008

(Per cent and number of contracts)

	Long positions							
	Percentage share in total positions				Average position size			Speculative limits
Commodity	Non-commercial	Commercial	Index	Non-reporting	Non-commercial	Commercial	Index	
Maize	42.4	23.4	22.8	11.3	1 134	1 499	16 260	22 000
Soybeans	42.1	20.4	25.2	12.2	590	1 052	6 024	10 000
Soybean oil	38.0	28.4	23.8	9.8	790	1 719	4 418	6 500
Wheat, CBOT	39.0	12.3	41.1	7.5	553	964	8 326	6 500
Wheat, KCBOT	38.1	23.4	21.0	17.5	680	632	1 816	6 500
Cotton	41.0	20.1	30.7	8.3	363	1 010	4 095	5 000
Live cattle	39.3	12.0	39.7	9.0	580	409	4 743	5 150
Feeder cattle	42.5	15.7	24.6	17.2	258	162	469	1 000
Lean hogs	36.3	8.7	43.8	11.3	419	712	3 983	4 100
	Short positions							
	Percentage share in total positions				Average position size			Speculative limits
Commodity	Non-commercial	Commercial	Index	Non-reporting	Non-commercial	Commercial	Index	
Maize	34.7	47.2	1.2	16.9	618	2 469	1 579	22 000
Soybeans	36.4	44.6	1.2	17.8	365	1 696	736	10 000
Soybean oil	29.1	63.2	0.9	6.7	512	3 385	720	6 500
Wheat, CBOT	41.7	42.3	3.0	12.9	554	2 124	1 218	6 500
Wheat, KCBOT	20.4	56.0	0.5	23.1	378	1 123	221	6 500
Cotton	39.8	54.1	1.0	5.1	380	2 706	496	5 000
Live cattle	34.5	43.8	0.7	21.0	456	879	487	5 150
Feeder cattle	34.0	20.9	1.0	44.2	166	150	213	1 000
Lean hogs	38.3	43.1	0.8	17.9	405	1 952	353	4 100

Source: UNCTAD secretariat calculations, based on data from CFTC; speculative limits from Sanders, Irwin and Merrin (2008: 25).
Note: Following the methodology applied by Sanders, Irwin and Merrin (2008), spread positions were added to both long and short positions for the percentage shares in total positions. Average size of spread positions is not reported here.
CBOT = Chicago Board of Trade.
KCBOT = Kansas City Board of Trade.

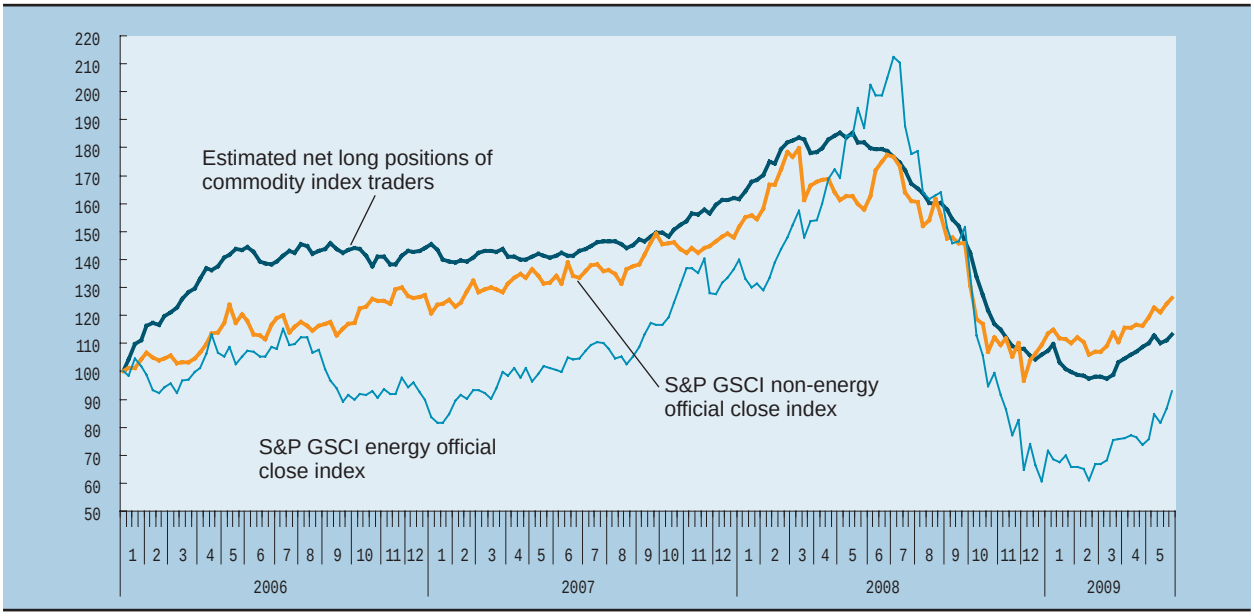
commercial or non-commercial traders. Positions of this order are likely to have sufficiently strong financial power to influence prices (Capuano, 2006). As a result, speculative bubbles may form, and price changes can no longer be interpreted as reflecting fundamental supply and demand signals. All of this can have an extremely detrimental effect on normal trading activities and market efficiency, despite position limits that exist to contain speculation.[11]

During the period 2006–2008, index traders actually exceeded speculative position limits in wheat contracts on the Chicago Board of Trade (CBOT), and for other commodities they came much closer to these limits than did the other trader categories (right-hand panel of table 2.2). This is perfectly legal, as index traders are generally classified as commercial traders, and therefore are not subject to speculative position limits. But, as noted by Sanders, Irwin and Merrin

Chart 2.2

ESTIMATED INDEX TRADER POSITIONS AND COMMODITY PRICES, JANUARY 2006–MAY 2009

(Index numbers, January 2006 = 100)



Source: UNCTAD secretariat calculations, based on Bloomberg; Goldman Sachs; and CFTC.
Note: The positions of commodity index traders are estimated based on the January 2006 weights of both the S&P GSCI and DJ-UBSCI, and index trader positions reported in the CFTC's Commodity Index Trader Supplement.

(2008: 8), "it does provide some indirect evidence that speculators or investors are able to use … [existing] instruments and commercial hedge exemptions to surpass speculative limits".

While the COT reports cover only 12 agricultural commodities, the data which they provide can be used to gauge the importance of index trading more generally. One way of making such an estimation is to assume that: (i) all index traders follow the energy-heavy S&P GSCI and the agriculture-heavy DJ-UBSCI, with an imposed fixed market share of 50 per cent each in the S&P GSCI and the DJ-UBSCI; and (ii) the shares of the specific commodities within each of the two indexes have remained unchanged since January 2006 (i.e. when the COT data began to be collected).[12] To prevent different price movements for different commodities from unduly influencing the results, the estimation is based on data on the number of contracts, and is expressed as index numbers. It should be noted that it is a conservative estimate of the size of financial investments in commodities, because it only relates to index trading but does not include positions taken by pension and hedge funds, investments in other vehicles (such as commodity mutual funds, exchange-traded funds and notes), equities of commodity companies and direct physical holdings. Neither does it include similar contracts that are traded over the counter, or trading activities outside the exchanges that are overseen by the CFTC.

The estimation suggests that the size of net long positions of index traders on commodity markets almost doubled between January 2006 and May 2008 (see chart 2.2). Index trader positions recorded sharp rises in the first quarter of 2006 and between the fourth quarter of 2007 and the second quarter of 2008, while they fell sharply in the third and fourth quarters of 2008. The chart also shows that the evolution of non-energy commodity prices is strongly correlated with that of index trader positions (the correlation coefficient being 0.93 for the period January 2006–June 2008), while the correlation between energy prices and index trader positions is somewhat weaker (the correlation coefficient being 0.84).

Correlation alone does not indicate causation. But there is little reason to believe that price changes caused position changes. On the contrary, given that index traders tend to follow a passive trading strategy, it is most likely that position changes caused price changes. Overall, the chart indicates that the effect of position taking by index traders appears to have been particularly pronounced in the smaller commodity markets, such as for food products, rather than in the much publicized energy markets. The following section sheds more light on this.

