



The relentless progress of commodity exchanges in the establishment of primary commodity prices [☆]



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ABSTRACT

A continuously expanding group of commodities are being priced on commodity exchanges. This paper explains the causes to the increasing preference of exchanges as pricing instruments. It also provides the detail of the shift in the 1970s and 1980s from producer determined prices to prices set by commodity exchanges for three major commodities—aluminum, nickel and petroleum.

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Introduction

The thesis of the present study is that commodity exchanges have proliferated over time as tools for primary commodity pricing. The detailed purpose of my deliberations is to explain how and why this development has taken place, and more specifically to have a careful look at the process through which pricing of three major commodities, aluminum, nickel and crude oil, was shifted some decades ago from a regime where the leading producers from time to time announced prices at which they were prepared to sell, towards the quotations established in deals transacted on commodity exchanges. The pricing of iron ore has recently been subject to fundamental change whose ultimate outcome is not yet clear. A follow-up question addressed at the end of the paper is if pricing of iron ore, too, will end up on the exchanges.

Before venturing into each of the three commodities, in turn, I find it useful to provide a context by reviewing the major alternative trading arrangements and pricing systems employed in primary commodity markets. I then turn to a detailed review of the materials under scrutiny, and inquire about the inevitability of the events that took place, their major drivers, and the motives of the parties on both sides of the transactions that permitted the shifts to take place.

A final part of the study comprises an evaluation of the main benefits and costs to the involved parties of the shift in pricing system for the three materials under review, as well as in more general terms. Issues like price instability, price transparency, facilities for trading and inventory holding and shifting distribution of benefits from trade are given consideration. A brief concluding section summarizes the producers' and consumers' sentiments towards using exchanges for pricing primary commodities.

Alternative trading arrangements and their implications for price formation in primary commodity markets¹

A myriad of arrangements are being practiced for pricing primary commodity trade, so the discussion in the present section must be selective. My ambition is to classify the trading and pricing arrangements into a few major forms, to indicate some of the markets in which they are practiced, and to point to the major implications for the sellers and buyers of each form. The logical order of my classification is from some highly private and opaque arrangements to the most public and transparent ones.

Transfer prices

Transfer pricing in commodity trading occurs when the producer/seller and the user/buyer are part of the same vertically integrated corporation. The prices in such trade are internal to the firm, and can be set at any level. They appear only in the accounts

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¹ This section draws heavily on Radetzki (2008).

of the firm and are seldom published. The transfer price level does not affect the corporate profit before tax.

Transfer prices assume importance only when trade across borders is involved. The profit maximizing multinational corporation will set the transfer prices so as to minimize the sum total of profits tax, export tax and import duty. Import duties on raw materials are usually low, so ordinarily the major corporate concern is with profits and export taxes. If the transfer price is set low, profits will be shifted to the importing country. This will reduce the tax burden, when the profits tax in the importing country is lower.

Where transfer prices dominate a market, the price transparency will usually be low. Even if the prices were known, it is unclear whether they would reflect the costs of production or the price level that would emerge in arm's length transactions.

Bauxite trade probably offers the best example of a commodity market based importantly on transfer prices. The extent of vertical integration from bauxite to alumina and aluminum is still high, and a substantial share of the bauxite and alumina that enter international trade is internal corporate deals. Transfer price arrangements also account for minor shares of international transactions in, for example, iron ore, tea, rubber, and some edible oils, where the processors in industrialized importing countries own some of their sources of primary supply. Transfer prices were far more common in the 1950s and 1960s, for example in petroleum, iron ore, unrefined copper and many food products. Since then, there has been a wholesale vertical de-integration of the industries producing and processing these materials. This resulted, importantly, from a widespread wave of nationalizations of the raw material producing industries in developing countries, but to some extent also due to changing fashions which considered vertically integrated corporate structures as imposing undesirable constraints on both buyers and sellers. In consequence, the significance of transfer pricing has been greatly reduced.

Posted prices

Governments of exporting countries desirous to maintain their tax income have instituted posted prices in some cases, to be applied for the purpose of tax assessment in the exporting unit of the integrated firm. These prices have sometimes been derived from production costs; in other cases they have been based on perceptions of prevailing price levels in trade between independent parties. The institution of posted prices reduces the corporate benefit from tax avoidance through transfer price manipulation.

Posted prices were widely applied in the oil market during the early 1970s, a period when the OPEC producers acquired their muscles, and when, initially, there was little arms length oil trade, so no meaningful market quotations existed. The major oil companies traded oil internally applying transfer prices that were often quite suppressed and that were rarely published. The major producing countries needed a measuring rod for taxing production and exports, hence developed a system of posted prices that were thought to reflect the value of oil. The need for the somewhat artificial posted pricing system in oil ceased to exist as OPEC countries nationalized their oil industries later in the 1970s, and government income from oil became dependent on the actual prices that the state owned enterprises could obtain from oil sales.

Bilateral contracts

This was for long a predominant arrangement in international commodity trade, and still is the normal transaction mechanism in many markets, comprising most minor metals and industrial minerals. It involves a pair of agents who independently agree on the terms that will apply to the trade between them. The crucial

terms on which all contracts have to be explicit are the commodity specification, the quantity, the time and place of delivery and the price. Other than that, bilateral contracts come in many different forms. Thus, some contracts can relate to a single transaction, while others concern repeated deliveries stretching over periods from a few months to a decade or more.

Bilateral contracts often employ the price levels set elsewhere, e.g. on commodity exchanges, as guiding posts for their price determination. Price setting becomes more tricky for commodities that do not have alternative guiding rods for prices that both parties can agree to use, for then each bilateral pair will have to negotiate and agree on the price that will apply to its contract. This will be arduous and time consuming. Since prices of contractual agreements are rarely published, the negotiations may result in a wide range of price levels at a particular point in time.

In practice, there are often conventions which simplify the procedure of price determination, and help avoiding blatant deviations from some average price level. In manganese, for instance, where most trade is transacted through annual bilateral contracts, a commercial practice has developed where a major supplier enters into preliminary discussions with a major customer, while the rest of the industry defers its contract negotiations. As soon as this pair reaches an agreement, all other suppliers and users adopt the agreed price as a guideline for their own price setting. Very similar practices applied to the annual contracts under which a large proportion of international iron ore trade was transacted, but this system has been undergoing significant change in the recent past (Wilson, 2012).

