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ROLES OF FINANCIAL MARKETS IN COMMODITY PRICE DEVELOPMENTS

I. Introduction[1]

The extreme scale of the recent changes in commodity prices and the greater correlation of price developments both across various categories of commodities and between commodity and financial markets, suggests that common (macroeconomic and financial) factors are behind these changes. Some consider broad-based changes in fundamental supply and demand relationships as the sole drivers of recent commodity price development and argue that the greater participation of financial investors in commodity markets have actually moderated price swings (see, for example Sanders and Irwin, 2010). Others argue that the financialization of commodity markets has had sizeable price impacts (see, for example, Gilbert, 2010a; Tang and Xiong, 2010; UNCTAD 2009).

The following builds on the latter branch of the literature and emphasizes the role of information in shaping trading decisions. Its main argument is that the greater participation of financial investors has caused commodity markets to follow more closely the logic of financial markets, rather than merely that of a goods market. Goods markets may be characterized by an atomistic market structure and by price discovery based on information from a multitude of independent agents who act according to their own individual preferences. By contrast, in financial markets, especially those whose assets largely fall in the same risk category (such as equities, emerging-market currencies and, recently, commodities), price discovery is based on information related to a few commonly observable events, or even on mathematical models that use past, rather than current, information for price forecasts. These differences between goods and financial markets regarding both the sources of information and the way information is processed imply behavioural differences. In goods markets, the most profitable behaviour generally is individually pioneering action based on an individual's own private circumstantial information. By contrast, in financial markets the most profitable attitude frequently means following the trend for some time and disinvesting just before the rest of the crowd does do so. In other words, a successful financial market strategy is characterized by herd behaviour. A high correlation between returns on investment in commodities and that in other asset classes indicates such behaviour.

II. Trends and developments in financial markets for commodities

The term "financialization of commodity trading" indicates the increasing role of financial motives, financial markets and financial actors in the operation of commodity markets. Financial investors have long been active on commodity markets.[2]But the financialization of commodity markets gained new momentum following the burst of the equity market bubble in 2000. This impetus relates to empirical findings, based on data for the period 1959–2004, pointing to the characteristic of commodities as an

asset class to be a quasi natural hedge of positions in other asset markets (Gorton and Rouwenhorst, 2006).[3]

It is difficult to assess the size of the financialization of commodity trading due to the lack of comprehensive data. But it is reflected, for example, by the strong increase, starting around 2004, in the number of futures and options contracts outstanding on commodity exchanges and in the amount of outstanding over-the-counter (OTC) commodity derivatives. The number of contracts outstanding on commodity exchanges has continued to increase since the collapse of commodity prices in mid-2008, and is now about 50 per cent higher than in the first half of 2008, when commodity prices peaked. In contrast, the notional amount of outstanding OTC-derivatives[4] has dropped to about one third, which corresponds to roughly half of its level in 2005–2006, but also to about five times its level in 1999.[5]

A number of reasons could explain the sharp decline in the notional value of outstanding OTC commodity derivatives. The collapse of commodity prices between mid-2008 and early-2009 to about half their previous level clearly accounts for part of this decline. Another reason could be that the financial crisis led to greater awareness of counterparty risk, making financial investors wary of exposure in bilateral OTC deals. Thirdly, the recent fall in recorded OTC activity probably reflects a decline in the relative importance of broad-based passive index investments by financial investors in commodities, which includes the use of swaps on OTC markets, and an increasing relative importance of more sophisticated active trading strategies, which emphasize the use of futures contracts traded on organized exchanges. A survey conducted in early December 2010 on how commodity investors plan to invest in the coming 12 months indicated that only 7 per cent expected to use index swaps compared with 43 per cent that would choose active management (Barclays Capital, 2010). Such active management includes the use of ETPs, such as ETFs, many of which are backed by futures contracts.

Evidence on the value of assets under management by financial investors in commodities (Barclays Capital, various issues) reveals two salient features. First, these investors have rapidly increased their involvement in commodities even more since mid-2010 than before the financial crisis when it was already growing fast. Judging from currently available data, the commodity-related assets under their management recorded a historic high in February 2011, when it reached almost $400 billion – about double the pre-crisis level of 2007. Second, while index investment accounted for 65–85 per cent of the total between 2005 and 2007, its relative importance has fallen to only about 45 per cent since 2008. This decline occurred despite a roughly 50 per cent increase in the value of index investments between 2009 and the end of 2010.

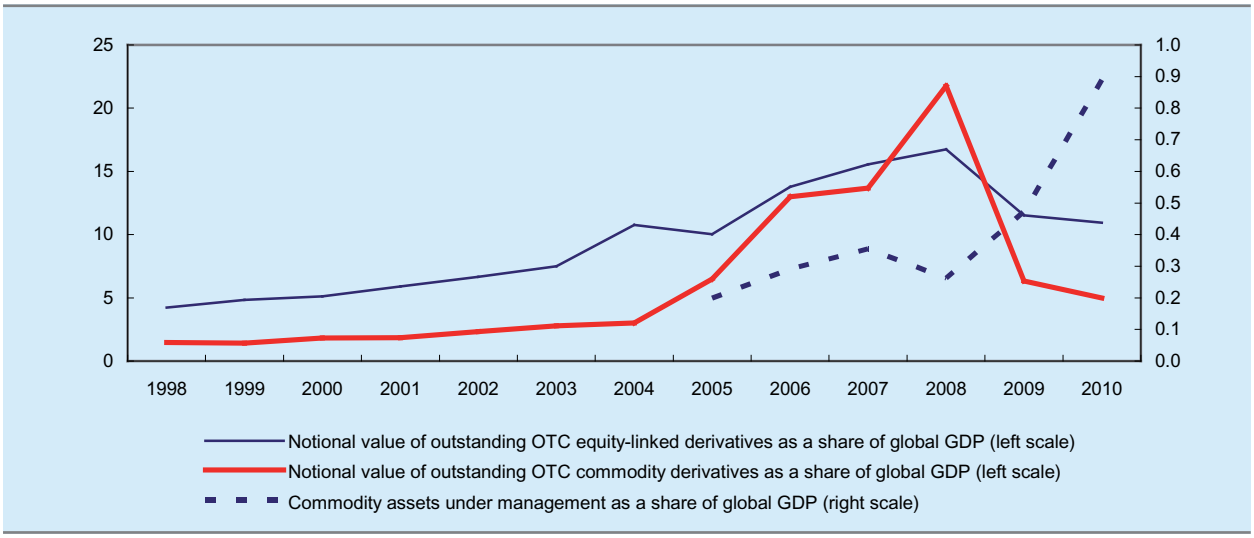
To put the size of financial investments in commodities in perspective, it is useful to consider how these have evolved relative to investments in equity markets, and relative to developments in the real economy. Between about 2002 and the outbreak of the financial crisis, the notional amount of outstanding OTC commodity derivatives increased considerably faster than comparable investments in equity-linked contracts. However, in 2008–2009 the value of commodity investments also declined considerably faster than that of equity-linked investments (figure 1). Perhaps more importantly, the share of the notional amount of outstanding OTC commodity derivatives in global gross domestic product (GDP) increased from 2–3 per cent in the early 2000s to more than 20 per cent in 2008, and, in spite of its subsequent rapid decline, this share has remained at about 5–6 per cent (i.e. roughly double its share about a decade ago). The evidence in figure 1 also reflects the differences in the evolution of commodity investments on exchanges and on OTC markets, noted above; it shows that the share of the value of commodity assets under management in global GDP increased more than fourfold in the period 2008–2010.

A comparison of the development of physical commodity production and financial investment in commodities sheds some further light on the size of the financialization of commodity markets. Concentrating on oil, which constitutes the largest share of total commodity production, reveals that the share of the notional value of total (i.e. not just oil for which no separate data are available) outstanding OTC commodity derivatives in the value of global oil production increased about fourfold between the early 2000s and 2007–2008 when it reached 40–45 per cent (shown by the dark columns in figure 2). A similar value-based measure relating to financial investments in commodity futures exchanges shows that the share of the notional value of the outstanding index investments in WTI crude oil on United States futures exchanges in the value

Figure 1

FINANCIAL INVESTMENT IN COMMODITIES AND GLOBAL GDP, 1998–2010

(Per cent)

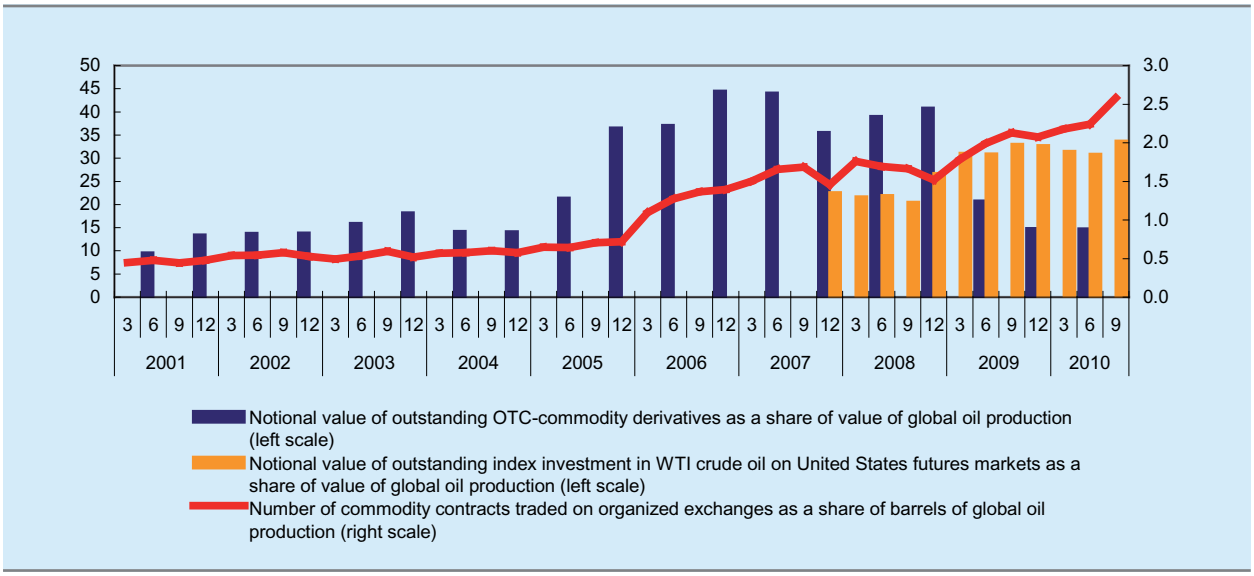


Source: UNCTAD secretariat calculations, based on BIS, Barclays Capital and UNCTADstat.