In sum, commodity futures exchanges do not function in accordance with the efficient market hypothesis. Rather, they function in such a way that commodity prices may deviate, at least in the short run, quite far from levels that would reliably reflect fundamental supply and demand factors. Financial investors that do not trade based on commodity market fundamentals have gained considerable weight in commodity markets. Given that commodity trading is based on partial and uncertain data on only a small number of signals, it is likely that large-scale financial investments provide price impulses. The herd behaviour of many commodity market participants can reinforce such impulses, which will persist if the short-term inelasticity of supply and demand prevents an immediate response that would push prices back to levels determined by fundamentals. Thus the traditional mechanisms – efficient absorption of information and physical adjustment of markets – that have normally prevented prices from moving away from levels determined by fundamental supply and demand factors have become weak in the short term. This heightens the risk of speculative bubbles occurring.

The financialization of commodity markets has weakened their efficient use of information and physical adjustment mechanisms ... this heightens the risk of speculative bubbles occurring.

D. The impact of financialization on commodity price developments

1. *Commodity prices, equity indexes and exchange rates*

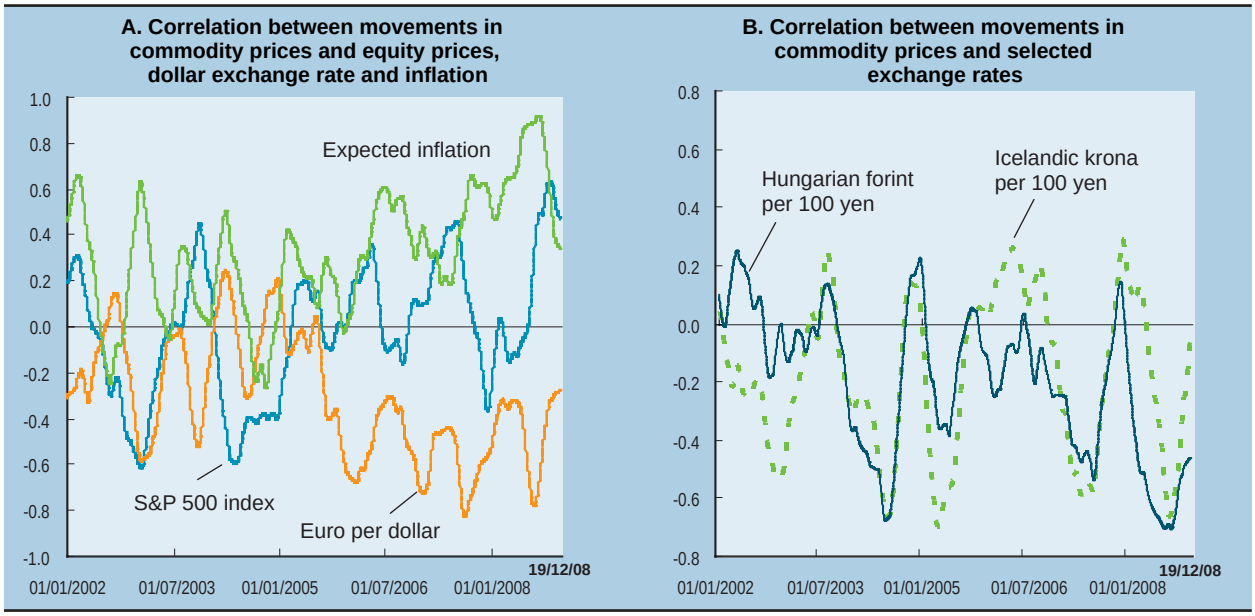
As already mentioned, financial investors in commodity markets aim to diversify their asset portfolios and/or hedge inflation risk. Their decisions to invest in commodities thus depend on broad-based portfolio considerations that also include the risk and return characteristics of other asset classes, including equities, bonds and exchange rates.

There is substantial historic evidence of the improved risk-return characteristics of portfolios that include commodity futures contracts in addition to equities and bonds. Gorton and Rouwenhorst (2006), for example, provide such evidence for the period 1959–2004. Investment in commodities appears to have been a particularly effective hedge against inflation and dollar depreciation since 2005, as the correlation between these two variables and commodity prices was much higher during the period 2005 to early 2009 than in previous years (chart 2.3A).

By contrast, there are indications that commodity prices, equity markets and the exchange rates of currencies affected by carry trade speculation[13] moved in tandem during much of the period of the commodity price hike in 2005–2008, and in particular during the subsequent sharp correction in the second

Chart 2.3

CORRELATION BETWEEN MOVEMENTS IN COMMODITY PRICES AND SELECTED FINANCIAL VARIABLES, JANUARY 2002–DECEMBER 2008



Source: UNCTAD secretariat calculations, based on Bloomberg.
Note: The data shown are six-month moving averages of 60-day rolling correlations between the S&P GSCI and the respective financial variable. Expected inflation is the difference between nominal and real United States 10-year bonds.

half of 2008. Commodity and equity prices were largely uncorrelated between 2002 and 2005, but were positively correlated during much of the period 2005–2008 (chart 2.3A). There has also been a strong correlation of commodity prices – particularly since 2004 – with the exchange rate of carry trade currencies such as the Icelandic krona and the Hungarian forint (chart 2.3B). This correlation was particularly strong during the unwinding of speculative positions in both currency and commodity markets during the second half of 2008 (UNCTAD, 2009: 28). Commodity index traders started unwinding their positions in commodities because their swap agreements with banks began to be exposed to significantly larger counterparty risks, while managed funds started unwinding their exposure in commodities when their leveraged positions faced refinancing difficulties.

The close correlation between commodities and other asset classes during the second half of 2008 suggests that financial investors may have had a strong influence on commodity prices.

Taken together, this evidence for the past few years indicates that, relative to the historic importance of strategic diversification considerations, tactical reasoning may recently have played a greater role for financial investors in commodities. Indeed, the search for higher yields through commodities trading may have been based on the illusion of risk-free profit maximization, given the historic diversification and hedging characteristics of financial investment in commodities. Financial investors started to unwind their relatively liquid positions in commodities when their investments in other asset classes began experiencing increasing difficulties. This strong correlation between commodities and other asset classes during the second half of 2008 suggests that financial investors may have strongly influenced commodity price developments.

2. Position taking and price developments

To gauge the link between changes in the positions of different trader categories and price changes, chart 2.4 shows, for the period January 2002–May 2009, net long non-commercial positions for crude oil, copper, wheat, maize, soybeans and soybean oil, as well as the net long index-trader positions for wheat, maize, soybean and soybean oil, for which separate data from January 2006 onwards began to be published by the CFTC. The chart confirms that market participants in the commercial category account for an overwhelming proportion of index trader positions (see also table 2.2).

However, chart 2.4 provides only scant evidence of a correlation between position and price changes.[14] While there clearly are periods and commodities where positions and prices have moved together, especially during the recent downturn and occasionally during the previous price upturn, there are other times when positions have not risen during periods of rapid price appreciation. For example, in the wheat market there was no increase in either non-commercial positions or index trader positions during the steep price increase from mid-2007 to the end of the first quarter of 2008. By contrast, during the same period there appears to have been a positive correlation between market positions and prices in the maize and soybean markets, while the evidence is mixed for the soybean oil market.

For oil and copper, for which separate data on index trader positions are not available, non-commercial positions declined along with prices in the second half of 2008. On the other hand, evidence for the earlier price increase does not suggest a correlation between non-commercial positions and prices: non-commercial copper positions declined during the period of the sharpest price increases – roughly from the beginning of 2004 through mid-2006. For oil, non-commercial positions exhibited strong volatility, even as oil prices rose almost continuously from the beginning of 2007 through the second quarter of 2008, by which time net oil positions had dropped roughly to zero.

Since the beginning of 2009, there has been an increase in the net long positions of both index traders and non-commercial participants excluding index traders (chart. 2.4). This may indicate that after the strong decline in their positions during the second half of 2008, both these groups are once again taking large positions on commodity markets.