In other cases the price transparency in bilateral contract markets is quite limited. This is true, for instance, of the international markets for sisal and jute or of phosphates and chromite, though in all these cases trade associations or specialized journals publish prices or price ranges purporting to reflect the levels of actual transactions. In uranium, NYMEX provides a time series of prices reflecting a thin spot trade market that is used for guidance of pricing immediate bilateral contract transactions, while the evidence of prices applied in the long-term contracts that dominate uranium trade, is scattered and less systematic.

In some cases, the true price may not even be clearly apparent from the content of the bilateral contract. This would be the case when the contracted price is preferential, to take account of the provision of long-term investment finance, or equity participation, by the buyer. Similarly, barter deals make it very hard to determine the true commodity price contained in the contract.

Especially in cases with lacking transparency, there is a likelihood that small parties with lesser access to information and with weaker bargaining power will get a worse deal in bilateral contracts than they would in the more transparent and impartial arrangements, such as those characterizing auctions and exchanges.

Producer dictated prices

Producer dictated prices, commonly known simply as 'producer prices', are of particular relevance to the present study, since this is the system that was originally employed in aluminum, nickel and oil, and that then disintegrated and was replaced by exchange determined pricing.

Producer dictated prices mean that the leading producer (s) announce the price at which they are willing to sell. In addition to virtually all manufactured products markets, such pricing systems occur in commodity markets where the number of producers is relatively small, and where each sells to many customers. Producer pricing implies some degree of monopoly power (Felgran, 1982); it also affords the producers a certain degree of initiative and convenience. The commodity is sold on a

take-it or leave-it basis, and, at least in theory, the producer's need to bargain with each customer is obviated. The example par excellence of producer pricing is the De Beers arrangement for the sale of uncut diamonds.

Some producer dictated pricing systems appear to be disintegrating, and examples are quoted below. Three factors commonly trigger such disintegration: (a) reduced producer concentration along with a weakened market share and market power of the leading supplier, features that have been accentuated by a widening of markets caused by declining communication and transport costs and falling tariff barriers; (b) inadequate adjustments of the producer set prices to emerging market conditions, creating unwanted market tensions and imbalances; and (c) emergence of alternative price quotations provided by traders or after the introduction of exchange-based trade.

Producer prices are commonly set for extended periods. An advantage of this is predictability and an apparent stability, compared to the daily and hourly price fluctuations on the exchanges. But the stability entails that lags will arise in pricing adjustments to shifting market conditions. When markets tighten, implying an increased price to keep demand equal to supply, an unchanged producer price will involve excess demand and necessitate rationing that inconveniences buyers. Conversely, producers will be unable to dispose of their entire supply when markets weaken, while prices remain. Producer inventories will then rise, or the producers will have to offer hidden rebates if they want to sell their entire output. Hidden rebates involve injustice to less privileged buyers.

Producer price quotations can coexist with prices set by commodity exchanges, but such coexistence will reveal the inconsistency between the two price series, and will tend to gradually dilute the producers' pricing power, until their quotation loses relevance (De Kuyper, 1983). This is the way that regional producer price quotations of the 1960s for copper and zinc went into oblivion, and that the producer set prices for aluminum and nickel in the 1970s were overshadowed by quotations of the initially insignificant trade on the LME. Cobalt, molybdenum and platinum are contemporaneous examples of similar, but not yet fully consummated shifts.

The historical pricing power held by cobalt of the Central African producers was taken over in some measure by Norilsk Nickel of Russia in the 1990s, while Western Mining Corporation (later merged with BHP Billiton) operated a mixture of producer pricing-cum-auctions on the internet for its cobalt sales (Humphreys, 2011a). Molybdenum prices used to be set by Amax (later integrated with Phelps Dodge), the leading US producer. But as the US share of global output declined from 70% in 2001 to 54% in 2010 (Cochilco, 2011) Amax' pricing role was replaced by trader quotations. Trading in cobalt and molybdenum was introduced on the LME in 2010. A few South African mining companies continue to account for a dominant share of world platinum production, and they prevail in setting a producer price. Platinum has been traded on Nymex since 1956, but only in recent years have the quotations there become the leading price indicator for the metal, leading to increasingly flexible and frequent adjustments in the producer quote, so as to mirror the free market price.

User driven prices

These are arrangements identical to producer dictated prices, but with the roles reversed, with the buyers being few and able to dictate prices to prolific producers. Such arrangements are not very common, and can be treated briefly. An example from the 1950s is the military procurement of uranium by the US and UK authorities, whose complete dominance of demand until the early 1960s permitted them to set the terms of their purchases

(Radetzki, 1981). User dictated prices prevail in some markets for food products, where heavily concentrated food processors and, increasingly, huge and widespread retail chains, encounter many scattered farmers.

Auctions

Auctions commonly accommodate many sellers and buyers, but unlike exchanges which operate continuously, business is transacted only at irregular intervals. In distinction from exchanges, where the double auction principle is applied, i.e. buyers and sellers are equally active in trade, the auction markets apply the principle of single auction, with a more passive role assigned to the sellers (ordinary auction) or to the buyers (Dutch auction). In ordinary auctions, the practice is to deal with the sellers consecutively, and to offer the supply of each at a time. Normally, the buyers make successively higher bids, with the transaction priced at the highest bid. In Dutch auctions, the procedure is reversed: the seller makes successively lower offers, with the transaction priced at the first accepted offer. As in the case of exchanges, auction prices are public and transparent, but they may lack continuity if auctions are irregularly held.

A key reason for trade at auctions rather than at fully fledged exchanges is the existence of a cumbersome variety of grades across producers and over time, in which these commodities are sold, but auctions appear to be going out of fashion in favor of exchanges as modes for commodity trade. Coffee, tea and flowers are sold at auctions in some East African countries, as is tea in Kolkata and Colombo (World Bank Commodity Price Data on the internet). An important auction market has recently been established on the internet for steam coal.

Commodity exchanges

Commodity exchanges go back a very long way in time—until the 1870s in the case of the LME, but are becoming an increasingly dominant mechanism for price setting in primary commodity markets, even though they are easily outstripped by bilateral contracts when it comes to transacted volumes. The commodities traded on exchanges are characterized by easily identifiable grades and a sizable number of sellers and buyers. The double auction principle is applied, i.e. buyers and sellers are equally active in the bids and offers until a deal can be struck. This is seen to assure the free rein of competitive forces in price formation.

Trading has been computerized to a large measure, but a few exchanges, e.g. the LME have maintained the anachronistic and curious practice of physical presence in the 'ring' of 'open outcry'. There is no scope nor need for price haggling. Trade goes on continuously throughout the year. Some exchanges have trading floors in many locations around the world, permitting continuous day and night activity.