Figure 2

FINANCIAL INVESTMENT IN COMMODITIES AND GLOBAL OIL PRODUCTION, 2001–2010

(Per cent)



Source: UNCTAD secretariat calculations, based on BIS, CFTC, IEA and UNCTADstat.

of global oil production in 2010 was about 50 per cent higher than in 2007–2008 (shown by the light columns in figure 2). Given that WTI appears to have ceded part of its function as a benchmark for global crude oil prices to Brent, this increase may well be an underestimation. Indeed, comparing the number of commodity contracts traded on organized exchanges and the volume of global oil production (indicated by the line in figure 2), indicates an unabated increase in the financialization of commodity markets.

III. Roles of different types of financial market players and their consequences

Several categories of market participants are active in commodity markets. These categories are usually distinguished on the basis of the reports on traders' positions that are published in anonymous and summary form by the Commodities Futures Trading Commission (CFTC), i.e. the institution mandated to regulate and oversee commodity futures trading in the United States.

The CFTC distinguishes three main trader categories.[6] One of them refers to market participants with a commercial interest in commodities and includes producers, merchants, processers and users. The other two categories refer to financial investors and include "swap dealers", who may be considered a broad approximation of index traders[7], and money managers. The money manager category includes a range of investors, such as hedge funds and institutional investors, that adopt different trading strategies, based on macroeconomic fundamentals, detailed commodity research, algorithmic trading or trend following, and general financial portfolio-diversification considerations. Thus they are able to adjust their exposure in commodity markets according to changes in asset prices with a view to stabilizing the structure of their portfolio. Given that money managers adopt active short-term trading strategies for which information plays a key role, the remainder of this section mainly applies to this category.

The availability and processing of information plays a key role in the determination of asset prices. This role has traditionally been examined on the basis of the efficient market hypothesis (EMH), whereby 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 (in the case of commodities, for example following announcements of harvest forecasts or changes in oil production), or when private information leads to transactions that affect prices.

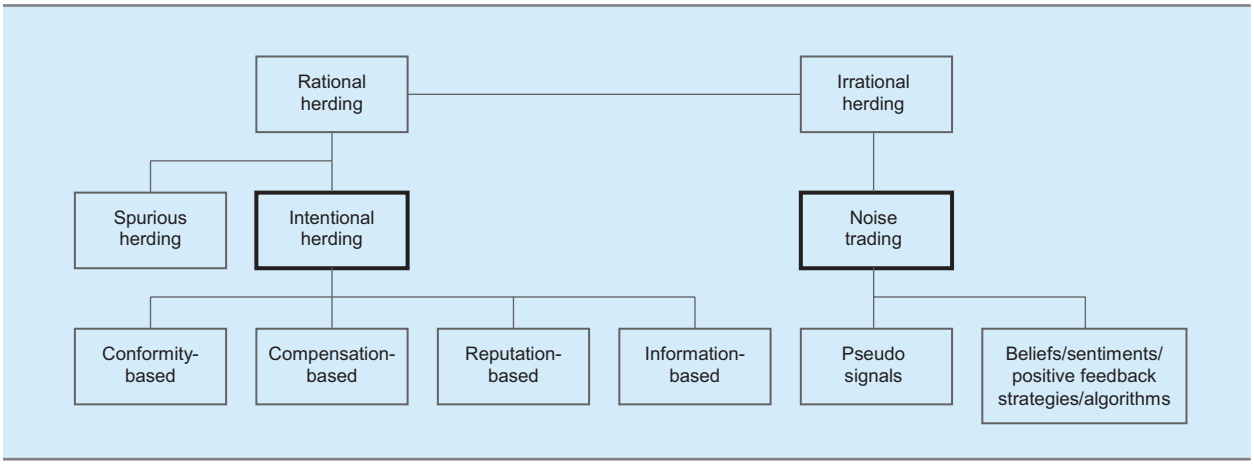
Crucial assumptions of the EMH are that market participants evaluate assets on the basis of fundamentals, act fully rationally, base their actions on publicly available or their own private information, and do so independently of each other. However, some circumstances can cause individuals to deviate from this assumed behavioural pattern and to engage in herd behaviour. Herd behaviour frequently occurs when decisions need to be taken in situations of uncertainty.[8] It may be defined as the tendency of individuals to mimic the actions of a larger group, rather than acting independently and on the basis of their own information.

Herd behaviour can take various forms and may be rooted in irrational behaviour, but it may also be fully rational. Figure 3 provides a taxonomy of different types of herd behaviour. Early models of herd behaviour were based on assumed deviations from perfect rationality, or so-called "noise trading" (Shleifer and Summers, 1990). Investment by noise traders is affected by pseudo-signals, which convey no information about future returns in a specific asset market, or by changes in traders' beliefs and sentiments that are not justified by news on fundamentals. An example of pseudo signals for positions in commodity markets is information related to other asset markets that triggers portfolio rebalancing, and, hence, changes in investors' exposures to commodities.

Changes in beliefs and sentiments may reflect investors' judgemental biases, such as overreacting to news or overoptimism.[9] It may also reflect use of inflexible trading strategies, such as momentum investment or positive feedback strategies. Such strategies assume that past price developments carry information on future price movements giving

Figure 3

DIFFERENT TYPES OF HERD BEHAVIOUR



Source: UNCTAD secretariat, derived from Bikhchandani and Sharma (2001) and Shleifer and Summers (1990).

rise, for example, to trend chasing. This will result in buying after prices rise and selling after prices fall, independently of any changes in fundamentals. Simple types of positive feedback strategies are closely related to technical analysis that utilizes past price and position data to assess patterns of activity that might be helpful in making predictions. More sophisticated trading rules use computer-based algorithms that strictly adhere to a predetermined set of rules. Algorithms analyse market activity and produce signals for trading strategies established either on the basis of past trading and price developments or on the basis of the anticipated reaction by other algorithmic traders to current market developments.[10] Given that several positive-feedback and algorithmic traders may use similar rules, they run the risk of collectively generating market movements that they then individually identify and follow. Moreover, to the extent that algorithms follow statistical strategies and monitor market developments across different asset markets, such rules will cause price signals to spill over from, for example, equity or currency markets to commodity markets, even when there is no change in the fundamentals on commodity markets.

Herd behaviour can also be fully rational. In this context, "spurious herding" should be distinguished from "intentional herding" (Bikhchandani and Sharma, 2001). Spurious herding describes situations where agents facing similar decision-making problems and information sets take similar decisions. Given that spurious herding reflects agents' common reaction to public information, it is entirely compatible with the EMH, provided that the information refers to the fundamentals of the specific market. Fundamentals-driven spurious herding in commodity investment can arise if, for example, a significant share of international supply is suddenly cut off, as occurred with oil during the Gulf war in 1990–1991 and with rice following the imposition of export bans by various large exporting countries in 2008.

Intentional herding may be based on four motives (Devenow and Welch, 1996; Bikhchandani and Sharma, 2001). First, conformity-based herding relates to an alleged intrinsic preference of individuals for conformity. Second, reputation-based herding relates to imitation which arises when traders and their employers are uncertain about the traders' abilities (Scharfstein and Stein, 1990). Traders who doubt their own abilities will not take positions contrary to those taken first by other traders, even if their own information would lead them to do otherwise. Doubtful traders, by imitating others, will avoid being considered low-skilled if taking positions contrary to those taken by others turned out to be loss-making. If the common decision turns out to be loss-making, it will be attributed to a change in general market sentiment, rather than to poor individual judgement or performance.[11] Third, closely related to reputation-based herding is compensation-based herding. This refers to agents who invest on behalf of others and whose compensation schemes and terms of employment provide incentives that reward imitation. For example, risk-averse investors will align their positions with benchmark portfolios

if their compensation increases when they do better than the benchmark but decreases when they underperform the benchmark. Compensation rules based on such relative performance measures can lead not only to herding but also to risk-loving investors taking excessively high risk.

Fourth, information-based herding is perhaps the most important motive of intentional herding. It refers to imitation in situations where traders believe that they can glean information by observing the behaviour of other agents. In other words, investors converge in their behaviour because they ignore their private information signals (Hirshleifer and Teoh, 2003). As explained by Banerjee (1992), who calls this effect "herd externality", information-based herding exerts an external influence on decision-making processes and causes position-taking that is not in line with an agent's own information. Position-taking based only on other peoples' previous actions will cause price changes without infusing any new information into the market. A sequence of such actions causes a so-called "informational cascade" (Bikhchandani, Hirshleifer and Welch, 1992) – a snowballing effect which will eventually lead to self-sustaining asset price bubbles.