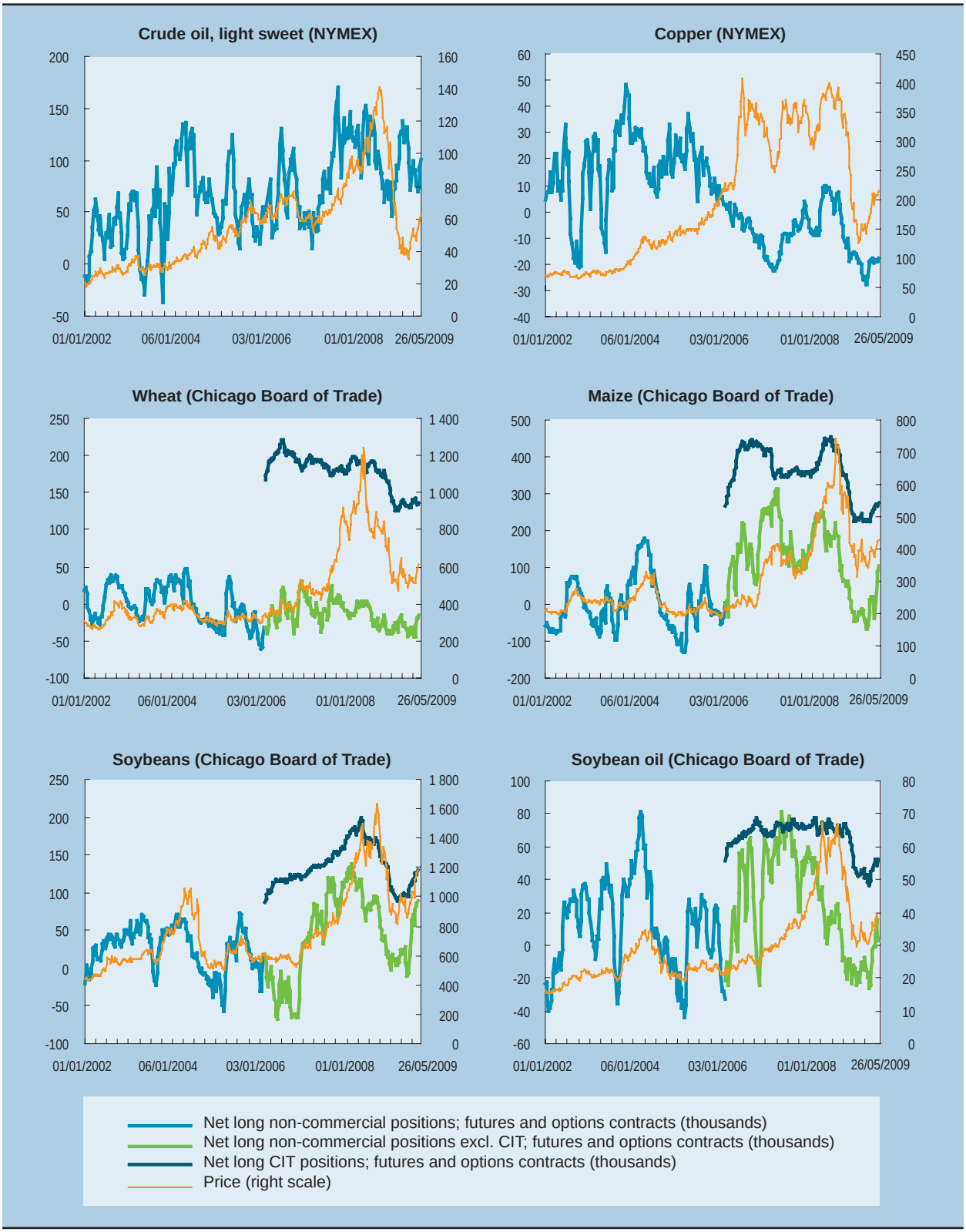
While the evidence in chart 2.4 does not point to a long-standing correlation between position and price changes, for most commodities some correlation is present over sub-periods, as peaks and turning points seem to occur around the same time across the two series. This suggests that any analysis of a relationship between position and price changes may be sensitive to the choice of time period.[15]

Generally, Granger causality tests, which examine causal lead and lag dynamics between changes in the positions of financial investors on commodity futures exchanges and changes in commodity prices, have not found evidence of a systematic impact on prices of positions taken by non-commercial traders. However, they have tended to find a statistically significant causal relationship between the movement of commodity futures prices and measures of position changes (see, for example, IMF, 2008b). However, the results of these studies suffer from a number of data problems. These include the aggregation of trader positions across maturities, the fact that weekly data cannot identify very short-term effects, even though intra-week trading activity may be significant (for example when index traders roll over their positions), and the fact that they usually concentrate on non-commercial positions thereby ignoring the positions of index traders.[16]

Using Granger causality tests to examine the effects of index-based investments on futures prices for grains on the Chicago Board of Trade, and CFTC's supplementary data reports in order to distinguish between positions held by index investors and those of other traders, Gilbert (2008a) found significant and persistent effects from index-based investments on the soybean market over the period February 2007–August 2008 (also apparent in chart 2.4), but failed to find such effects for maize, soybean oil or wheat futures. Investigating the same hypothesis in relation to the IMF food commodity price index using monthly data for the period April 2006–August 2008, Gilbert (2008b) found evidence that index investments in agricultural futures markets had raised food commodity prices. He explained this by the tendency of financial investors to look at the likely returns on commodities as an aggregate asset class, and not at likely returns on specific commodities.

Chart 2.4

FINANCIAL POSITIONS AND PRICES, SELECTED COMMODITIES, JANUARY 2002–MAY 2009

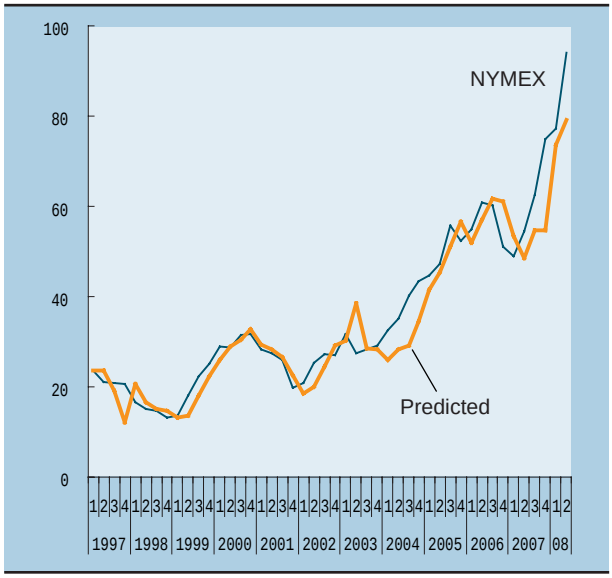


Source: UNCTAD secretariat calculations, based on Bloomberg; and CFTC.
Note: CIT = commodity index traders. Price refers to $/barrel for crude oil, cents/bushel for wheat, maize and soybeans, and cents/lb for copper and soybean oil.

Chart 2.5

ACTUAL AND PREDICTED CRUDE OIL PRICES, 1997–2008

(Dollars per barrel)



Source: Kaufmann et al., 2008; and private communication from RK Kaufmann.

This may have increased price correlations across markets and transmitted upward price movements in the energy and metals markets to the agricultural commodities markets. Gilbert concluded that, overall, "there is weak evidence that index investment may have been partially responsible for raising at least some commodity prices during the recent boom" (Gilbert, 2008a: 24).

Causal analysis of price formation for specific commodities is usually undertaken with the help of structural econometric models that incorporate both the role of current fundamental supply and demand factors and expectations about the future development of those factors. These models enable a distinction to be made between the relative impact of the fundamental factors and financial investments on price developments.