Prices are monitored and immediately published. Trade on the exchanges has added greatly to the price transparency in commodity markets. The prices on the exchanges are instantaneously influenced by events in the outside world. Hence, there tends to be much stronger short-run volatility in the exchange-determined prices than under most other trading arrangements.

The exchange typically provides the opportunity for both physical spot transactions, and paper deals in futures and options. Its services are used by producers and users of the commodity, but also by speculators and financial investors as well as traders, who play an important role by providing depth and liquidity to the trade. Transaction costs are low, and the widespread introduction of electronic trade that is replacing the open outcry, is lowering them further. The major exchanges provide warehouses to deal

with inventories that result from imbalances between supply and demand for consumption in physical (spot) trade.

A number of formalities that facilitate trade apply to the functioning of exchanges. For instance:

- There is a strict standardization of trade practices, with regard to e.g. volumes, qualities, delivery times, margins and payment terms. Some exchanges stipulate a maximum permitted price change from the previous day.
- Futures transactions with a high degree of transferability dominate trade. A majority of the futures contracts are liquidated through the issue of opposite contracts before delivery falls due. Physical trade commonly has a subordinate position, but nevertheless plays an important role as a default outlet for immediate purchases or sales when other trading options are not readily available.
- A clearing house, established and financially guaranteed by its members is regularly attached to the exchange. This secures against failures to honor existing contracts. All futures contracts have the clearing house as their opposite party. The net position of the clearing house for a particular commodity and delivery date must always be zero.

Commodity exchanges have experienced considerable progress over the past 3–4 decades: many new exchanges have been set up, and the number of products traded there has proliferated, (see Table 1). The use of the prices recorded by the exchanges has proliferated even more. There are several explanations to this trend.

- The introduction of computers in combination with newly developed mathematical tools, has simplified the extension in time of futures markets and the development of options along with the assessment of their values. Hedging for the purpose of price predictability has been greatly facilitated to producers and users in consequence.
- In former times, exchanges operated as pricing mechanisms mainly for uniformly standardized materials like refined copper or tin. More recently, ways have been invented to price non-standardized products like blister copper or tin ores as well as various qualities of coffee, cotton and natural rubber, by using differentials from the price of refined metal or from the price of a specific quality of the agricultural product traded on the exchange. Intriguingly, such differentials, for instance, the charge for smelting copper concentrate, have sometimes become products in their own right that are traded in Over the Counter (OTC), markets, often dominated by professional traders, in order to allow hedging.
- As noted, declining communication and transport costs have converged formerly distinct regional markets in which many

commodities were traded into ones with a more global reach. This has widened and improved the representativeness of price quotations communicated by the exchanges.

- There has been a tendency in a number of commodity markets towards more competitive conditions, and lesser concentration among producers and consumers, leading to a replacement of collapsing producer pricing systems by price discovery on commodity exchanges.

Such progress has made exchanges an increasingly important institution in commodity trade and pricing. Precious metals and natural gas provide interesting exception to this tendency. For not entirely clear reasons, the exchange quotations for gold, platinum and silver have remained somewhat secondary, and precious metals price ‘fixing’ is still essentially done in OTC bullion markets (private communication with David Humphreys former chief economist of Rio Tinto). Though a lively exchange trade has existed in New York since 1990, and the prices generated there have been widely applied in the US, most gas trade in the rest of the world has maintained prices closely linked to the price of oil. The absence of a truly global gas market due to the exceptionally high cost of gas transport probably explains why the NYMEX price has failed to penetrate gas trade outside the US.

Examples of disintegrating producer pricing institutions

The general historical tendency in commodity markets should be evident from the preceding section. Global pricing has slowly but surely replaced regional pricing, and free market pricing has gradually taken over from a variety of administered pricing systems. The degree and pace of these tendencies has varied substantially between products, and for some materials, the process is far from complete.

In this section I provide an account of how aluminum, nickel and oil pricing shifted from a producer dictated system into one where exchange quotations became the accepted price indicator. The focus of my investigation is on the changing modes through which the prices are set. It must be underlined that changes in the pricing modes do not necessarily involve changing contractual conditions, even though the latter are likely. Producer dictated prices of the past often involved bilateral contracts, a contract form that may have remained after the commodity exchanges took over the pricing function, even though the contract duration has commonly been shortened by the pricing shift.

As will be seen from what follows, the history of aluminum and nickel carries many similarities, that of oil is different and more complex, importantly because of the heavy political element that was absent in the metals

Table 1
Important primary commodities first introduced on LME or NYMEX since 1975.
Sources: NYMEX on internet; Wikipedia on internet.

Commodity	Date	Exchange
Gold	1975	NYMEX
Aluminum	1978	LME
Nickel	1979	LME
Crude oil	1983	NYMEX
Tin	1989	LME
Natural gas	1990	NYMEX
Steam coal	2001	NYMEX
Uranium	2007	NYMEX
Steel	2008	LME
Crude palm oil	2010	NYMEX
Cobalt	2010	LME
Molybdenum	2010	LME

Aluminum

The aluminum industry has a relatively recent origin. Commercial production started early in the 20th century, and attained a significant scale only in the 1940s (*Metallgesellschaft, annual*). This was for long a heavily concentrated, vertically integrated industry. It was characterized by substantial entry barriers caused by proprietary production technologies and tightly held superior bauxite and energy sources (*Smith, 1988*). Another feature distinguishing the aluminum producers from the captains of many other metal industries was their urge to integrate forward into fabrication. This cemented the entry barriers even more, since the rigid pricing system made it possible to charge lower aluminum prices for internal transactions than for sales to independent fabricators (*Mardones et al., 1985*).

Table 2
Leading aluminum producers: Per cent share of non-Socialist world output.
Source: 1955–1981 from [Mardones et al. \(1985\)](#); 1990 from RMG data bases.

Company	Country	1955	1965	1970	1972	1981	1990
Alcoa	US	23.2	17.1	16.3	15.4	13.8	11.4
Alcan	Canada	24.5	15.6	16.3	15.3	11.9	11.0
Reynolds	US	13.5	13.2	12.8	11.0	9.9	5.2
Kaiser	US	13.3	11.5	9.4	8.8	8.4	3.5
Pechiney	France	6.1	8.4	9.3	8.1	8.0	5.1
Alusuisse	Switzerland	4.0	6.8	6.6	5.6	5.7	2.8
Sum total of six		84.5	72.3	70.7	64.2	57.7	39.0

As late as 1950, Alcoa in the US, the dominant aluminum company, generated more than half of global production outside the socialist bloc, but in that year, it was ordered by the antitrust authorities to divest itself of its Canadian affiliate, which then emerged under the name Alcan. About the same time, Kaiser and Reynolds, two companies set up by the US government during the war to assure aluminum supply to the armaments effort, were privatized ([Non-Ferrous Metals, 1990](#)). In 1955, four North American companies accounted for 75% of non-socialist world output, and even in 1972, these companies' share exceeded 50%. [Table 2](#) provides further detail of the extreme North American dominance in the industry throughout the period shown, along with the gradual reduction in corporate concentration, but even in 1981, the six leading companies, two of which were European, held a non-socialist world market share of close to 60%, a very high figure compared with many other minerals industries.