Informational cascades are most likely to occur where market participants are unequally informed and ignore the accuracy of other peoples' information. Market participants who judge their own information to be incomplete and approximate will tend to delay their decision-making, preferring to act only once they can make inferences on the basis of other – supposedly better informed and more experienced – peoples' action. This implies that position-taking by investors that make early decisions is likely to determine which way followers will decide to move, and it therefore has a disproportionate impact on price changes. This will be the case even if the assessments of the early movers are incorrect, based on overconfidence or on idiosyncratic motives (such as readjusting portfolio composition following price changes in other asset markets). It also implies that an increase in the number of market participants and in liquidity does not necessarily indicate that market transactions are based on more information.

Informational cascades are not limited to one market. They can spread across different asset markets if prices in those markets are correlated. Herding across markets can lead to excess correlation (i.e. a level of correlation between asset prices that exceeds the correlation between their fundamentals) (Cipriani and Guarino, 2008).

Informational cascades and information-based herding can be altered or even reversed by a publicly observable shock or by the release of public information (Hirshleifer and Teoh, 2003). Both events infuse new information into the market. They also allow followers to assess the accuracy of the information on which they assumed precursors were acting, as they know that the newly released public information is more accurate than what they inferred from the actions of the early position-takers. Such new public information may consist of easily observable events (such as extreme weather events that impact harvests) or well-researched findings from specialized agencies.[12] However, it may also consist of newsletter recommendations from investment banks or other analysts who base these recommendations on models that are proprietary knowledge. This means that the methodologies that produce these findings are impossible to verify, and therefore their objectivity is open to question.[13] Unless investment banks keep research and trading departments completely independent, such predictions may well be an attempt to ignite a new informational cascade and be combined with the analysts' prior position-taking, the returns on which will increase through imitation by others.

If herd behaviour has an impact on price movements, early movers will benefit the most. Imitation by followers will gradually become less profitable the longer it is delayed, and the greater becomes the probability that newly arriving public information will alter the informational cascade. The speed at which opportunities for high return and incentives to engage in herding behaviour decline, and the extent to which herding affects prices, depend on the degree of uncertainty. When it is difficult to differentiate between uninformed traders, who are herding, and informed traders, market participants may believe, mistakenly, that most traders possess accurate information. The ensuing confusion allows uninformative herd behaviour to have dramatic effects on prices and can lead to bubbles and excessive volatility (Avery and Zemsky, 1998). Such situations occur when the prevalence of uninformative noise trading is underestimated, either because of a lack of data on the relative importance of different trader categories, or because of the mistaken belief that trading from rational arbitrageurs will instantaneously balance any price effect from trading that is not based on fundamentals, as discussed below.

The persistence of price deviations from fundamental values caused by herding depends on the speed and efficiency of arbitrage. An arbitrage opportunity presents the possibility of earning a positive return at no risk. Such a possibility will arise if prices diverge from fundamental values or across markets on which identical assets are traded. According to the EMH, an arbitrageur will detect such an opportunity immediately, act upon it and thereby make such price divergences disappear. Given that all these actions are assumed to happen instantaneously, the notion of unlimited arbitrage implies the absence of any arbitrage opportunities. It also implies that irrational position-taking that would drive prices away from fundamental values will not make profits, and hence be driven out of the market. Thus, from an EMH-perspective, speculation must be stabilizing (Friedman, 1953).

However, there is widespread agreement that there are limits to arbitrage (for a recent survey, see Gromb and Vayanos, 2010). For example, rational arbitrageurs may not be able to correct mispricing either because of risk aversion (de Long et al., 1990a) or because of capital constraints. Shleifer and Vishny (1997) argue that arbitrageurs may need to use other people's capital. If the market initially moves against the arbitrageurs, they will need to report intermediate losses. This will cause the arbitrageurs' client investors to withdraw part of their money, so that the arbitrageurs would need to liquidate their positions at a loss. Given that arbitrageurs are aware of this possibility, they will exploit arbitrage possibilities only partially.

What is more, it may not even be optimal for rational arbitrageurs to counter the position-taking of irrational investors that follow positive feedback strategies. Instead, they may want to buy and push up the price following some initial good news, thereby providing an incentive for feedback traders to aggressively buy the asset. This reaction by feedback traders will allow the rational arbitrageurs to sell their positions at a profit. But in so doing, profitable arbitrage also contributes to the movement of prices away from fundamentals and feeds short-term price bubbles (de Long et al., 1990b).

Bubbles may persist even over a substantial period of time. This can occur when a bubble bursts only once a sufficient mass of arbitrageurs have sold out and rational arbitrageurs know that there will always remain some agents that are overconfident or pursue momentum-trading strategies. Rational arbitrageurs who know perfectly well that the bubble will eventually burst then need to weigh the risk of overestimating the remaining number of irrational traders, which would imply losing all capital gains by getting out too late, against maximizing profits by riding the bubble as it continues to grow and exiting from the market just prior to the crash. New public information about market fundamentals would allow rational arbitrageurs to synchronize their exit strategies, and thus make the bubble burst earlier (Abreu and Brunnermeier, 2003). The same may be true for disclosure of data that indicate the true number of remaining irrational traders.[14]

Taken together, the above discussion shows that financial investors have a variety of motives, either rational or irrational, for engaging in trend-following and momentum trading, as well as for engaging in arbitrage only to a limited extent. As a result, asset prices can deviate from fundamental values, at least for some time. The discussion also shows that herding can have sizeable detrimental effects since it reduces the information content of prices, and because, being based on only a little information, existing price levels become very sensitive to seemingly small shocks. Consequently, commodity prices risk being subject to speculative bubbles, move far away from fundamental values and display high volatility.

An empirical assessment of herd behaviour is notoriously difficult. It is particularly difficult to test models of informational herding where intentional herding must be distinguished from spurious herding (which reflects a common and simultaneous reaction to public announcements). Observing market transactions and prices cannot reveal the factors that ultimately determine the decisions of market participants. This is because actions do not reveal the kind of private information or signals that agents receive and that motivate their position-taking. For commodity markets, this problem is exacerbated by the fact that data on market transactions are available only in aggregated form and at relatively long intervals, and it is often difficult to pinpoint what constitutes fundamentals and how they should be measured and quantified. This is the case especially in the presence of a variety of big events that may change fundamentals gradually but permanently, such as climate-change related events, peak oil concerns, or increasing demand in emerging markets.

Nonetheless, despite these difficulties, a small number of studies have attempted to test for herd

behaviour in commodity markets. In principle, trend-following and momentum trading in commodity markets can be examined by regressing speculative position-taking over price changes on previous days. In addition to unresolved questions as to what trader categories should appropriately be considered as "speculators", daily data on speculative position-taking are not publicly available. Therefore, using confidential position data from the CFTC, Irwin and Yoshimaru (1999), based on data for 1988–1989, and Irwin and Holt (2005), based on data for 1994, found evidence for the existence of trend-following or momentum strategies, but they also found that these had relatively low price effects. However, the data used in these studies are dated, and thus cannot reveal the effects of herding behaviour over the past few years.

A recent study by Gilbert (2010a) uses data for seven commodities (aluminium, copper, crude oil, maize, nickel, soybeans and wheat) and looks for evidence of trend-following behaviour in the pricing process itself. Using monthly data for the period 2000–2009, the study finds a single eight-month bubble for copper (February to October 2006), as well as one-month bubbles for aluminium (May 2006) and nickel (April 2007). Using daily data for the period 2006–2008 for crude oil and the three grains, and for the period 2000–2008 for the non-ferrous metals, the study finds clear evidence of price bubbles in copper trading (2004, 2006 and 2008), weak evidence for crude oil (first half of 2008), nickel (January–March 2007) and soybeans (early 2008), and clear evidence of the absence of any bubble for aluminium, maize and wheat.[15] However, Gilbert emphasizes that the results must be interpreted with caution because the identification of bubbles may be sensitive to the selection of the initial date for the sample,[16] and also because explosive price developments may indicate buoyant fundamentals (i.e. spurious herding) rather than speculative bubbles.[17]

IV. The interplay between physical and financial markets[18]

Scepticism is often expressed with regard to the link between financial investment and commodity price developments. One source of this scepticism relates to alleged 'logical inconsistencies' in the view that financial investment can affect prices even though it only relates to futures market activity and does not concern spot market transactions.

Irwin, Sanders and Merrin (2009) and Sanders and Irwin (2010) synthesize a number of arguments that have been made against the view that financial investment affect commodity prices. Their main point is that financial investors are involved only in financial transactions using futures markets; accordingly, any causal link between their position taking and cash prices would be complex and unclear. In particular, they argue that financial investors neither hold physical inventory nor hold futures contracts up to expiration and participate in the delivery process where, they claim, price discovery takes place. However, as argued by Gilbert (2010c: 409), in many markets, price discovery at delivery is often the mechanism of last resort, whereas the bulk of transactions are executed at futures prices with reference made to the price of nearby futures contracts. For maize, soybeans and wheat, the empirical findings in Hernandez and Torero (2010) support earlier evidence by indicating that changes in futures prices lead changes in cash prices more often than not. Moreover, financial investors may not hold physical inventory themselves but their investment bid up the prices for futures contract which, in turn, provides an incentive for others to hold inventory.