Kaufmann et al. (2008) have attempted to explain oil price developments on the basis of supply and demand levels, refinery capacity and expectations which provide an incentive for inventory storage that bolsters demand.[17] Crude oil prices predicted by the model were fairly close to actual prices until about mid-2007, when the predicted prices began to grow rapidly but the actual prices increased even more rapidly and started to exceed the predicted prices by a substantial margin (chart 2.5). This result suggests that fundamental supply and demand factors pushed stocks downwards and prices upwards starting from 2003, but in 2007-2008 prices rose above their fundamental levels.[18]

3. Statistical properties of price developments

(a) Price volatility

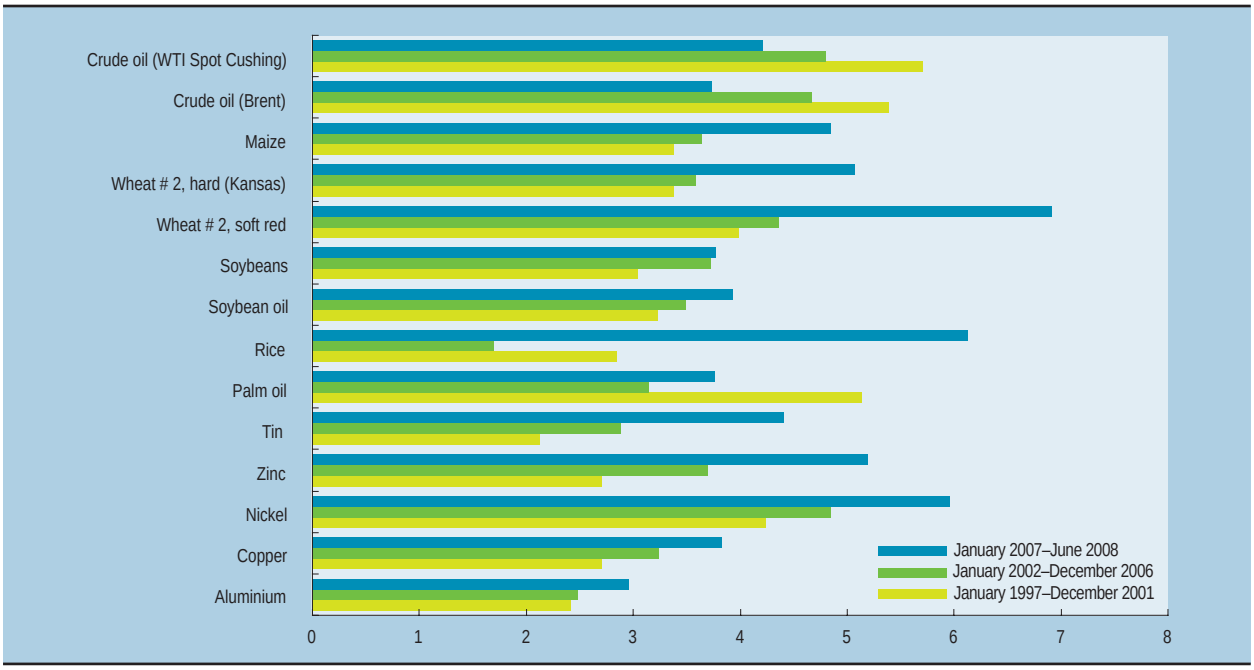
Price volatility is a key feature of commodity markets; indeed, annual price changes sometimes exceed 50 per cent (chart 2.4). In addition to reasons particular to each commodity, the low short-run price elasticity of both supply and demand is the main reason for sharp price fluctuations. As a result, price changes tend to overshoot any supply and demand shock.

It is possible to gauge how the greater presence of financial investors on commodity exchanges has affected commodity price volatility by examining the standard deviation of weekly price changes (chart 2.6). During the period 1997–2001, commodity price developments were relatively smooth and financial investments in commodity markets were low. Booms in commodity prices and financial investments started roughly in 2002, commodity prices and index trader investments sharply increased in 2007 and peaked roughly in mid-2008. This analysis therefore distinguishes three periods: January 1997–December 2001, January 2002–December 2006, and January 2007–June 2008. The chart reveals that price volatility was highest in the third period for all commodities except oil, and for most of the commodities it was lowest in the first period. The fact that price volatility also increased for commodities that are not included in the major commodity indexes, such as rice and palm oil, may suggest that factors other than the financialization of commodity markets must have caused the increase in price volatility of exchange-traded commodities. However, there are clearly substitution effects between commodities of the two groups in terms of both production and consumption, as between wheat

Chart 2.6

COMMODITY PRICE VOLATILITY, SELECTED COMMODITIES AND PERIODS

(Per cent)



Source: UNCTAD secretariat calculations, based on Thomson Financial Datastream.
Note: Volatility is measured as the standard deviation of 12-month moving averages of weekly price changes.

and rice, and between palm oil on the one hand and soybean oil and crude oil on the other.

Time-series evidence based on daily price data for the period January 2005–August 2008 also shows that price volatility increased, except for crude oil (Informa Economics, 2009, part 3). What is more, this examination of non-public data indicates that positions taken by money managers, and in particular those taken by index traders, were positively correlated with price volatility in agricultural markets, as mentioned earlier. This speculative activity may well have been attracted by higher volatility. However, given that index traders generally follow a passive trading strategy, it is more likely that it was an increase in their activity that caused greater price volatility. Taken together, the evidence suggests that the growing participation of financial investors in commodity markets has increased price volatility.

The evidence suggests that the greater involvement of financial investors in commodity markets has increased price volatility.

(b) Price co-movements

The financialization of commodity markets is likely to have caused a greater co-movement of prices across individual commodities, because financial investors generally lack commodity-specific knowledge and allocate funds to commodities by investing in a commodity index. Given that various commodities are included (according to some specified weights) in such indexes, the entire range of commodities is affected by changes in the prices of other asset classes. This triggers a change in the exposure of financial investors in commodities. Moreover, some commodity categories, such as energy and especially oil, often have a much greater weight in commodity indexes than, for example, food products. As a result, changes in energy markets based on actual or expected market conditions may be transmitted to other commodity markets, even though there may

have been no change in the fundamentals of those other markets.

A further examination of the three sub-periods cited above (January 1997–December 2001, January 2002–December 2006, and January 2007–June 2008) reveals an increase in the co-movement of all the commodities (listed in table 2.3) with oil prices between the first and the two subsequent periods. Indeed, there was a continuous increase in their co-movements over the three time periods, except for aluminium and rice between the first and second period, and nickel and zinc between the second and third period.

The greater co-movement with oil prices is particularly striking for the food items in the table: their price movements tended to have a very low, or even negative, correlation with those of oil in the first period. This could reflect the greater effect of oil price changes on food transport and production costs. However, Mitchell (2008) estimates that the increase in energy and transport costs combined raised production costs in the United States agricultural sector by only 15–20 per cent. Part of the greater co-movement between oil and food prices may also be due to the diversion of food crops – particularly maize in the United States and oilseeds in Europe – into biofuel production. However, Gilbert (2008a: 15) examines the link between crude oil, biofuels and food prices and concludes that "there is as yet little econometric evidence that can substantiate the claim that the oil price and biofuel demand are driving food commodity prices". The co-movement between oil prices and the prices of other commodities was extremely high in the period July 2008–December 2008 (table 2.3, fourth panel), during which the strong price correction occurred. This may be partly due to the generally worsened economic outlook during that period. However, it is likely that most of this increased co-movement was caused by the withdrawal of index traders from commodity markets and the associated deleveraging of their energy-heavy futures positions across the different commodities. Moreover, the co-movement of prices of food items strongly declined (table 2.3). Taken together, this evidence suggests that the greater impact of oil price movements on food prices may have been due to the financialization of commodity futures trading.

The greater impact of oil price movements on food prices may have been due to the financialization of commodity futures trading.

(c) *Extrapolative behaviour and speculative bubbles*

There is a strong probability of speculative bubbles occurring on commodity markets. This is because short-term price effects resulting from changes in index traders' positions may be misinterpreted by other traders as incorporating new market information, as already mentioned. More importantly, in the presence of uninformed traders that use statistical analyses, such as trend extrapolation, to determine their position taking, such short-run effects may well give rise to "explosive extrapolative behaviour" that causes speculative bubbles (Gilbert, 2008a, b).[19]

Such behaviour was found on the market for non-ferrous metals over the period February 2003 to August 2008, during which ten months of explosive behaviour were detected (Gilbert, 2008a). Similar results were obtained for Chicago grain markets in the period 2006–2008, including numerous instances of explosive behaviour of soybean oil prices (Gilbert, 2008b).[20] The finding of explosive behaviour of soybean and soybean oil prices is of particular importance because of the pivotal role of soybeans as substitutes for wheat and maize in production, of other vegetable oils and animal feedstuffs in consumption, and of crude oil in energy. Taken together, these results indicate that explosive extrapolative behaviour is widespread in commodity futures markets, and that this may have contributed to price volatility in recent years. The evidence also suggests "that the efficient markets view that uninformed speculation has no effect on market prices and volatility should be rejected" (Gilbert, 2008a: 21).