A number of circumstances evolving during the 1970s led to a disintegration of the producer pricing system and its gradual replacement by the nascent LME quotation launched in 1978. Each of the circumstances, discussed in what follows, played a role, but it was their aggregate weight that brought about the pricing system change. The leading producer group was initially strongly opposed to the shift in the pricing system.

World economic growth decelerated sharply after the first oil crisis of the mid-1970s. A consequence of this was an equally sharp decline in the demand growth for metals ([Tilton, 1990](#)), resulting in an extended period of surplus capacity and low metal prices. The advent of depressive market conditions typically complicates producers' attempts to maintain stable producer prices. Delayed price reactions in periods of falling market prices will induce customers to seek supply elsewhere, further aggravating the demand shortfall for the price setting suppliers.² So, this was the first of several hurdles for maintaining aluminum's producer pricing system.

I have already noted the gradually weakened industry concentration reflected in [Table 2](#) above, but this, in isolation, was not a serious impediment to continued producer dictated prices. Other changes on the supply side were probably more important in punctuating the system. An important change was the proliferation of supply sources. There were two types of new suppliers entering the market. One was the suppliers from the Soviet Union and other socialist countries.³ The other comprised the group of state owned enterprises recently established in the third world in consequence of widespread nationalizations in the mineral sector. The newcomers were lacking the marketing experience needed to establish and operate their own producer pricing systems. Both were therefore energetically seeking the simplest possible means to dispose of their output, and their eagerness to adopt exchange

prices further compromised the maintenance of the traditional pricing system ([Hubbard and Weiner, 1991](#)).

The mineral nationalizations of the 1970s also diluted the leading aluminum producers' competitiveness and market power in that they deprived them from the bauxite deposits in low-cost locations like the Caribbean, Surinam and Guinea. The high price policies of the International Bauxite Association indeed led to a declining role of these nations as bauxite suppliers, but the traditional aluminum producers had difficulty in establishing preferential supply conditions in emerging producing countries like Australia and Brazil, given that the latter had their own ambitions to produce aluminum. The extent of the industry's vertical integration was reduced in consequence.

The oil crisis that erupted in 1973–1974 led to a substantial increase in global energy costs, and prompted a relocation of many of the energy intensive aluminum smelting facilities to the remaining low-cost sources of energy, e.g. in the Middle East, to make use of gas that had until then been flared. Here again, the desires of the old aluminum champions were confronted with the ambitions of the hydrocarbon owners who wanted to set up their own smelters.

The sum total of the 1970's changes was a reduction of industry concentration and market power, a less profound vertical integration, a reduced competitiveness for the old guard that was deprived of its low-cost sources of bauxite and energy, and a plethora of newcomers eager to enter the market by all possible means. It is not surprising, given these circumstances, that launching aluminum trade on the LME was a success, serving a quantitatively important group of suppliers and an increasing number of buyers not prepared to pay any price above the exchange quote. The initial reaction of the leading producers was a refusal to accept. The views of Alcoa were typical for the industry ([Alcoa's Kevin Anton, 2007](#)):

“When the Exchange first introduced an aluminum contract, in 1978, we refused to have anything to do with it. We were the biggest aluminum company in the world, we were used to the producer price mechanism and we thought that system worked best for us. Such was our antipathy to the LME price that Alcoa's then president, Krome George, said anyone found referencing the Exchange's aluminum contract would not have a future at the company.”

By the time the LME contract arrived (1978), the system of list prices set by producers was already damaged, with a lot of metal offered with discounts to the producers' official offers, so the LME initiative was only formalizing what was already occurring. The inevitable demise of the traditional pricing system was delayed for some time, but to function at all, price announcements had to be made with increased frequency and flexibility, to keep the deviations from market prices at levels that did not wipe out further business to the leading suppliers. The futility of maintaining producer prices that differed from the increasingly authoritative LME quotes eventually dawned on the leading producers, and their list prices were discontinued.

But while the exchange took over the pricing function, the habit of bilateral contracts between the producers of aluminum and their customers, specifying quantities, qualities, dates and places of delivery were maintained. There was a tendency to shorten the contract duration, but the significance of this change was small. Most business continued to be conducted directly between the producers and their customers. Physical trade on the exchange comprised a minor share of overall physical trade in aluminum, and price discovery was one of the exchange's most important function. Over time, the LME quotation has become increasingly authoritative, and questioning its relevance and reliability is rare.

² The problem is vividly described in [Humphreys \(2011b\)](#) by reference to iron ore in 2008–2009, when spot prices fell below contract prices.

³ The data base of RMG assesses the 1990 global share of USSR supplies at 16.8%, more than one half of the total for six leading non-socialist producers. No data for the USSR are available for earlier years.

Nickel

Like aluminum, nickel is a relative newcomer among metals in human use. In 1900, global refined output was a mere 8 Ktons, compared to 6 Ktons for aluminum, but its growth over time was greatly surpassed by aluminum, so that by 1980, world nickel output, at 740 Ktons, corresponded to no more than 4.5% of that of aluminum (Metallgesellschaft, annual).

Like in the case of aluminum, the nickel industry has been characterized by heavy concentration and strong North American domination. Until the early 1950s, a single corporation, the International Nickel Company of Canada (Inco), controlled some 80% of non-socialist world output (Rafati, 1982), and so held a position even stronger than that of Alcoa in the aluminum market. Inco's dominance was primarily due to the control of superior low-cost sulfide deposits, and, to a lesser degree, to proprietary holding of vital processing patents, along with a tight and extended vertical integration that provided a further entry barrier. Like Alcoa, Inco announced prices at which it was willing to sell, and its market control yielded substantial resource rents.⁴ An investigation from the 1980s asserts that two thirds of Inco's resource rent was due to its superior resource base (Ricardian rent) and one third resulting from its monopolistic market control (Cairns, 1982).