The observation that no such accumulation of inventory occurred during the commodity price spike of 2006–2008 relates to a second argument that was introduced by Krugman (2008) in relation to oil prices. According to him, speculative activity that drives prices above fundamental equilibrium levels will cause market imbalances and excess supply, which eventually must result in inventory accumulation. Reported oil inventories had not increased, so that, according to this reasoning, speculation cannot have played a role in the 2008-oil-price hike. However, Khan (2009: 5) argues that data on oil inventories are

notoriously poor. Most non-OECD countries, which account for almost half of world demand for crude oil and include very large consumers such as China, do not report data on oil inventories, and oil stored in tankers distorts the inventory data reported by OECD countries. Hence, no strong inferences can be drawn from such data. More fundamentally, Krugman's argument may take time to play out. As also argued by Gilbert (2010c: 408), it is correct to say that rising demand for futures contracts tends to cause a price increase in long-dated futures contracts which, in turn, will provide an incentive to accumulate inventories. But given the very low short-run price elasticity of commodity supply, the short-term inventory supply curve is close to vertical. As a result, only an increase in spot prices can meet the increase in demand. Over time, production and consumption will respond to the higher price, inventories will gradually accumulate and prices decline.

Third, Irwin, Sanders and Merrin (2009) and Sanders and Irwin (2010) argue that even if financial investors had any price impact and drove a wedge between market prices and fundamental values, such an arbitrage opportunity would cause rational traders to trade against such wrongly informed financial investors and bring market prices back to fundamental values. However, there is widespread agreement that there are limits to arbitrage, as discussed in section III.

The possibility that even rational traders may feed short-term price bubbles casts doubt also on a fourth argument made by Irwin, Sanders and Merrin (2009) and Sanders and Irwin (2010), namely that there is no indication for excessive speculation. Measuring the adequacy of speculation relative to hedging demands on the basis of positions, they argue that for the period 2006–2008 the level of speculation in commodity futures markets was within historical averages. However, judging the adequacy of speculation merely on the basis of the number of positions, rather than the kind of information and expectations on the basis of which such positions are taken, ignores the possibility that even rational speculators might not always trade on the basis of fundamental values. Moreover, even on the basis of such numerical comparisons, Büyüksahin and Robe (2010: 15) conclude that "[e]xcess speculation increased substantially, from about 11% in 2000 to about 40-50% in 2008."

Fifth, focusing on index investment, Irwin, Sanders and Merrin (2009) and Sanders and Irwin (2010) argue that if index investors in futures markets had caused the commodity price spike, then commodities not included in such indexes (such as iron ore, onions and rice) should not have experienced price increases. However, Tang and Xiong (2010) show that different mechanisms account for the price spikes of these two groups of commodities, whereby that of commodities included in indexes was affected by financial investors.

Finally, Irwin, Sanders and Merrin (2009) and Sanders and Irwin (2010) argue that if index investment affects prices, such effects should be uniform across markets for the same relative position size which, they claim, is not the case. However, the common effect of index investment occurs simultaneously with commodity-specific supply and demand shocks. These idiosyncratic shocks may counter or reinforce the common effect, depending on commodity-specific circumstances, and do so at different degrees. Moreover, the size of index-trader positions in a specific market does not depend on the size or the liquidity of that market, but on the specific composition of the index that the trader follows.

V. The overall impact on commodities price developments and market liquidity

A. Trader positions and commodity prices

The impact of financial traders on commodity prices is difficult to quantify. Part of this difficulty is due to the fact that the financialization of commodity trading became a major factor roughly at the same time as demand for physical commodities from emerging economies started to increase rapidly. These roughly simultaneous developments make it difficult to disentangle their relative price impacts.

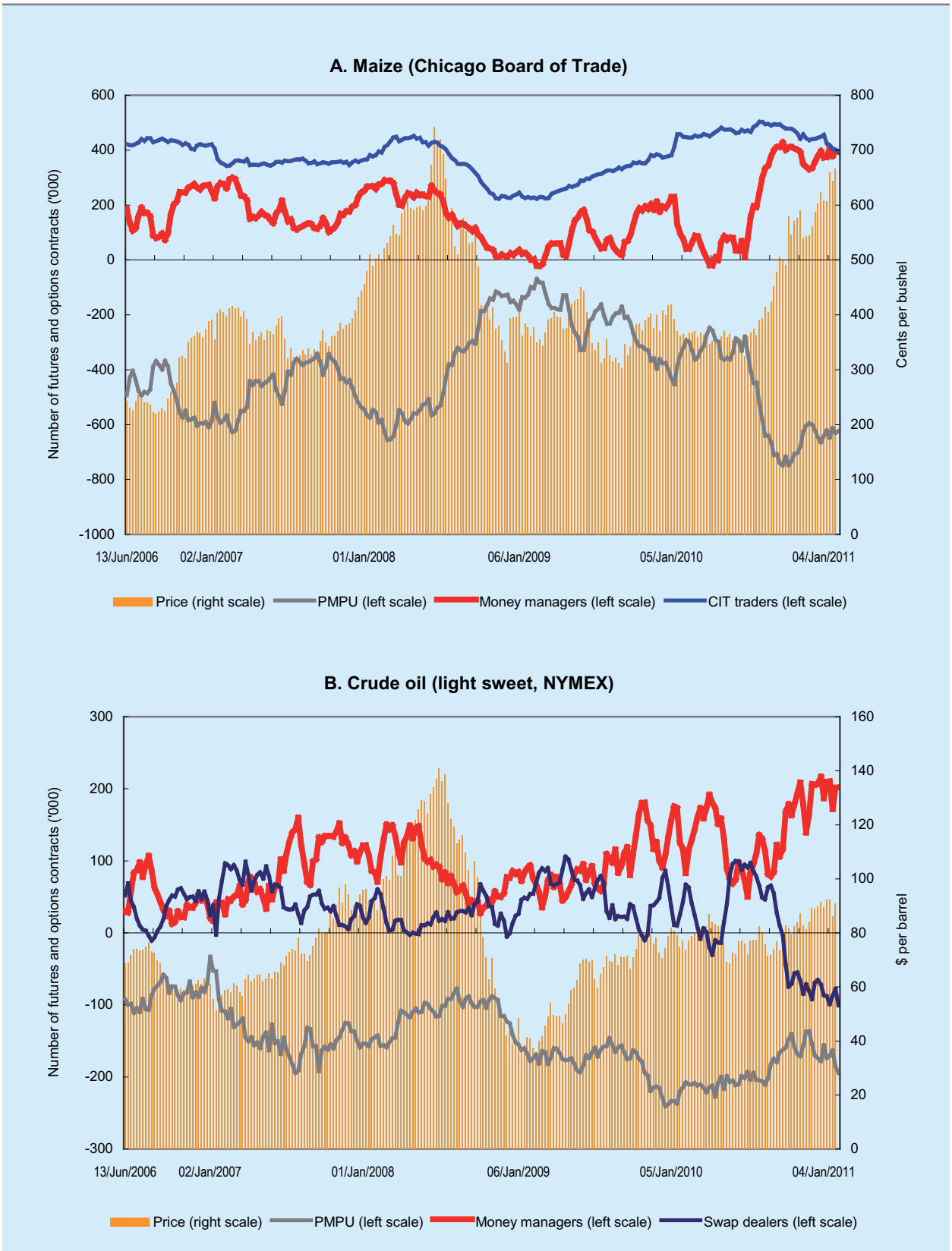
Accordingly, most empirical assessments of the impact of financialization on commodity prices have emphasized either fundamental supply-and-demand factors or variables that reflect the financialization of commodity trading. Given that commodity prices have been influenced by both factors, both these groups of studies have found a significant impact on commodity prices of the variables they selected. Hence, those that attribute most of the development of commodity prices over the past few years to fundamental factors (e.g. Sanders and Irwin, 2010), as well as those that point to an additional impact from increased financial investment (e.g. Gilbert, 2010b), have been able to provide empirical support for their point of view. A prominent recent empirical study has included both fundamental and financial variables (Tang and Xiong, 2010). The results of this analysis refute the contention that growing demand from emerging economies was the main driver of the commodity price hike in 2006–2008. They show that variables reflecting financialization remain significant even after controlling for fundamental factors. This finding suggests that the process of financialization has caused commodity prices to be determined no longer simply by supply and demand, but also by a wide range of financial factors and financial investors. The resulting change in commodity price dynamics is likely to persist and seriously affect commodity producers' hedging strategies, as well as many countries' food and energy policies.

Much of the empirical evidence discussed in the literature so far relates to the impact of index investments on the 2007–2008 commodity price spikes. However, as mentioned above, the relative importance of index investors has declined while that of money managers has increased. The question therefore arises as to what price impact these two trader categories have had over the more recent period.

Comparing price developments and net financial positions of different trader categories reveals a number of salient features (figure 4).[19] First, market participants that have an interest in physical commodities (i.e. the category PPMU) almost always take net short positions (i.e. they are net sellers of futures and options contracts). Second, financial investors almost always take net long positions (i.e. they are net buyers of futures and options contracts). Third, overall, the comparison provides only scant evidence of a long-running correlation between index positions and price changes. While there are clearly periods and commodities where positions and prices have moved together, especially during the price collapse in 2008 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 money-manager or index-trader positions during the steep price increase from mid-2007 to the end of the first quarter of 2008 (see UNCTAD, 2009). By contrast, there appears to have been a positive correlation between market positions and maize prices during the same period (figure 4). For oil, money-manager positions exhibited strong volatility, even as oil prices rose almost continuously from the beginning of 2007 through the second quarter of 2008 (figure 4). Nevertheless, in both graphs in figure 4 some correlation between position and price changes is present over subperiods, as peaks and turning points seem to occur around the same time.

Figure 4

PRICES AND NET LONG FINANCIAL POSITIONS BY TRADER CATEGORY, SELECTED COMMODITIES, JUNE 2006–FEBRUARY 2011



Source: UNCTAD secretariat calculations, based on weekly data from Bloomberg and CFTC.
Note: CIT traders = commodity index traders; PMPU = producers, merchants, processors, users.