4. Conclusions

In sum, the above findings suggest that part of the commodity price boom between 2002 and mid-2008, as well as the subsequent sharp decline in commodity prices, were due to the financialization of commodity markets. Taken together, these findings support the view that financial investors have accelerated and amplified price movements

Table 2.3

CO-MOVEMENTS OF PRICE CHANGES, SELECTED COMMODITIES AND PERIODS

(Correlation coefficients, per cent)

	Alumini-um	Cop-per	Nickel	Zinc	Tin	Palm oil	Rice	Soy-bean oil	Soy-beans	Wheat, soft red	Maize	Crude oil (Brent)	Crude oil (WTI)
							January 1997–December 2001						
Aluminium	100.0												
Copper	60.5	100.0											
Nickel	43.4	47.7	100.0										
Zinc	48.9	41.2	36.5	100.0									
Tin	21.2	21.2	19.9	16.9	100.0								
Palm oil	-12.8	-3.5	-12.8	-7.2	-1.2	100.0							
Rice	12.3	6.1	3.2	3.8	7.9	-6.8	100.0						
Soybean oil	-0.1	14.6	3.3	-3.1	2.1	29.0	-2.5	100.0					
Soybeans	16.1	17.4	19.7	4.6	8.5	0.2	-7.6	55.2	100.0				
Wheat, soft red	2.7	4.6	6.5	1.5	7.0	1.6	-6.2	27.2	38.5	100.0			
Maize	-1.3	4.4	10.6	-1.8	4.2	2.5	-6.6	45.5	64.9	56.9	100.0		
Crude oil (Brent)	16.3	12.7	19.6	3.2	-1.1	-17.7	3.3	-4.6	-1.9	5.1	-3.0	100.0	
Crude oil (WTI)	16.7	13.7	19.4	5.9	-4.7	-17.1	2.8	-6.0	-1.9	3.5	-0.5	82.0	100.0
							January 2002–December 2006						
Aluminium	100.0												
Copper	65.4	100.0											
Nickel	43.2	50.3	100.0										
Zinc	58.3	69.7	45.8	100.0									
Tin	33.2	36.7	32.5	37.6	100.0								
Palm oil	6.0	9.4	2.3	7.0	10.6	100.0							
Rice	-2.4	6.0	-4.8	-3.7	7.1	8.4	100.0						
Soybean oil	8.8	11.5	2.8	13.2	12.7	43.4	3.5	100.0					
Soybeans	4.8	8.9	2.4	7.4	18.9	27.4	0.6	61.1	100.0				
Wheat, soft red	16.2	14.1	7.4	18.9	15.4	2.6	-8.1	24.3	26.9	100.0			
Maize	12.6	13.6	3.8	18.6	26.0	17.1	1.7	38.4	48.3	41.9	100.0		
Crude oil (Brent)	15.0	23.1	25.0	24.7	22.2	-4.6	-5.7	5.8	7.8	11.1	2.6	100.0	
Crude oil (WTI)	14.5	19.4	19.7	21.0	17.4	-0.7	-6.1	9.4	7.7	11.8	7.0	87.4	100.0
							January 2007–June 2008						
Aluminium	100.0												
Copper	62.1	100.0											
Nickel	48.3	42.4	100.0										
Zinc	56.0	67.1	43.4	100.0									
Tin	38.2	41.0	26.6	48.5	100.0								
Palm oil	36.9	31.1	33.9	32.7	10.7	100.0							
Rice	-14.9	-0.4	2.7	-6.3	-2.8	-7.5	100.0						
Soybean oil	41.4	20.3	26.5	17.8	16.3	61.5	-26.4	100.0					
Soybeans	34.3	15.3	26.3	9.9	12.4	51.6	-21.3	85.9	100.0				
Wheat, soft red	9.4	13.7	-10.1	3.2	6.4	4.7	-28.2	19.3	23.2	100.0			
Maize	13.8	2.2	10.8	8.8	11.2	18.5	7.1	22.0	35.5	23.8	100.0		
Crude oil (Brent)	28.9	26.1	6.0	5.6	19.2	15.7	0.7	31.5	22.8	13.9	9.7	100.0	
Crude oil (WTI)	18.9	21.4	-1.5	0.8	23.0	10.6	1.7	27.6	21.2	17.0	2.6	86.4	100.0
							July 2008–December 2008						
Aluminium	100.0												
Copper	48.9	100.0											
Nickel	43.9	55.3	100.0										
Zinc	52.4	71.4	63.6	100.0									
Tin	19.8	38.3	72.6	43.5	100.0								
Palm oil	22.2	49.0	10.2	33.2	-11.5	100.0							
Rice	29.7	22.3	-5.2	11.2	-13.1	-15.5	100.0						
Soybean oil	27.6	57.4	32.5	36.7	13.7	74.7	-2.7	100.0					
Soybeans	30.8	31.3	33.6	26.3	11.7	48.4	-3.5	79.2	100.0				
Wheat, soft red	13.4	11.1	-8.4	4.8	-29.2	37.3	-8.0	41.4	49.1	100.0			
Maize	27.6	31.9	26.5	17.2	-0.1	33.6	15.1	66.5	79.6	62.4	100.0		
Crude oil (Brent)	19.0	62.1	31.7	27.6	26.0	61.9	8.4	78.6	45.8	29.1	45.4	100.0	
Crude oil (WTI)	11.9	59.1	25.0	16.0	25.4	46.9	21.1	69.7	37.4	22.4	41.9	93.1	100.0

Source: UNCTAD secretariat calculations, based on Thomson Financial Datastream.
Note: Co-movement measured in relation to weekly price changes.

driven by fundamental supply and demand factors, at least in some periods of time. This acceleration and amplification of price movements can be traced for commodities as a group. Regarding the impact of financial investors on individual commodities, some effect can be observed in the oil market, but it appears that most of the impact occurred in the smaller and less liquid markets for agricultural commodities, including food products. Some of these effects may have been substantial and some persistent. However, the non-transparency of existing data and the lack of a comprehensive breakdown of data by individual commodity and trader category preclude more detailed empirical analysis.

E. The implications of increased financial investor activities for commercial users of commodity futures exchanges

If the financialization of commodity trading causes futures market quotations to be driven more by the speculative activities of financial investors and less by fundamental supply and demand factors, hedging against commodity price risk will become more complex, and this may discourage long-term hedging by commercial users.

To the extent that financial investors increase price volatility, hedging becomes more expensive, and perhaps unaffordable for developing-country users, as they may no longer be able to finance margin calls. For example, during the period January 2003–December 2008, margin levels as a proportion of contract value increased by 142 per cent in maize, 79 per cent in wheat and 175 per cent in soybean on the Chicago Board of Trade (CME, 2008: 17–18). In early 2007, the LME raised its margin requirement by 500 per cent over the space of only a few months (Doyle, Hill and Jack, 2007). Larger, well-capitalized firms can afford these increases, but smaller participants may need to reduce the number of contracts they hold. This itself could reduce liquidity, add to volatility and discourage more conservative investors. Hedging food commodity exposure may become particularly risky because of the typically long-term nature of such hedges, which correspond to harvest cycles. Indeed, evidence reported by the Kansas City Board of Trade (2008) pointed to a reduction in long-term hedging by commercial users at the beginning of 2008, caused by higher market volatility.

To the extent that financial investors increase price volatility, hedging becomes more expensive, and perhaps unaffordable for developing-country users.