Table 3 tracks the evolution of corporate concentration in the non-socialist world nickel industry. The very substantial decline of Inco's share as well as that of the four leading producers in aggregate, was primarily due to the emergence of new third world producers, but expanding production in the USSR and other nations in the Socialist world also contributed to a reduced global corporate concentration.⁵ The third world expansion was not primarily due to nationalizations, but importantly caused by technological advances in extraction from lower grade lateritic ores found mainly in the tropics and sub-tropics, and the increased use of ferronickel, the alloy product of most laterite projects (Cairns, 1984). Between 1960 and 1975, the share of sulfides fell from 75 to 60%, that of laterites rose from 25 to 40% (Rafati, 1982). These developments undermined Inco's long standing comparative advantage based on a superior resource base, and on proprietary hold of technology for extraction from sulfide ores.

The emerging exploitation of laterites was often publicly owned, and a common characteristic of state ownership in the sector was to keep high and stable capacity utilization, even at the cost of lower profits (Radetzki, 1985).

Inco's market dominance in the 1950s and early 1960s allowed the company to take a relaxed position with regard to custom and price. There were in fact no contracts with customers to regulate Inco's deliveries. The company set its prices about once a year at a level it found comfortable and intended to reflect a "long-run equilibrium", without much regard about its competitors. It then simply satisfied the market needs that remained after the other suppliers' sales (Rafati, 1982).

Inco's cavalierly attitudes changed sharply by the mid-1970s. There was the shift to laterites and the USSR entry into the international market, with an ensuing substantial decline in Inco's market share. A burdensome excess capacity emerged in consequence of stagnant demand that followed the deceleration in world economic growth by the middle of the decade. Growing inventories caused rising problems to all producers, and Inco's competitors implemented sharp price discounting in an effort to keep their production facilities in business. This accentuated the fall in Inco's market share. I noted the market losses suffered by the leading aluminum producers as aluminum

Table 3

Leading nickel producers: Per cent share of non-Socialist world output. Source: 1955–1976 from Rafati (1982); 1985 from RMG data bases.

Company	Country	1955	1965	1970	1974	1976	1985
Inco	Canada	67.1	61.1	43.9	39.1	35.0	27.2
SLN	New Caledonia	5.1	8.7	10.8	9.6	11.5	13.0
Western Mining	Australia	–	–	3.4	7.2	8.0	8.3
Falconbridge	Canada	9.4	9.0	7.1	6.4	6.1	10.3
Sum of four		81.6	78.8	65.2	62.3	60.6	58.8

smelting moved to the Middle East to avoid the exploding energy costs after 1974. Inco was less affected on this count. Its position was protected in some measure by cheap Canadian hydropower resources and by the lower energy intensity in sulfide exploitation, providing an advantage against the expanding laterite-based nickel industry. Even so, the company suffered profoundly from the evolution of events.

Inco did not much help itself by attempts to preserve market share through discounting.

In April 1977, well before nickel was introduced on the LME, the company took the drastic step to discontinue publishing its producer price, while complaining that other producers had used its price quotation as a basis from which to offer discounts. The company apparently felt that it no longer had enough market share to cut back deliveries sufficiently in the defense of its quoted price. Nor could its recently more modest market position permit Inco to act as a producer of last resort in the event of an upswing in demand. Instead, the company started to encourage customer loyalty by entering into contractual arrangements with its clientele, a policy that it had long shunned and that its competitors had adopted years before (Cairns, 1984).

At the time of Inco's producer price demise, there was a dealers' market handling refined nickel products, mainly from the USSR and Cuba, but since this was a thin market, it provided an irregular price guidance within relatively wide ranges. There followed a period of opaque pricing disarray until April 1979, when a nickel contract was launched on the LME, accompanied by violent protests from the leading producers who asserted that trade on the exchange would destabilize prices. Inco attempted to re-establish producer prices early in 1979 on a nickel market that had been strengthened by an 8-month strike at Sudbury, its main production facility in Canada. This effort was not successful, and in 1980 the market weakened again while trade on the LME gained speed and repute. Like in the case of aluminum from the 1980s onwards, nickel pricing of the bilateral contracts that dominate trade, has been based on LME quotations which have over time become increasingly authoritative.

The above discussion demonstrates that the evolution of the pricing systems in nickel and aluminum has had considerable similarities. The shift from producer quotations to prices determined on exchanges was caused in both cases by the entry of "outsiders" without a firm grip over the marketing process, and so eager to adopt the simplicity of LME pricing, and by a gradually weakened market dominance of the traditional leading producers. The tilt from one system to the other was prompted by excess supplies and weakened prices that characterized both markets in the second half of the 1970s. In both nickel and aluminum, the leading producers expressed a sharp dissatisfaction over what they regarded as a loss of their pricing control, while the shift was supported by the "outsiders" who saw a more equal opportunity to trade in the emerging system. Consumers also preferred the "impartial" market prices to the stiff quotations controlled by the dominant producing giants with a bent for monopolistic gain. It took a number of years for these producers to realize and employ the inherent opportunities offered by trade on the exchanges

⁴ Return on investments in excess of "normal" capital return.

⁵ By 1990, output of Russian Norilsk Nickel marginally surpassed that of Inco, according to RMG data.

(Déja vu, 2007). I will revert to a discussion of these opportunities and their benefits in the next section of this study.

Oil

The developments of oil pricing are more complex than those for the two metals covered above. Hence, a brief historical review of the consecutive pricing phases may be in place.

Until the late 1950s, the international oil industry was completely dominated by the large, vertically integrated multinational oil companies, regularly referred to as the Seven Sisters (Sampson, 1975). Host governments did not participate in production or pricing, their role being to provide the oil companies with concessions, for which they received a flow of royalties and income taxes. There was little arms length trade in oil, most of the transactions being internal to each company, some occurring discretely between members of this group to even out imbalances between crude production and processing capacity of each. Long term contracts with producer set prices applied to these transactions. The terms of these contracts and the price levels were considered to be commercial secrets, hence were not disclosed to outsiders.

In the late 1950s, the Seven Sisters' dominance was challenged by the arrival of independent oil companies, whose entry was made possible by concessions granted predominantly by the governments of Iran, Libya and Venezuela (Yergin, 1991). The Soviet Union, which at the time enjoyed a very significant production growth, contributed to the challenge (Parra, 2004). The entry of these “outsiders” led to the emergence of arms length trade in crude oil outside the Seven Sisters' control. The added crude supplies caused a market surplus that suppressed prices, and the formation of OPEC in 1960 was primarily a reaction to the weak market, that aimed at preventing the income of its members from declining. A very fast oil demand growth between 1965 and 1973 (BP, annual) tilted the balance of power in favor of OPEC. This created a foundation for dramatic and widespread nationalizations of the oil industry in the cartel's member countries in the 1970s, and for a decade of oil prices that were exceptionally high by historical standards. The Seven Sisters were weakened and their market control was severely diluted in the process.