Table 1

SIMULTANEOUS CORRELATION BETWEEN PRICE AND POSITION CHANGES, SELECTED COMMODITIES AND TRADER CATEGORIES, JULY 2009–FEBRUARY 2011

(Correlation coefficient)

Oil	Index positions	0.18
	Money manager positions	0.81
Cocoa	Index positions	0.35
	Money manager positions	0.45
Maize	Index positions	-0.08
	Money manager positions	0.52
Sugar	Index positions	-0.12
	Money manager positions	0.54
Wheat	Index positions	0.09
	Money manager positions	0.56

Source: UNCTAD secretariat calculations, based on data from Bloomberg and CFTC.

Fourth, and perhaps most importantly, since about mid-2009, when commodity prices appear to have terminated their downward overshooting and started a relatively stable sideward movement, which for most commodities ended with the onset of the price surge in mid-2010, there has been a fairly close correlation between price changes and changes in money managers' positions. This close correlation is further highlighted by the evidence given in table 1, where the especially high correlation coefficient for crude oil is noteworthy.

Overall, the above evidence indicates that active investment strategies are increasingly gaining importance at the expense of the more passive, broad-based index investment strategies. It also indicates a close correlation between commodity prices and the positions of financial investors that pursue an active trading strategy.

B. Herding and its effects in many different markets

As already mentioned, the decision by financial investors to add commodities to their portfolios relies on broad-based portfolio considerations. It is part of a larger change in portfolio strategy away from a concentration on equities, bonds and exchange rates and towards the inclusion of commodities. This change in strategy has been based on historic evidence suggesting that such a broader portfolio composition improves risk-return characteristics. Using data for the period 1959–2004, Gorton and Rouwenhorst (2006: 1) argue that "the risk premium on commodity futures is essentially the same as equities, [whereas] commodity futures returns are negatively correlated with equity returns and bond returns. The negative correlation between commodity futures and the other asset classes is due, in significant part, to different behaviour over the business cycle."[20]

However, recent evidence suggests that adding commodity futures no longer helps investors to hedge against equity market risk. The process of deleveraging that began with the onset of the current crisis in the summer of 2008 and affected all asset markets caused the return on commodity futures to become, in a very significant manner, positively correlated with the return on equity investment (figure 5).

From the evidence in figure 5, it would appear that the positive correlation between commodity and equity markets emerged only in the run-up to the current financial crisis, and that it became a remarkable fact only in its aftermath. However, it is well-known that diversification across different commodity categories and across individual commodities is to provide the most important diversification benefits from investing in commodity futures (Erb and Harvey, 2006; Basu and Gavin, 2011). Because the S&P-GSCI, which was used in figure 5, is heavily weighted in energy, it is possible that the evolution of this correlation during the early 2000s, and especially its strongly negative numbers in 2003, was heavily influenced by events in energy markets, and especially events around the war in Iraq in 2003. Thus, it is useful to examine the correlation between returns in non-energy commodity futures and equities. Doing so indicates that the correlation between returns on commodity futures and equity investment began to rise already in the early 2000s, well before the onset of the current crisis (figure 6).[21] This evidence supports findings by Tang and Xiong (2010) who "showed that the introduction of index trading led to a rise in the correlation among the individual commodities included in an index, thus reducing or even eliminating the gains to diversification within individual index funds." But it also shows that the crisis-related deleveraging process implied a further shift change and gave rise

Figure 5

COMMODITY AND EQUITY-MARKET DEVELOPMENTS:
CORRELATION BETWEEN S&P GSCI EXCESS RETURN AND S&P 500 INDICES

Source: UNCTAD secretariat calculations, based on Bloomberg.
Note: The data shown reflect one-year rolling correlations based on daily data.

Figure 6

NON-ENERGY-COMMODITY AND EQUITY-MARKET DEVELOPMENTS:
CORRELATION BETWEEN DJ-UBSCI NON-ENERGY EXCESS RETURN AND S&P 500 INDICES

Source: UNCTAD secretariat calculations, based on Bloomberg.
Note: The data shown reflect one-year rolling correlations based on daily data.

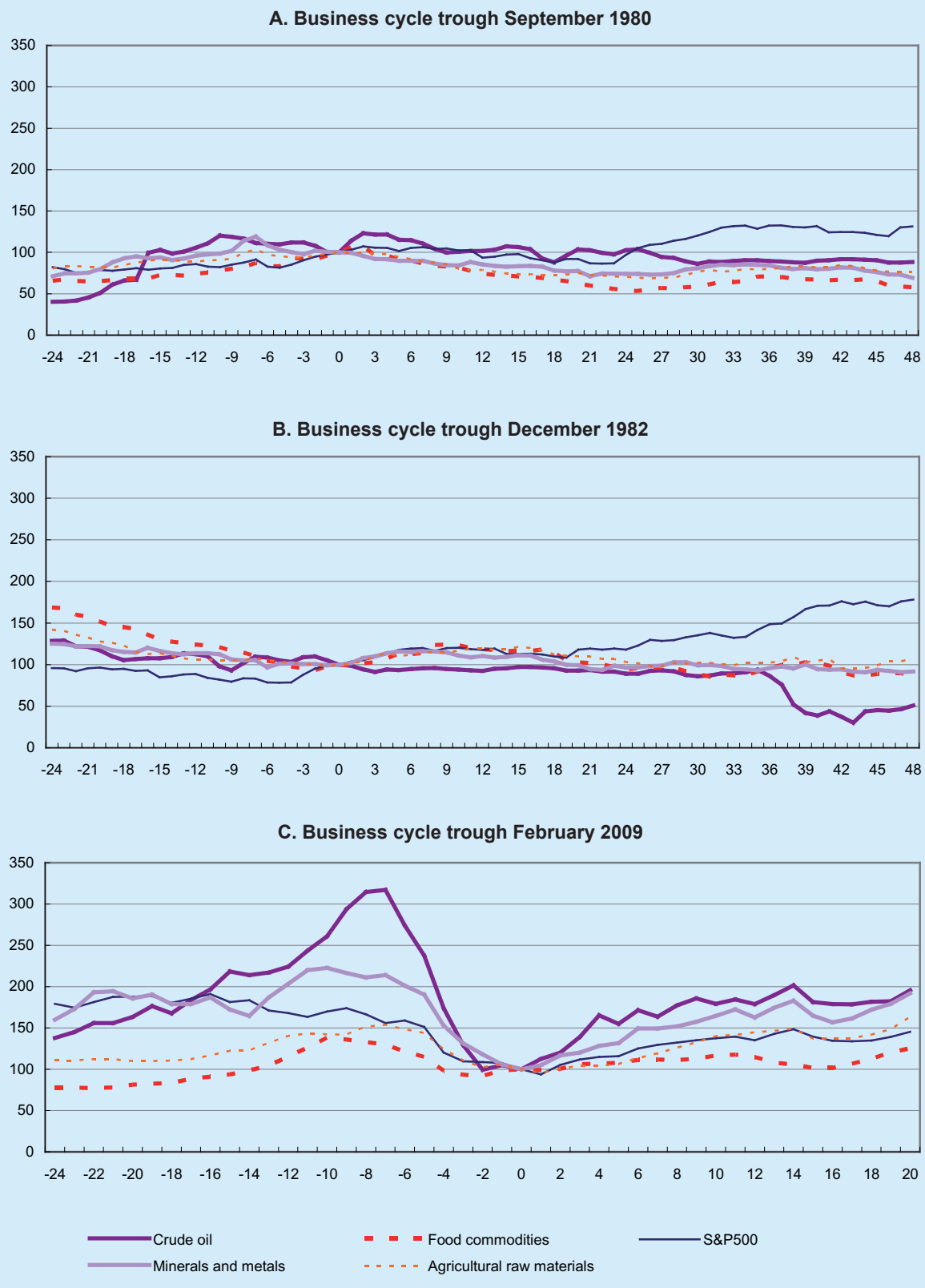
to a strongly positive correlation between returns on commodity futures and equity investments.

The significant price impact of financial investors, and especially the related impact of developments in equity markets on commodity prices, also affects the behaviour of commodity prices in the global business cycle. As already mentioned, returns on commodity and equity markets prices have historically been uncorrelated, or even negatively correlated, due to their different behaviour over the business cycle. Figures 7A and B show that following the business cycle troughs in September 1980 and December 1982 commodity prices tended to decline while equity prices increased. By contrast, there has been a remarkable synchronization of equity price and commodity price movements in the most recent cycle. Since the trough in February 2009, not only equity prices but also commodity prices have increased (figure 7C).

Figure 7

DEVELOPMENT OF SELECTED INDICATORS, SELECTED BUSINESS CYCLES, 1980–2011

(Index numbers: business cycle trough = 100)



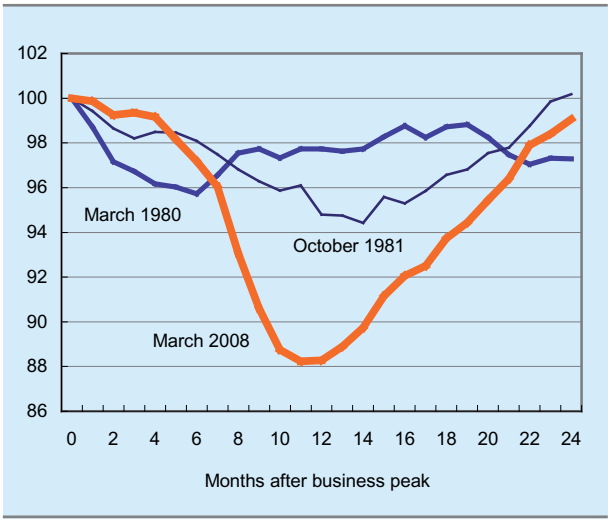
Source: UNCTAD secretariat calculations, based on CPB Netherlands Bureau for Policy Analysis; European Central Bank; OECD; and UNCTADstat database.