Moreover, since 2006, there have been numerous instances of a lack of price convergence between spot markets and futures contracts during delivery, for maize, soybean and wheat. The price of a futures contract that calls for delivery may differ from the current cash price of the underlying commodity, but these prices should very closely match when the futures contract expires. The difference between the futures and the cash price ("basis") tends to widen when storage facilities are scarce, and shrink when physical supply becomes tight. If, in an otherwise balanced market, prices diverge by more than the cost of storage and delivery, arbitrageurs usually act to make the prices converge eventually. Failure to do so would cause increased uncertainty about the reliability of signals emanating from the commodity exchanges with

respect to making storage decisions and managing market position risks. This could eventually result in decreased hedging, as commercial users seek alternative mechanisms for transferring and managing price risk (Irwin et al., 2008). Commercial users might also decide to reduce their use of commodity exchanges because the non-convergence of futures and spot prices not only increases uncertainty but also the cost of hedging (Conceição and Marone, 2008: 56–57).

F. Policy implications

Price discovery and price risk management traditionally have been considered the main benefits that commodity futures exchanges can provide to developing-country users. Hedging on commodity futures exchanges, by reducing price risk, has also been viewed by some observers as an alternative to supply management under international commodity agreements. Meanwhile, commodity exchanges have begun to assume a broader developmental role, as they are increasingly seen to be useful to developing countries in terms of removing or reducing the high transaction costs faced by entities along commodity supply chains (UNCTAD, 2007). However, the financialization of commodity futures trading has made the functioning of commodity exchanges controversial. It has therefore become necessary to consider how their functioning could be improved so that they can continue to fulfil their role of providing reliable price signals to producers and consumers of primary commodities and contributing to a stable environment for development. This section seeks to address this issue by examining whether regulatory changes have been keeping pace with commodity market developments, in particular the participation of new trader categories such as index funds. The subsequent section addresses broader international policy measures.

The functioning of commodity futures exchanges has to be improved so that they can provide reliable price signals to producers and consumers of primary commodities.

1. Regulation of commodity futures exchanges

Regulation of commodity exchanges has to find a reasonable compromise between imposing overly restrictive limits on speculative position holdings and having overly lax surveillance and regulation. Being overly restrictive could impair market liquidity and reduce the hedging and price discovery functions of commodity exchanges. On the other hand, overly lax surveillance and regulation would allow prices to move away from levels warranted by fundamental supply and demand conditions, and would thus equally impair the hedging and price discovery functions of the exchanges.

A substantial part of commodity futures trading is executed on exchanges located in the United States, which the CFTC is mandated to regulate. Abuse of futures trading by speculators is addressed by applying limits on "excessive speculation", defined as trading that results in "sudden or unreasonable fluctuations or unwarranted changes in the price" of commodities underlying futures transactions (section 4a of the Commodity Exchange Act (CEA)). In principle, speculative trading is contained by speculative position limits set by the CFTC (see section C above).

While it is often held that commodity exchanges have generally functioned well, the recent, very sizeable price changes occurring, sometimes within a single trading day, have raised growing questions about the appropriateness of existing regulations. These questions relate to both the adequacy of information that the CFTC is mandated to collect, and the extent of regulatory restrictions on financial investors relative to those imposed on participants with genuine commercial interests. The need for tighter regulations has been discussed under three headings: the "Enron loophole", the "London loophole" and the "swap dealer loophole".

The Commodity Futures Modernization Act (CFMA) of 2000 created the so-called "Enron Loophole" by exempting over-the-counter energy trading undertaken on electronic exchanges from CFTC oversight and regulation. The Enron loophole was addressed by legislation that entered into force on 18 June 2008. This legislation provides for the previously exempt electronic exchanges to become self-regulatory organizations. It also gives the CFTC greater authority to require data reporting on trading and on the positions of hedgers and speculators, and to suspend or revoke "the operations or regulatory status of an electronic trading facility that fails to comply with the core principles, fails to enforce its own rules, or violates applicable CFTC regulations" (Jickling, 2008: 5). However, some observers argue that this legislation has not gone far enough, because it covers only electronic trading but does not extend to bilateral swaps, and because it does not place energy commodities on the same regulatory footing as agricultural commodities that must be traded on the CFTC-regulated exchanges (Jickling, 2008; Greenberger, 2008).

The "London loophole" is closely related to the "Enron loophole", as only one of the active markets exempted from CFTC regulations handles a volume of energy trading similar to that handled by CFTC-regulated exchanges (CFTC, 2007). A large proportion of West Texas Intermediate crude oil contracts is traded on NYMEX, which is regulated by the CFTC. However, "look alike" contracts are traded in London on ICE Futures Europe (owned by Atlanta-based Intercontinental Exchange), which is regulated by the Financial Services Authority (FSA) of the United Kingdom. This means that traders can execute transactions in similar crude oil contracts on NYMEX and ICE, arbitraging between the two markets, yet the CFTC can oversee and regulate only the trading on NYMEX. The significance of this loophole may be illustrated by the fact that, in principle, under section 8a (9) of the CEA, the CFTC has the authority, "whenever it has reason to believe that an emergency exists", to take measures "including, but not limited to the setting of temporary emergency margin levels on any futures contract [and] the fixing of limits that may apply to a market position". However, the CFTC did not apply this mandate, for example, when on 6 June 2008 the price on oil futures contracts rose by about $11 per barrel in a single day. Greenberger (2008: 21) argues that the CFTC may not have done so because it had data only on contracts traded on NYMEX but not on similar contracts traded on ICE.

Given the global nature of commodity futures trading, international collaboration among regulatory agencies is needed.

Proposed legislative action to close the London loophole was presented to the United States Congress on 12 June 2008 (Chilton, 2008), but so far it has not resulted in actual legislative changes. In the meantime, the CFTC introduced changes to the 'No-Action' letter issued in 1999 that granted the ICE permission to make its electronic trading screens available to trading in the United States. These changes provide for ICE trading and position data to be reported to the CFTC, and for the imposition of position limits (including related hedge exemption provisions) comparable to those applicable on the CFTC-regulated exchanges.

The "swap dealer loophole" has received considerable attention in the current debate on the changes needed in the CFTC's regulatory mandates. This is because swap agreements are concluded on OTC markets and thus escape the CFTC's supervisory and regulatory oversight.[21] Moreover, the greater involvement of financial investors in commodity futures trading has significantly increased the positions that swap dealers hold in commodity futures contracts. Swap dealers typically sell OTC swaps to their customers (such as pension funds that buy commodity index funds) and hedge their price exposures with long futures positions in commodities. Swap dealers are generally included in the category

"commercial traders", as they use commodity exchanges for hedging purposes. This has allowed them to be exempted from regulation of speculative position limits. But contrary to traditional commercial traders, who hedge physical positions, swap dealers hedge financial positions. The combination of significant trading activity on OTC markets and the exemption of swap dealers from speculative limits on futures exchanges has severely constrained the ability of regulators to access sufficient information about positions. They would need such information in order to identify undue concentrations of positions, evaluate the overall composition of the market and assess its functioning.

Several proposals have been advanced on how to close the swap dealer loophole. For example, the Kansas City Board of Trade (2008) has proposed addressing the index fund hedge exemptions by limiting their total direct or indirect futures hedge positions to a maximum percentage in the contracts that have a remaining maturity of one or two months. This would create an additional incentive to spread the total position across several months and ease position concentration. It has also suggested changes to the definition of a bona fide hedger and a related distinction to be made in margin requirements between those that have true commercial hedge positions and those that hedge financial positions. In addition, it has proposed alleviating strains in financing margins by accepting commercial agricultural collateral (such as warehouse receipts). These last two changes, in particular, would tend to improve the functioning of commodity exchanges with respect to participants with truly commercial interests.

Given the global character of commodity futures trading, and the fact that through trading arbitrage some contracts involve the jurisdiction of regulatory authorities in more than one country, international collaboration among regulatory agencies is required. Such collaboration would involve not only the sharing and publishing of information, some of which is already in place, but also greater cooperation and harmonization of trading supervision.[22] It seems particularly urgent that exchanges whose legal base is London should be required to provide data on positions by trader categories similarly to those made publicly available by the CFTC for some agricultural products through its COT supplementary reports. In addition, the product coverage of these supplementary reports needs to be enlarged. Product coverage has remained limited because for many commodities traded on United States exchanges, look-alike contracts can be traded in London. As a result, data on positions on United States exchanges provide only a partial picture of the total positions of traders that are active on both the United States and London exchanges. Moreover, in the absence of such data for energy products, legislation enacted in the United States to address the London loophole is probably unlikely to be effective unless similar data on positions taken on ICE are made available.