By the mid-1970s, the cartel succeeded in establishing what in effect was a producer pricing system managed by OPEC governments. This was centered on a “reference price” set on Saudi Arabia's Light Arabian oil. Other oil qualities produced by OPEC nations were priced with premiums or discounts to this price (Fattouh, 2011).

The system of “reference prices” lasted for almost a decade, but it eventually collapsed about 1985, primarily in consequence of rising competitive forces faced by OPEC that were triggered by the high prices that prevailed between 1975 and 1985 (Mabro, 2000). The causes to the collapse were both external and internal to the cartel. The high price of oil, maintained both as a result of OPEC's interventions and political events outside the realms of the cartel, e.g. the Iranian religious revolution and the extended war between Iraq and Iran, led to an extraordinary production expansion outside OPEC (see Table 4). There was an ensuing shrinkage of the cartel's market by more than 10 million barrels per day. The defense of the price within the OPEC cartel relied mainly on Saudi Arabia which set the reference price and had to face the major consequence of other cartel members offering high discounts on their oil and cheating on quotas. In the five years prior to the collapse (1980–1985), OPEC's output shrank by 40%, that of Saudi Arabia by 65%.

Late in 1985, Saudi Arabia had had enough of market shrinkage and gave up its role as price setter. Prices collapsed dramatically early in 1986 and volumes demanded recovered gradually in

Table 4

Per cent share of global oil production by country group.
Source: BP (annual).

	1965	1970	1975	1980	1985	1990
OPEC	44	48	47	41	28	34
of which Saudi	7	8	13	16	6	11
OECD	34	29	25	27	35	29
USSR	15	15	18	19	21	18
Rest of world	7	8	10	13	16	19

subsequent years, especially those for Saudi oil. The oil price crisis of 1986 saw OPEC abandon the producer administered pricing formula, and to accept a more market related system of pricing. At the time, NYMEX had already operated a crude oil contract for a few years. This trade outlet helped pricing arms length sales conducted by the independent producers in non-OPEC countries that had emerged during the high price period. It also accommodated the growing exports from the USSR. Exchange based pricing received a boost in 1986 when Pemex, the Mexican state owned oil company decided to adopt it for pricing its sales. By 1988, pricing determined by quotations on exchanges had gained wide acceptance among most oil exporting countries. Since then, this has remained the unquestioned and dominant pricing form for international oil trade (Fattouh, 2011).

Exchange determined prices in bilateral commodity contracts

The antecedents to the evolution of the pricing system differ between oil and the two metals in focus of my study. Politics and governments have played a much more important role for shaping the progress in oil than in the metal markets. At the same time, the course of events that led to the reliance on exchanges for pricing the three materials exhibits considerable similarities. In all three, the fundamental force behind the collapse has been the entry of “independent” competitors who have gradually diluted the market share and market power of leading traditional suppliers, until the realization that the costs of maintaining producer determined pricing had become greater than the benefits that could be derived from it. Leading aluminum and nickel producers protested vehemently at the producer pricing system's demise, while oil producers appear to have been more resigned to accept the shift.

Physical trade on the exchanges for the three products constitutes a limited proportion of total physical trade; most trade is conducted on the basis of bilateral contracts determining all important conditions, except the price. Exchanges generate both spot prices and a plethora of futures prices and options for trades expiring at different dates. A word is needed before this section is closed on exactly which exchange price is used in the bilateral contracts. Another word is needed to review the changes that took place in the contractual conditions as pricing shifted from producer determined systems to price quotations set by the exchanges.

Practices vary between the three products and over time, in the selection of exchange determined prices that are employed for pricing the bilateral contract deals, and it has been up to the contracting parties to decide in each case. Basically, the choice is between spot and futures prices. Spot prices have the “advantage” of being less subject to the influence of investors and speculators who operate mainly in the futures business. Futures prices may be more attractive because they are typically more stable than the spot quotes. Futures prices may be preferred when there is a delivery lag, so that the time of expiry of the chosen futures contract price corresponds to the contracted physical delivery time. In many cases, the contracting parties choose an average of prices, e.g. of those quoted over a month rather than the price recorded on a particular day. All of the price formulas just

mentioned have been employed in practice, and the preference of one over another has shifted with fluctuating fashions. The prices agreed to in metals contracts are usually at a small premium to the exchange quotation, to account for the buyer's advantage of being assured of a specific grade delivered at a location of his choice (private communication with Phillip Crowson, former chief economist of Rio Tinto). In oil, there may be a premium as well as a discount, depending primarily on the quality difference between the shipment and the chosen exchange benchmark (Fattouh, 2011).

Contract duration is an important feature, apart from price, that has undergone some alteration after the exchanges took over the pricing function. It is true that a variety of contractual durations existed when producer dictated prices were in force, but contracts with an extended duration were preferred by producers, because they assured them of more predictable outcomes. Nevertheless, long contracts coexisted with short ones, e.g. those applying to a single deal. The alternative contract durations survived the change in pricing, but a tendency has been seen to shorten the average contract length. This has possibly been due to the greater competition among suppliers for existing customers in the application of exchange pricing. One year is probably the norm in metals (private communication with Phillip Crowson, former chief economist of Rio Tinto), and one to two years in oil (Fattouh, 2011).

Why exchanges are becoming growingly important instruments for commodity trading and pricing

The preceding section compared prices set by producers with exchange determined prices in three markets. In all three, the producer pricing power was gradually diluted by the system's inflexibility and by the uncontrolled emergence of new suppliers who underbid the traditional ones until the pricing system gave in and had to be replaced. Producers in the two metal markets protested to the change, since they disliked the loss of control over price settlement. Producers in all three markets expressed concern that the exchange determined prices were unduly unstable and were exposed to the vagaries of financial investors and speculators. I will scrutinize these concerns later in the present section. In what now follows, I enumerate and analyze the main facilities afforded by the exchanges to commodity sellers and buyers that are not readily available in producer pricing systems. I begin by considering the exchanges' ability to flexibly track market conditions and to discover prices, arguably their most important function.

Exchanges assure equilibrium prices in commodity markets

There is a common and reasonable perception among economists that prices in a competitive market have a desirable tendency to strive towards equilibrium where demand equals supply.