These price developments have also been noted by the IMF (2010: 33) that, however, warns against interpreting the increased synchronization as evidence in favour of the financialization of commodity markets and affirms that "increased co-movement, however, likely reflects the sensitivity of both markets to broader economic developments." But such an interpretation neglects the fact that the most recent decline in world industrial output was by far the strongest of all downward cycles in the past 35 years. With a sharp drop of 12 per cent from its most recent peak, other recessions look like mild slowdowns in comparison (figure 8). This low level of capacity utilization in the wake of the "Great Recession" of 2008 and 2009 would, in principle, imply a low level of industrial use for commodities and thus a low level of demand for commodities from their most significant users. Under such circumstances steadily rising prices for commodities, even ahead of the rebound of equity markets, appear to be related more to the anticipation of a future revival of demand rather than a response to actually rising demand. The most plausible explanation for such price behaviour is the financialization of commodity markets.

Figure 8

GLOBAL INDUSTRIAL PRODUCTION: DEVELOPMENT AFTER BUSINESS CYCLE PEAK, SELECTED BUSINESS CYCLES, 1980–2011

(Index numbers: business cycle peak = 100)



Source: UNCTAD secretariat calculations, based on CPB Netherlands Bureau for Policy Analysis and OECD.

More importantly, the fact that monetary policy has reacted to price pressure stemming from rising commodity prices by raising interest rates already far ahead of bottlenecks in industrial production points to a worrisome aspect of financialization: financialization risks causing damage to the real economy induced by the wrong signals it gives for macroeconomic management.

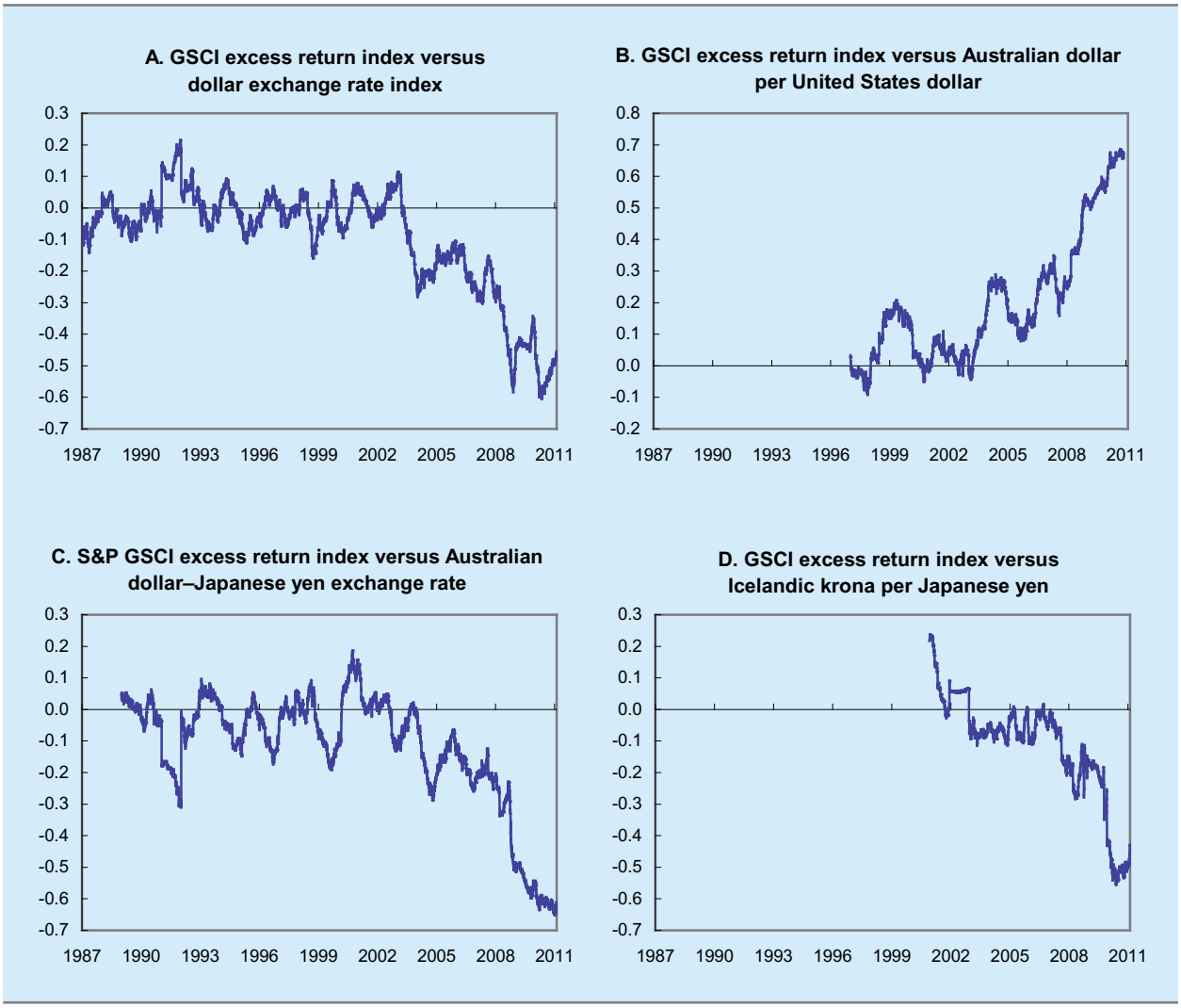
The greater correlation between returns on commodity futures and investment in other asset classes is not limited to equity markets. Indeed, such increased positive correlation appears to have emerged in a perhaps even stronger way with respect to currency markets.

It is well-known that dollar-denominated commodity prices often move in the opposite direction of the dollar exchange rate. This is because a lower value of the dollar makes commodities cheaper in non-dollar consuming areas, thereby increasing incentives to consume, while it reduces the revenues of producers in non-dollar areas, thereby decreasing incentives to produce (UNCTAD, 2008). This mechanism may well explain part of the increased negative correlation between returns on the S&P-GSCI excess return and the dollar exchange-rate index, which emerged in the early 2000s (figure 9A). Indeed, it is consistent with growing commodity demand from emerging economies in a period of dollar depreciation, as noted by Tang and Xiong (2010: 11). However, the abrupt character and sizeable size of this shift change, the fact that it occurred in 2002–2003 and that another similar shift change occurred in the wake of the current crisis suggest that other factors have contributed to this feature as well.

One such additional factor most probably is the emergence of the dollar as a funding currency of carry trade speculation.[22] The correlation between returns on commodity futures and the exchange rates of currency pairs that have been popular with carry trade speculators experienced a substantial change in 2002–2004, i.e. when the financialization of commodity trading began, as shown in figures 9B–D for a number of selected currency pairs. This evidence shows that the positive correlation between returns on commodities futures and exchange rates that have featured prominently in carry trade speculation emerged some time between 2002 and 2004. But it clearly gathered importance in the run-up to the commodity-price peak in 2008, was very strong after the onset of the current crisis when there was a general process of deleveraging across different asset classes, and it has remained substantial since then.

Figure 9

CORRELATION BETWEEN FINANCIAL INVESTMENT IN COMMODITIES AND SELECTED EXCHANGE RATES



Source: UNCTAD secretariat calculations, based on Bloomberg.
Note: The data shown reflect one-year rolling correlations based on daily data.

Taken together, the above evidence for the past two decades indicates that, relative to the historic importance of strategic diversification considerations, the search for yield has come to play a greater role for financial investors in commodities. This search for higher yield through investment in commodities may have been based on the illusion or risk-free profit maximization, given the historic diversification and hedging characteristics of financial investment in commodities. The recognition that the diversification benefit of investing in commodities may have been overestimated could provide an upper limit to broad-based index investment in commodities. But it could also increase the attractiveness of more targeted investment, such as through indexes limited to specific categories of commodities or even individual commodities. The recent increased popularity of exchange-traded products, many of which are related to indexes that replicate the return on selected commodities, may indicate that financial investors are not yet ready to turn their back to commodities as an asset class.

VI. Interviews of market participants

Interviews with commodity market participants can provide valuable qualitative insights with regard to both what sources of information physical and financial traders actually use and how they process this information. This section provides a brief account of such interviews that were conducted in Geneva between December 2010 and February 2011.[23]

Physical traders mentioned official statistics and publicly available reports as key sources of information. Those engaged in soft commodities stressed the importance of supporting such information through local information from producing countries. However, only large trading companies could obtain such information as smaller firms could not afford employing so-called "crop counters". Most traders pointed to the role of conversations with other traders in providing information as to "what the market thinks". Finally, the physical traders felt it to be necessary to have an idea about the position-taking (intentions) of financial traders, as their positions involved considerable volumes and, thus, were likely to have short-term price effects. Such information was required in particular because financial traders were increasingly getting involved also in physical markets, for example through the creation and management of physically-backed ETFs. The greater recent incidence of sharp short-term price fluctuations, in turn, had made hedging more expensive (because of additional margin payments) and, in particular, riskier as an existing favourable hedge position could rapidly become unfavourable and as it was not clear, even from one day to the other, whether an existing contractual commitment could be closed as foreseen. To contain such risk, physical traders would increasingly try and anticipate position changes by financial traders, for example, by observing financial data to which financial traders were presumed to react and by employing technical analysis similarly to that often used by financial investors.