2. International policy measures

In addition to regulatory issues, the financialization of commodity futures trading confronts the international community with the issue of how supply-side measures can address excessive commodity price volatility. This issue is of particular importance for food commodities because, despite some recent improvement, grain and oilseed stocks remain very low so that any sudden increase in demand or a major shortfall in production, or both, will rapidly cause significant price increases (see annex to chapter I). Hence, physical stocks of food commodities need to be rebuilt urgently to an adequate level in order to moderate temporary shortages and buffer sharp price movements.

> Physical stocks of food commodities need to be rebuilt urgently, and should be sufficiently large to be able to moderate temporary shortages and buffer sharp price movements.

It has often been argued that it is difficult to finance and guarantee the accumulation of sufficiently high physical inventory stocks, especially of food commodities, so that they could function as physical buffer stocks. Moreover, holding large inventories around the world has often been judged economically inefficient, and it has been recommended that net food importing countries should rely on global markets rather than on building their own reserves. However, there can be little doubt that newly imposed trade restrictions (particularly for rice) played a role in exacerbating the spiralling

increase in food prices in early 2008. This has added to anti-globalization sentiments and to more favourable assessments of the protection that national food reserves can provide.

Partly to counter such anti-globalization sentiments, and in particular as part of efforts to prevent humanitarian crises, von Braun and Torero (2008) – echoed by the G-8 summit in June 2008 – have proposed a new two-pronged global institutional arrangement: a minimum physical grain reserve for emergency responses and humanitarian assistance, and a virtual reserve and intervention mechanism. The latter would enable intervention in the futures markets if a "global intelligence unit" were to consider market prices as differing significantly from an estimated dynamic price band based on market fundamentals. However, adopting such a mechanism would commit a public agency to second-guess market developments. More importantly, in order to stem speculative price bubbles, the agency would need to be prepared to sell large amounts of physical commodities. Given the certainty that any accumulated stocks will eventually be exhausted, there is considerable risk that speculators could mobilize significantly more financial funds than any public agency's capacity to provide physical commodities. Hence it is likely that the funds allocated to such an agency would be an easy target for speculators.

Even if a virtual reserve and intervention mechanism could be made to work satisfactorily, it would not make more physical commodities available on markets, except for emergency situations. Given that the historically low level of inventories was one determinant of the abrupt price hike in food commodities in early 2008, the question remains as to how incentives to increase production and productivity in developing countries, particularly of food commodities, could be fostered. Such incentives could include a reduction of trade barriers and domestic support measures in developed countries.

G. Conclusions and outlook

The financialization of commodity futures trading has made commodity markets even more prone to behavioural overshooting. There are an increasing number of market participants, sometimes with very large positions, that do not trade based on fundamental supply and demand relationships in commodity markets, but, who nonetheless, influence commodity price developments.

Due to the limited transparency of existing data, as well as the lack of a comprehensive breakdown of data by individual commodity and trader categories that would enable a determination of the position changes of different trader categories, it is difficult to conduct a detailed empirical analysis of the link between speculation and commodity price developments. Nevertheless, various existing studies and new results provided in this chapter indicate that the activities of financial investors have accelerated and amplified commodity price movements. Moreover, these effects are likely to have been substantial, and in some cases persistent. The strongest evidence is found in the high correlation, particularly during the deleveraging process in the second half of 2008, between commodity prices and prices on other markets, such as equity and currency markets, which were particularly affected by carry-trade activities. In these markets, speculative activity played a major role.

These effects of the financialization of commodity futures trading have made the functioning

of commodity exchanges increasingly contentious. They tend to reduce the participation of commercial users, including those from developing countries, because commodity price risk hedging becomes more complex and expensive. They also cause greater uncertainty about the reliability of signals emanating from the commodity exchanges with respect to making storage decisions and managing the price risk of market positions.

It is unclear whether financial investors will continue to consider commodities as an attractive asset class. The trading strategy of index investors has proved to be strongly dependent on specific conditions (i.e. rising or backwardated markets) to be profitable. Moreover, since their strategy is fairly predictable, other market participants may make sizeable profits by trading against index investors. Hence, financial investors are likely to move away from investing passively in indexes towards more active trading behaviour, either by adopting a more flexible approach in determining how and when to roll forward positions, or by concentrating on other investment vehicles such as commodity-exchange-traded funds.[23] This implies that the distinction between short-term oriented managed funds and other financial investors will become less clear. Its effect on commodity prices will largely depend on the extent to which such a shift in financial investors' trading strategy leads to a greater concentration on specific commodities, instead of commodities as an aggregate asset class. But such a potential shift in financial investors' trading behaviour is unlikely to reduce the relative size of their positions. Thus they will continue to be able to amplify price movements, at least for short periods of time, especially if they concentrate on individual commodities.

Data for the first few months of 2009 indicate that both index traders and money managers have started to rebuild their speculative positions in commodities. This makes a broadening and strengthening of the supervisory and regulatory powers of mandated commodity market regulators indispensable. The ability of any regulator to understand what is moving prices and to intervene effectively depends upon its ability to understand the market and to collect the required data. Such data are currently not available, particularly for off-exchange derivatives trading. Yet such trading and trading on regulated commodity exchanges have become increasingly interdependent. Hence, comprehensive trading data need to be reported to enable regulators to monitor information about sizeable transactions, including on similar contracts traded over the counter that could have an impact on regulated futures markets.

In addition to more comprehensive data, broader regulatory mandates are required. Supervision and regulation of commodity futures markets need to be enhanced, particularly with a view to closing the swap dealer loophole, in order to enable regulators to counter unwarranted impacts from OTC trading on commodity exchanges. At present, banks that hold futures contracts on commodity exchanges to offset their short positions in OTC swap agreements vis-à-vis index traders fall under the hedge exemption and thus are not subject to speculative position limits. Therefore, regulators are currently unable to intervene effectively, even though swap dealer positions frequently exceed such limits and may represent "excessive speculation".

Another key regulatory aspect concerns extending the product coverage of the CFTC's COT supplementary reports and requiring non-United States exchanges, particularly those based in London that trade look-alike contracts, to collect similar data. The availability of such data would provide regulators with early warning signals and allow them to recognize emerging commodity price bubbles. The resulting enhancement of regulatory authority would enable the regulators to prevent bubble-creating trading behaviour from having adverse effects on the functioning of commodity futures trading.

Developing-country commodity exchanges might want to consider taking similar measures, where relevant,[24] though their trading generally tends to be determined more by local commercial conditions than by any sizeable involvement of internationally operating financial investors.

Notes

1 Notional amount refers to the value of the underlying commodity. However, traders in derivatives markets do not own or purchase the underlying commodity. Hence, notional value is merely a reference point based on underlying prices.

2 The Bank for International Settlements (BIS) is the only source that provides publicly available information about OTC commodity trading. However, commodity-specific disaggregation is not possible with these data.

3 In the DJ-UBSCI, weights primarily rely on the relative amount of trading activity of a particular commodity, and are limited to 15 per cent for individual commodities and to one third for entire sectors. In the S&P GSCI, on the other hand, weights depend on relative world production quantities, with energy products usually accounting for about two thirds of the total index.

4 A commodity exchange is a market in which multiple buyers and sellers trade commodity-linked contracts according to rules and procedures laid down by the exchange and/or a mandated supervisory and regulatory body. Such exchanges typically act as a platform for trade in futures contracts (i.e. standardized contracts for future delivery). For further details, see UNCTAD, 2006.

5 The study was done using daily data. Such data are not publicly available, but could be used by Informa Economics (2009) as their study was commissioned by a consortium of futures exchanges. The authors conclude that the positive correlation between the trading activities of index traders and those of momentum-trading money managers on agricultural markets may simply indicate that in this period, during most of which prices were rising strongly, money managers favoured the same "long" strategy that index traders routinely use.