Markets can fail to strive towards equilibrium if prices are influenced by the authorities or set by producers, consumers, traders or financial investors without due regard to prevailing market conditions. Disequilibrium price levels will then create inconvenient tensions, such as occurred in the oil market in 1985–86, when prices collapsed (see above).

Commodity prices in competitive markets, such as those recorded by the exchanges, are basically determined at each point in time by the intersection of the short run supply and demand curves. In Fig. 1, price will settle at P_1 if S and D_1 represent the supply and demand schedules, respectively. There is nothing special about commodities in this regard; all competitive markets behave in this way. In the short run, the capacity to produce is given, and the supply schedule depicts the variable cost levels in

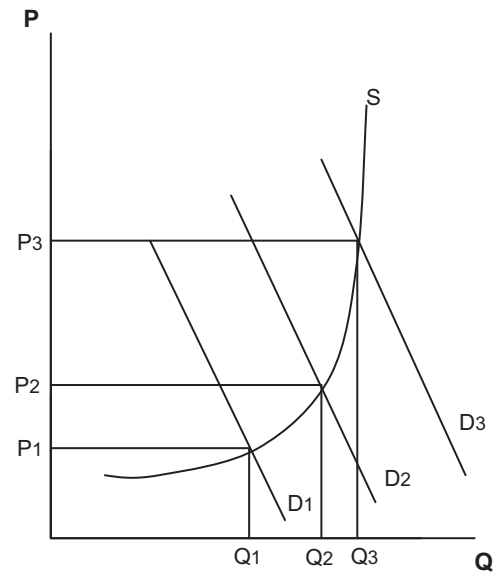


Fig. 1. Short run price determination in commodity markets.

existing production units, ranked in ascending order. Natural advantage, managerial efficiency, or a high proportion of fixed costs will yield low variable cost levels, and vice versa.

Capacity will be used to produce in the short run so long as the variable costs are covered by price. A rise in demand, demonstrated in Fig. 1 by a rightward shift of the demand schedule from D_1 to D_2 , will require the employment of additional production units, and their higher variable costs will tend to push up the price to P_2 . Such a shift could be caused by the secular economic growth from one year to the next, by a cyclical upturn in business conditions which increases the demand for current consumption as well as for user inventories, or simply by the expectations, rational or irrational, of an impending price increase, which result in a surge in inventory demand for precautionary or speculative purposes.

A similar upward push in price will result from a temporary leftward shift in the supply schedule (not shown in Fig. 1), as part of the existing supply capacity becomes unavailable due to e.g. a strike or an accident immobilizing an important mine or mineral processing installation.

At low levels of capacity utilization, the short-run supply schedule tends to be relatively flat. As full capacity utilization is approached, the supply schedule tends to become increasingly steep. Additional increases in demand will then be harder to accommodate by rising output, so they will result in accentuated price reactions, as shown by the move from of the demand schedule from D_2 to D_3 . At full capacity, the short run supply schedule becomes vertical.

The somewhat simplistic construct from price theory, contained in Fig. 1, can be employed to account for the general commodity boom that has affected virtually all commodity prices since 2004. An extended period of historically high global economic growth led to an accelerated expansion of raw material usage, and shifted the demand curves for such materials rightwards to a position like D_3 , intersecting with a (virtually) vertical portion of the supply curve. Producers were unprepared and could not increase output in the short run, so prices rose far beyond what was motivated by costs. A return of prices to more "normal" levels would require a recession suppressing demand (moving the demand curve leftwards), or new capacity (shifting the supply curve rightwards). A recession did indeed occur in 2008–2009 in the wake of the global financial crisis, but its impact on raw

materials demand and prices was small and limited in time. This was because the emerging economies, and China in particular, which have dominated primary commodity demand in recent times, continued to grow through the recession at fast rates (Radetzki, 2013). In the absence of a recession that suppresses demand, new capacity is needed to bring down prices, but the build-up of capacity is a slow, drawn-out process (Radetzki, 2013). Hence, commodity prices have continued high through mid-2012, as this is being written.

The high prices that typically arise when existing production capacity is fully used, will strengthen the incentives to invest in capacity expansion. The capacity additions that eventually emerge, will extend the short run supply schedule to the right, and so dampen the price. Capacity change, however, is part of long run price determination, long run being defined as a period extended enough to permit variations in capacity, but this goes beyond the realms of the present discussion.

What has been said above is equally applicable to competitive and monopolistic markets. Producers with market power (e.g. OPEC in the oil market) will implement higher prices by reducing their capacity utilization, just as would be the case in the event of a strike in a competitive market. And in the longer run, colluding producers may assure higher prices by deciding against capacity growth even when the new capacity would be profitable. In both cases, trade on the exchanges assures a continuous equilibrium, where demand for consumption and inventory holding equals available supply.

The proliferation and growing success of exchanges in the pricing of commodities is precisely due to the exchanges' ability to discover the direction towards equilibrium prices, and so to avoid the tensions of markets in disequilibrium. This ability is absent in markets where producers or authorities dictate the price level. Exchange determined prices have their deficiencies and shortcomings, and some of these are discussed below. But the exchanges' sensitivity to and ability in tracking market conditions and in implementing the price adjustments that these conditions warrant at each point in time is widely accepted as superior to other pricing mechanisms reviewed in this study, and is probably their most important characteristic.

A constantly available facility to buy and sell

Most commodity exchanges provide a facility for physical trade, even though such trade is commonly dwarfed by the activity on the futures markets. This is a highly useful function for distressed producers or consumers who are in a hurry and without an established alternative market access. The need for a sales outlet was critically important for new aluminum and nickel suppliers in the 1980s, as was the case for independent oil producers outside OPEC, that emerged during the period of oil price excesses in the early part of the same decade. These needs were critically important for the successes of the exchanges in launching trade in the three commodities.

A facility for financing inventory holdings

Strong critical views have been expressed about the financialization of commodity exchanges in the present century, and the detrimental impact of this development for price discovery. That critique is discussed below. At this point, I want to illuminate the nature of an age-old and highly useful financial intervention in commodity markets made possible on exchanges that trade spot as well as futures contracts. This is to permit the financing of growing inventories that tend to emerge in periods of excess supply over consumption needs.