Financial traders also pointed to the importance of information about physical market conditions. They said that, over the past few years, demand had been increasing faster than supply, supporting a medium-term rising price trend. In this situation, it was crucially important to have information about inventories because when inventories were low even small supply shocks could trigger sharp price movements, i.e. give rise to substantial profit opportunities for financial investors. It was also important to know how much information was available, and of what quality it was, as this could approximate the state of uncertainty in the market which, in turn, would indicate the probability of sharp price changes.

VII. Conclusions

The financialization of commodity markets implies that, over significant periods of time, price developments do not appropriately reflect new information regarding commodity-specific supply and demand conditions. As a result, there may be a sizeable misallocation of resources. Information coming from financial markets contaminates ordinary price discovery in commodity markets, thereby generating wrong signals for consumers and producers. Any adjustment made on the basis of such information may turn out extremely costly once the price bubbles burst.

Policy responses to improve market functioning should emphasize the following areas:

- Increased transparency in physical markets – while information on supply and demand is

available from a variety of sources, there is substantial uncertainty in terms of the timeliness and reliability of information, particularly for inventories. The harmonization of data provision and a more systematic way of data presentation would greatly facilitate the accessibility of available information. Inventories are often held by the private sector and the proprietary character of this information causes publicly available inventory data to be particularly incomplete. Owing to these factors monitoring and analysing information on commodity market fundamentals is a difficult task, so that a significant proportion of trading in commodities is subject to considerable uncertainty. In such a situation, market participants may tend to give undue attention on non-fundamental factors and risk engaging in herd behaviour.

- Increased transparency in commodity exchanges and OTC markets – more information on position-taking by different categories of market participants should be made available and it should be published at shorter time intervals. This applies in particular to commodity trading in Europe where transparency lags significantly behind that in United States markets. Improved transparency is important not only for market participants but also for regulators, who can only intervene if they know what is happening in the market.

- Tighter regulation of financial investors – tighter rules at the international level would be an optimal scenario, so that regulatory migration could be avoided. The large size of financial positions often causes changes in the positions of financial investors to impact prices. The imposition of position limits aimed at limiting the engagement of individual financial investors in commodity markets might be helpful in this respect. However, it is difficult to determine appropriate levels of position limits. Hence, as a first step, it might be useful to adopt position points at which traders would be required to provide additional information. In addition, proprietary trading of financial institutions that are involved in hedging transactions of their clients would need to be addressed, because of conflicts of interest.

- A number of commodity price stabilization measures are currently being debated. They include the establishment of a government-administered virtual reserve mechanism and the introduction of a transactions tax system. These deserve further consideration. However, effective implementation of these schemes may prove difficult, for both administrative and technical reasons.

Notes

1 This contribution is drawn from UNCTAD (2011), unless indicated otherwise.

2 This is evidenced by the frequently quoted examples of commodity price bubbles created by financial investors, including the tulip mania in Holland in the 1630s, the Mississippi Bubble in France and the South Sea Bubble in England in the early 1700s (Garber, 1990).

3 Financial innovation has played a facilitating role, as tracking commodity indexes, such as the Standard and Poor's Goldman Sachs Commodity Index (S&P GSCI), is a relatively new phenomenon. Commodity market deregulation, such as enacted by the Commodity Futures Modernization Act (CFMA) of 2000, was a further facilitating factor, as discussed in UNCTAD (2009: 76–77).

4 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.

5 For further discussion, see UNCTAD (2011).

6 The following discussion ignores "non-reporting traders", i.e. smaller traders who are not obliged to report their positions, as well as "other reporting traders", i.e. every reporting trader that is not placed into one of the three categories mentioned in the text. Positions of the latter category are usually negligible but may at times become more important such as, for example, in cocoa, cotton and soybeans in early 2011.

7 This approximation is crude. In fact, the index trader category of the *Supplementary Commodity Index Traders* (CIT) reports does not coincide with the swap dealer category in the *Disaggregated Commitment of Traders* (DCOT) reports. This is because the swap dealer category of the DCOT reports includes swap dealers who do not have commodity index related positions and, therefore,

are not included in the index trader category of the CIT reports. Also, the index trader category of the CIT reports includes pension and other investment funds that place index investment directly into the futures markets rather than going through a swap dealer; these traders are classified as managed money or other reportables in the DCOT reports (see also Irwin and Sanders, 2010).

8 Uncertainty in decision-making may be a defining characteristic of commodity markets. This is because (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; (ii) inventory data, which provide valuable signals for short-term price expectations, suffer from significant measurement errors (Gorton, Hayashi and Rouwenhorst, 2007; Khan, 2009), and (iii) data on current global commodity supply-and-demand conditions are published with long time lags and are frequently revised. Therefore, even well-informed traders must formulate price expectations on the basis of partial and uncertain data.

9 Experimental evidence on persistent judgemental errors in decision-making abounds (see, for example, Ariely, 2010).

10 High-frequency trading (HFT) is a technologically advanced method of conducting algorithmic trading at ultra-high speed. Contrary to other types of algorithmic trading, which focus on price levels and maintain positions over a period of time, HFT traders attempt to benefit from price volatility and usually close out their positions by the end of a trading day. HFT has attracted considerable attention following allegations that it caused the so-called "flash crash" on United States equity markets on 6 May 2010. Some observers have also blamed algorithmic trading for the increase in price volatility on sugar markets since November 2010 ("High-speed trading blamed for sugar rises", *Financial Times*, 8 February 2011).

11 Similar mechanisms apply when investors follow the advice of analysts who overweigh public information and underweigh their own private information in their messages. Conformity to other analysts' messages increases investment in the recommended asset and the associated return. This, in turn, improves the analysts' reputations.

12 Casual observation suggests that the release of United States Department of Agriculture (USDA) reports on livestock and agricultural crops have significant price effects.

13 Such price predictions can have significant impact if they come from a reputed source. For example, Arjun Murti, a Goldman Sachs analyst, gained considerable fame between 2004 and 2008 when his successive predictions of ever higher oil prices appeared to be vindicated by market developments. According to media reports, other investors questioned whether Goldman Sachs' own traders were benefiting from these predictions, but the bank's chief executive denied such accusations ("An oracle of oil predicts $200-a-barrel crude", New York Times, 21 May 2008).

14 While this "true number" is necessarily hypothetical, frequent disclosure of disaggregated data on positions taken by different trader categories in futures exchanges and OTC markets could provide valuable information in this context.

15 In a further step, Gilbert (2010a) estimates the price impact of index-based investment by comparing the actual price developments with those that would have prevailed had there been no index investment. The evidence indicates that for crude oil prices, index investors accounted for about 3–10 per cent of the price increases in 2006–2007, but that their impact rose to 20–25 per cent in the first half of 2008. Their impact on grain prices is estimated to have been about half that for oil. Gilbert (2010a: 26, 28) concludes that during the first half of 2008 "index-based investment generated a bubble in commodity futures prices" and that overall "it would be incorrect to argue that high oil, metals and grains prices were driven by index-based investment but index investors do appear to have amplified fundamentally-driven price movements."

16 Phillips and Yu (2010) indicate that this problem can be solved by using an information criterion, rather than the beginning of the data series, to determine the date of the first observation.

17 Phillips and Yu (2010), on examining the migration of price bubbles across equity, bond, currency and commodity markets (cocoa, coffee, cotton, crude oil, heating oil, platinum and sugar) since the mid-1990s, find a sequence of price bubbles, each followed by a financial collapse. They show that with the eruption of the subprime crisis in August 2007, financial investment transited from the United States housing and mortgage markets onto certain commodity and foreign-exchange markets. Growing awareness of the serious impact of the financial crisis on real economic activity both in the United States and globally caused the general collapse of asset prices in mid-2008. With respect to commodity prices, their results point to a price bubble in crude oil between March and July 2008, in heating oil between March and August 2008, and in platinum between January and July 2008, while no price bubbles are detected in cocoa, coffee, cotton and sugar. This supports the finding of Gilbert (2010a), whose product sample overlaps with that of Phillips and Yu (2010) only with respect to crude oil, for which he identifies a price bubble during the first half of 2008. Phillips and Yu (2010: 26) explain that early phases of speculative bubbles are characterized by only small price divergences from fundamental values, and are therefore statistically indistinguishable. This may explain why the estimated date for when the oil price bubble begun is somewhat later than the observed beginning of the rapid price increase.

18 This section is drawn from Mayer (2011).

19 For simplicity, these graphs show the net positions of only three trader categories. Both graphs omit the category "other reporting traders". The graph for maize also omits the category "swap dealers", whose positions correspond closely to that of the category "CIT traders". Given that no data for the category "CIT traders" are available for crude oil, the respective graph shows the category "swap dealers". However, it should be noted that, contrary to agricultural commodities, for energy commodities, such as crude oil, the positions taken by "swap dealers" and "CIT traders" may differ significantly. This is because swap dealers operating in agricultural markets undertake only a few transactions that are not related to index investments. Swap dealers in energy markets, by contrast, conduct a substantial amount of such non-index related transactions, which is the very reason why the CFTC has excluded energy commodities from its CIT reports. The CFTC (2008) estimates that in 2007–2008, less than half of the long swap dealer positions in crude oil futures were linked to index fund positions. This may also explain why

swap dealer positions in crude oil are significantly more volatile that those in agricultural markets.