6 More precisely, among the types of firms engaged in business activities that can be hedged and therefore classified as "commercial" by the CFTC are merchants, manufacturers, producers, and commodity swaps and derivative dealers. The CFTC classifies as "non-commercial" all other traders, such as hedge funds, floor brokers and traders, and non-reporting traders (i.e. those traders whose positions are below the reporting thresholds set by an exchange).

7 These 12 commodities are: feeder cattle, live cattle, cocoa, coffee, cotton, lean hogs, maize, soybeans, soybean oil, sugar, Chicago wheat and Kansas wheat.

8 Using data on bank participation in futures markets, Sanders, Irwin and Merrin (2008: 9) show that index trader activity in grain markets started in 2003, and that the most rapid increase in trader positions occurred between early 2004 and mid-2005. Given that the CFTC's index trader data start only in 2006, they cannot reflect these events.

9 A long position is a market position that obligates the holder to take delivery (i.e. to buy a commodity). This contrasts with a short position, which is a market position that obligates the holder to make delivery, (i.e. to sell a commodity). Net long positions are total long positions minus short positions.

10 Open interest is the total number of futures contracts – long or short – in a market, which have been entered into and not yet liquidated by an offsetting transaction or fulfilled by delivery.

11 Speculative position limits define the maximum position, either net long or net short, in one commodity futures (or options) contract, or in all futures (or options) contracts of one commodity combined, that may be held or controlled by one person other than a person eligible for a hedge exemption, as prescribed by an exchange and/or the CFTC.

12 The results do not materially change if commodity shares are based on 2009 weights.

13 For a discussion of carry trade speculation, see *TDR 2007,* chapter I.

14 The absence of any systematic difference in recent price developments between commodities that are traded on futures exchanges and those that are not is sometimes cited as further evidence for an absence of any significant impact of financial investors on price developments (ECB, 2008: 19). This evidence

is interpreted as supporting the view that commodity prices have been driven entirely by supply and demand fundamentals, and that futures exchanges have simply provided the mechanism through which information about fundamentals is reflected in market prices.

15 Informa Economics (2009) uses the concept of "price pressure" to investigate the effects that daily changes in position taking by different trader categories have on daily final prices. They consider price pressure that pushes prices towards their daily end level, which they call "true value", as beneficial, and price pressure that pushes prices away from that level as detrimental. For all the analysed agricultural products, except cotton, the study finds that commercial traders had the lowest ratio of beneficial to detrimental price pressure, while money managers and index traders had the highest such ratios. In other words, among all the trader categories, commercial traders, who supposedly trade on the basis of information on fundamental supply and demand conditions, exerted the least influence on daily price discovery, and financial investors exerted the most influence. Informa Economics (2009, part 4: 34) interprets this finding as indicating that commercial traders are only concerned about hedging their price risk, but do not care much about whether commodity prices reflect fundamental supply and demand conditions. But the finding could also be interpreted as meaning that the weight of financial investors in commodity futures trading is such that more often than not it moves prices away from levels that would have occurred on the basis of fundamental market conditions. The concept of price pressure applied to arrive at this finding nonetheless raises methodological issues. It assumes, for example, that all price changes result from position changes (i.e. based on private information), and that prices do not react to newly available public information. According to Grossman and Stiglitz (1980), this implies an assumption of complete information *inefficiency* of commodity markets.

16 Most existing studies that use Granger-causality tests have had to rely on publicly available weekly data on positions in commodity markets. However, a frequently quoted study by the Interagency Task Force on Commodity Markets conducted Granger causality tests for the oil market using non-public data on daily positions of both commercial and non-commercial traders, as well as those of various sub-groups of traders for the period January 2003–June 2008 (CFTC, 2008). This study also found no evidence that daily position changes by any of the trader subcategories had systemically caused price changes in oil futures contracts over the full sample period. This means that, at least in the crude oil futures markets, results of Granger-causality tests appear to be largely unaffected by using either daily (instead of weekly) data or position changes for sub-groups of traders instead of aggregated data.

17 More precisely, Kaufmann et al. (2008) specify the near-month price of crude oil on the New York Mercantile Exchange (NYMEX) as a function of: (i) the equivalent of days of consumption of existing OECD crude oil stocks; (ii) a factor that reflects OPEC capacity utilization, OPEC's share of global oil production and the extent to which OPEC members cheat on their quota; (iii) United States refinery utilization rates, which may be subject to abrupt temporary disturbances during the hurricane season; and (iv) expectations as reflected by the difference between the price for the 4-month and the price for the 1-month futures contract for West Texas Intermediate on NYMEX. This difference indicates whether the market is in backwardation or contango, with contango providing an incentive to build and hold stocks, thereby bolstering demand and ultimately prices. On the basis of this relationship, price changes can be estimated with an error correction model, where first differences of the above variables as well as the forecasting errors of previous periods are taken as independent variables.

18 Prometeia (2008) adopts a similar approach in examining whether the strong increase in oil prices between mid-2007 and mid-2008 can be explained by rational pricing behaviour of market participants or whether it reflects a bubble. The tests cannot reject the presence of a bubble. Prometeia (2008) interprets the evidence as pointing to the role of financial investor activities on commodity futures markets in accelerating and amplifying price movements that in the medium and long run are driven by fundamentals. However, other structural models for the oil market ascribe much of the recent price developments to fundamental supply and demand factors. These models do not infer demand shocks from an econometric model, but treat repeated revisions of forecasts of real income growth in emerging and advanced economies as a series of exogenous demand shocks for the global crude oil market (e.g. Kilian and Hicks, 2009). However, it is hard to believe that informed oil traders would be repeatedly surprised by the impact on oil demand of buoyant growth in emerging economies. Moreover, any such calculation is extremely sensitive to assumptions about the short-run price elasticity of supply and demand.

19 More formally, tests for explosive extrapolative behaviour are based on the following equation: $\ln f_t = \alpha + \beta \ln f_{t-1} + \varepsilon_t$, where f_t and f_{t-1} are the current and past prices respectively, β is the autoregressive factor, and ε is an error term.

20 The number of these instances indicates that there is a higher probability of them being due to

explosive speculative behaviour than merely chance occurrences.

21 On 13 May 2009, the United States Government unveiled a plan designed to increase the transparency of OTC trading and tighten its oversight and regulation (see http://www.ustreas.gov/press/releases/tg129.htm). The centrepiece of the announced plan is to allow regulators to mandate the clearing of all standardized OTC derivatives through regulated central clearinghouses that would require traders to report their activities and hold a minimum level of capital to cover losses. While details of the proposed legislative changes still need to be determined, it appears from the plan that standardized derivatives would be traded on exchanges or through clearinghouses, while customized or individualized derivative products would not. This means that the plan would not cover swaps. Some commentators argue that this distinction between customized and other derivatives and the fact that swap-based transactions "would be reported privately to a 'trade repository', which apparently would make only limited aggregate data available to the public", is a serious shortcoming of the proposed plan (Partnoy, 2009).

22 The Financial Services Authority (FSA), which monitors commodity markets in the United Kingdom, considers commodity markets as specialized markets which are dominated by professional participants, and hence require less regulatory attention than equity and bond markets. It supervises firms that are active in commodity markets in order to ensure the financial stability of market participants so that contract settlements can take place on time and without default by any party. In addition, it mandates commodity exchanges to regulate their own markets with a view to providing clearly defined contract terms and ensuring against manipulation. In their advice on the European Commission's review of the commodity trading business, the Committee of European Securities Regulators (CESR) and the Committee of European Banking Supervisors (CEBS) pointed to potential problems relating to the low levels of transparency in OTC commodity derivatives trading and the current client categorization rules and transaction reporting requirements. However, they concluded that there was not much benefit to be gained by mandating through legislation greater pre- and post-trade transparency in commodity derivatives trading, and that the current practice of how regulated markets reported trading was sufficient (CESR, 2008).

23 Commodity exchange traded funds are listed securities backed by a physical commodity or a commodity futures contract.

24 To the extent that history is a guide for current events, developing countries would be ill-advised to close their commodity futures exchanges. For example, Jacks (2007) provides a historical account of the establishment and prohibition of commodity futures markets and shows that such markets have generally been associated with lower, rather than higher, price volatility.

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