20 As discussed in more detail by Basu and Gavin (2011: 44–46) on the basis of additional empirical evidence, Gorton and Rouwenhorst (2006) found a statistically significant negative correlation between returns on equities and commodity futures only for longer periods, such as five years. For short periods it was nearly zero, and for periods up to one year it was negative but not statistically significant.

21 Statistical tests indicate that the shift change in the mean of the correlation following the burst of the equity-market bubble in 2000 is strongly significant even if the post-crisis period is excluded. The evidence is qualitatively similar, though numerically less strong, if the S&P-GSCI non-energy index is used instead of the DJ-UBSCI non-energy index.

22 Carry trade speculation is a strategy in which an investor sells (e.g. by incurring debt in) a currency with a relatively low interest rate (i.e. the so-called "funding currency") and uses these funds to purchase short-term assets denominated in a different currency yielding a higher interest rate.

23 Geneva is a well-suited location for such interviews as with over 500 registered commodity trading companies it is among the global centres of commodity trade and commodity trade financing. For a full account of these interviews, see section 5 in UNCTAD (2011).

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Area (1)

ECONOMIC DEMAND-SIDE DRIVERS

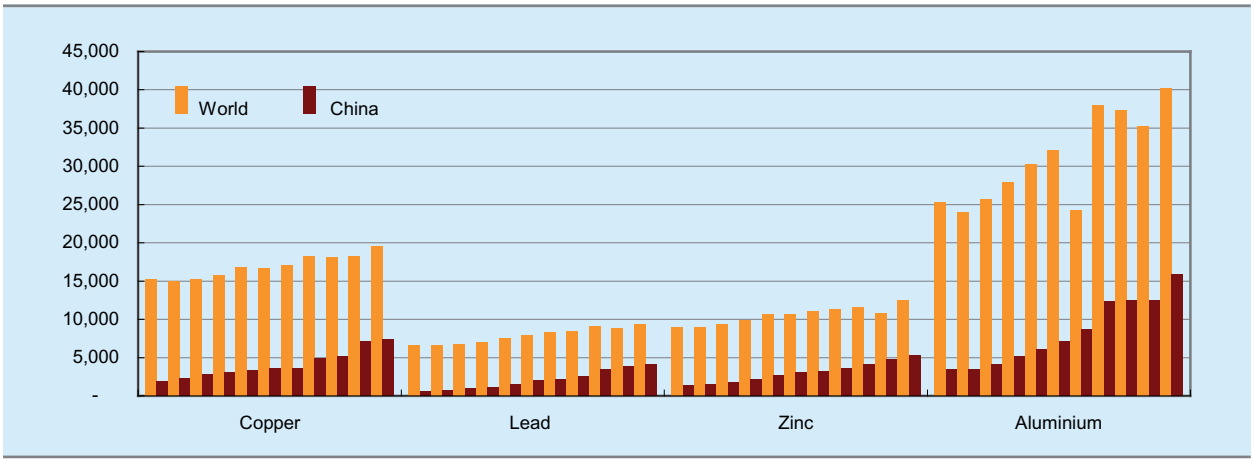
I. Demand outlook and medium-term trends for major metal commodities

Global output growth and the associated supply and demand forces are major determinants of mineral-commodity prices. During 1998–2009, global base metals demand increased by an annual average rate of about 4 per cent, slightly exceeding the growth of primary production. As a result, most metal markets moved into, or very close to, deficit, as measured by the difference between primary production and consumption. This sharp increase in demand for metals can be attributed mainly to economic growth, as well as industrialisation and urbanization, in emerging developing countries, particularly China. Between 2000 and 2008, China's consumption of key base metals (such as aluminium, copper, lead, nickel, tin, and zinc) grew on average by 16.1 per cent a year (World Bank 2010: 7). In 2009, despite the crisis, Chinese base metals demand grew by about 24 per cent, whereas in the rest of the world metal consumption declined by about 13.5 per cent. However, in 2010, China's imports of base metals sharply declined with attendant effects on the country's demand for base metals (Angel Commodities, 2011: 2). Figure 10 shows Chinese consumption trends for four base metals during the last 10 years.

Figure 10

BASE METAL CONSUMPTION TRENDS IN CHINA, 2000–2010

('000 tons)



Source: International Study Group (for copper, lead and zinc) and World Bureau of Metal Statistic (for aluminium).

Over the short to medium term, demand for base metals and iron ore is widely expected to double, based primarily on the commodity-intensive growth pattern of emerging countries. However, a key factor in this assumption is that global macroeconomic economic conditions support mineral commodity demand. In this regard, it needs to be recognized that both developed and developing countries may face inflationary pressure that may induce governments to unwind economic stimulus, thereby also reducing support for mineral and metals intensive industries. This together with the elevated risk of financial stress in the euro area, concerns about fiscal sustainability in some major advanced economies, and risks of overheating in emerging economies (such as China) could result in a larger-than-expected decline in projected world growth rates and an overall reduction of base metals consumption (such as copper and zinc).

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Area (2)
ECONOMIC SUPPLY-SIDE DRIVERS

I. Supply outlook and medium-term trends for major metal commodities

Over the about 10-year period prior to the onset of financial and economic crisis, there were some indications that metals supply was responsive to rising prices. But in spite of this supply response, most metal markets were approaching a situation of supply shortfalls, and excess metals demand needed to be met by running down inventories or using scrap. Concerns as to the ability of supply to keep pace with future consumption growth have remained, in particular in light of the commodity-intensive growth of emerging countries. This increasing metals scarcity is related only partly to a lack of capital investment associated with the financial crisis. For some metals, technological and geological constraints have also led to declining mine productivity, in particular for copper and tin. For other metals, constraints on current production technologies imposed by environmental policies may also affect supply, in particular for lead and, to a lesser extent, aluminium. Box 1 presents the impact of energy efficiency targets and weather conditions on aluminium production in China in 2010.

Box 1

ENERGY EFFICIENCY AND WEATHER CONDITIONS IMPACTS ON ALUMINIUM PRODUCTION IN CHINA

Pressures on Chinese energy efficiency targets from an expiring five-year plan and the resulting curtailment of over 2.5 million tones of Chinese smelting capacity during the second half of 2010 led to Chinese production levels falling from a record peak in June to a fifteen-month low in November 2010. The supply cuts were exacerbated by cold weather conditions in China towards the end of 2010, leading to power shortages within some of the key aluminium producing regions, and delaying smelter restarts. The supply curtailments have had no noticeable impact on China's aluminium imports but encouraged destocking within China with the State Reserve Bureau selling back into the markets some of the stocks it had accumulated during the financial crisis.

Source: Tulpulé (2010).

II. Investment trends in metals exploration

With metal prices on the rise again, global investment for exploration has started to pick up again in 2010, after a sharp fall in 2008-09. Investment levels are now back to the record level reached in 2005 ($8 billion). According to Metals Economic Group, exploration budgets reached a record of $11.2 billion in 2010. Planned exploration spending increased in all regions of the world. Latin America, which has been the most popular exploration destination since 1994, accounts for the largest share of allocations, attracting 27 per cent of global spending. In this region five countries (Mexico, Peru, Chile, Brazil and Argentina) have traditionally attracted the vast majority of exploration spending directed to gold and base metals. Africa also continues to attract more exploration spending and accounts for 13 per cent of global exploration budgets. Four countries attracted almost half of the planned spending in this region (Democratic Republic of Congo, South Africa, Zambia and Burkina Faso).

The bulk of exploration spending is carried out by companies based in Australia or Canada. However, China is also becoming an increasingly relevant investor in mineral exploration worldwide. In 2010, Chinese companies accounted for about 11 per cent of the global exploration total, with about 31 per cent of

Box 2

COPPER: SUPPLY AND DEMAND TRENDS

From 2000 to 2007, world copper demand grew by 2.6 per cent. Demand fell in 2008 and part of 2009 as a result of the economic downturn, but then resumed its upward trend, mainly driven by strong demand from China. With regard to refined copper, in 2010, consumption levels grew by about 7 per cent principally owing to economic recovery in the European Union (EU), Japan, and the United States, where consumption grew by 8, 20 and 8 per cent, respectively. However, consumption in these advanced countries remained well below pre-crisis levels (aggregate consumption is still 18 per cent below its level in 2007). In 2010, Chinese consumption increased by a more modest 4.3 per cent; however, this increase followed on the very strong consumption growth of 37 per cent registered in 2009. Overall, excluding China, global consumption of refined copper increased by around 8.5 per cent in 2010. In 2011, world copper demand is expected to increase at around 6.5 per cent pushed by economic recovery and restocking elsewhere, in particular of refined copper.

From the supply side, global mine production contracted by 0.5 per cent in 2009. In 2010, world mining production increased by a modest 1 per cent. Copper mine capacity is set to grow in the future but the industry faces a number of challenges, notably declining ore grades, rising costs, declining energy and water availability. Much of the growth in supply is projected to come from Latin America and Africa's copper belt. Nevertheless, production in the latter region poses challenges with respect to labour, power, and flooding, as well political risks regarding licensing and contracts. Refined copper production will also continue to witness a decline due to the tight global copper concentrate market. From a longer perspective, higher copper prices and supply deficit could accelerate substitution. However, prospects of rapid and significant substitution are expected to be limited. Overall, a major concern for the global copper market is the lack of new large copper mines in pipeline.

Source: Angel Commodities (2011), International Copper Study Group (2011), World Bank (2010).

their budget allocated to metals exploration in Canada, Africa, and the Pacific/Southeast Asia regions. In 2011, it is forecasted that worldwide exploration spending will further increase as metal prices remain strong (Metals Economics Group 2011: 7).

Box 2 discusses supply and demand trends for copper. Copper is widely seen as a gauge of world economic activity as it is used in construction and transport.

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