Excess supply depresses spot prices and typically results in a *contango* market, where futures prices exceed spot prices. If the contango (difference between futures and spot price) is higher than the storage and interest costs, financial agents will have an incentive to buy in the spot market and store the commodity, while simultaneously selling the higher priced futures, to earn a risk-free profit from the excess of the contango over the cost of storage and interest. Their action will raise the spot price and reduce the futures price, so that the level of contango will shrink, and market balance is improved. The financial agents perform a useful role in taking over the burden of inventory holdings from suppliers during periods of weak markets when these suppliers are already strained by low price levels.

A facility for hedging

Exchanges with futures markets offer the sellers and buyers who use them the facility of hedging. This secures a predictable price for future physical transactions and so avoids the uncertainties inherent in price instability. The mechanics of hedging are straightforward. Say that I am an aluminum user and want to avoid the price instability prevailing in the metal markets over the next twelve months' deliveries that cover my needs. The exchange offers me the facility of hedging by acquiring futures contracts that permit me to buy at today's price. As a physical delivery comes due, I pay the actual spot price and at the same time I dispose of the futures contract. If price has gone up, the futures transactions will yield a gain that corresponds to the increased price that I have to pay for the physical delivery. If price has gone down, my futures deal yields a loss that corresponds to my gain from the lower price for the physical delivery. In both cases, hedging assures me of today's price in satisfying my forthcoming needs. The price instability characterizing the market leaves me unaffected. Commodity exchanges even make it possible for service-minded sellers to offer their customers contracts at fixed prices based at today's exchange quotations, without assuming any price risk. Their risk can simply be hedged away.

It is important to point out that the benefit of hedging involves a cost in the foregone opportunity from future beneficial price changes.

Futures contracts offered by commodity exchanges have gradually become increasingly extended in time, and the purposes for which hedging is used have been diversified in consequence. It is not uncommon with futures contracts that expire 5–10 years hence, even if trade becomes quite thin for the more distant dates. The long futures contracts have been widely used to secure project finance. New projects, be they mines or processing facilities, carry considerable price risks. No one can tell what the price will be 3–5 years into the future, when the new project starts to produce and earn. Even if the investors were willing to accept this uncertainty, their bankers are likely to be more risk averse, and require an assurance that earnings will be sufficient to repay the loans. Hedging is a way out of this dilemma. It offers the facility to do away with the price risk by selling the project's output for a number of years at the price quoted on the exchanges today.

A playing ground for speculators?

As noted, producers of aluminum and nickel expressed strong apprehension against using exchanges for pricing at the time of the demise of producer prices. The predominant argument in the public debate at the time as well as in more recent years has been that speculators active on the exchanges destabilize prices and unhealthily move the price levels away from fundamentals. I will analyze the issue of speculation and price instability in the next

sub-section. The following paragraphs provide a broader overview of the role of speculation on commodity exchanges.

“Speculators” is a pejorative term, and the debate would gain objectivity if it were replaced by “investors” to refer to the agents interested in commodities purely as paper assets. Investors’ desire for exposure to commodity markets is predominantly in the expectation of profits, sometimes also in the belief that such exposure will impart desirable characteristics (e.g. diversification) to their overall portfolio holdings. Distinctions between agents trading on exchanges are not easy to make. Many transactions by genuine suppliers and users have only a tenuous relation to their interest in the commodity as such, and are made simply in the hope of generating a profit.

Investment in commodities is of course nothing new. It has existed as long as the commodity exchanges, and long before that in more restricted forms. Such investment has played several useful roles for the functioning of exchanges. Helping to finance inventories, described above, is one example. The most important, undoubtedly, is to raise the volume of trade and so to provide depth and liquidity, to assure a smooth functioning of the pricing process on the exchange. These useful roles have always been played by commodity traders. What is new is that more recently investors have supplemented the trader activities.

The period since 2000 has seen an extraordinarily strong financialization of commodity markets, i.e. the entry of various actors with huge volumes of funds invested in diverse forms on the commodity exchanges. Most of the action has taken place in the futures markets. One of the more prominent forms in terms of value has been the Commodity Index Funds which operate through the purchase of commodity futures, which are then rolled forward by being sold prior to maturity and immediately replaced by new futures purchases with a more distant maturity date. No comprehensive data exist on the overall amounts held by these funds, but a total of less than \$10 billion has been suggested for 2002, rising to \$187 billion by the end of November 2010 (CFTC, 2010). The latter is quite a large sum relative to the size of the markets in which the investments take place (Tilton et al., 2011).

This financialization has prompted a widespread concern that the rising investor involvement could seriously distort commodity prices. Masters (2009) is one of the most outspoken exponents of the belief that investors have a major influence on markets. He claims that “when speculative euphoria... takes over, speculators can and will drive prices to levels that do not reflect supply and demand conditions.” Media have energetically jumped on the Masters bandwagon. Numerous press comments (Economist, 2007, Financial Times, 2008a, 2008b, 2010) have defended this view. And there is circumstantial evidence in support of this position. The exceedingly strong commodity boom of the past decade has indeed coincided with huge financial inflows into commodity markets.

Analysis of this issue is significantly hampered both by misleading agent classification and fundamental data deficiencies. Nevertheless, the weight of the more serious analytical attempts to resolve this issue points to small, if any, impact on prices from rising financial presence, and to fundamentals as the main drivers of commodity prices. Thus, IMF (2006) concludes that there is “little support for the hypothesis that speculative activity (as measured by net long non-commercial positions) affects either price levels over the long run or price swings in the short run”, and reasserts four years later (IMF, 2010), that “there remains little evidence that financial investment has a significant sustained impact on commodity prices above and beyond current and expected supply–demand fundamentals”. Krugman (2008), and Irwin and Sanders (2010a, 2010b), too, see the supply and demand for physical commodities as the major determinant of market trends. Irwin and Sanders note (2010a) that “the levels of

speculation in all markets examined (during the 2000s commodity price boom) were within the realm of historical norms. Across most markets, the rise in index buying was more than offset by commercial (hedger) selling.” Arguing against the exaggerated impact of speculation on prices, Irwin and Sanders (2010b) also point to markets for which no futures markets exist to attract investor demand (e.g. those for iron ore or rice), where price movements have been every bit as dramatic as for materials traded on exchanges.

As noted, the large scale entry of investors on commodity markets has been regarded with considerable skepticism by many observers. And indeed, examples of harmful behavior by investors are easy to quote. Investors’ sudden and large scale entry on the spot market, or their assumption of ownership and control of warehouses attached to the exchanges could plausibly have distorted the fundamental supply–demand balance. But at the same time, it is important to note that the public discourse has been unbalanced in its neglect of the positive aspects of the inflow of investment capital into commodity markets. A seldom discussed desirable consequence of the financialization of commodity trade over the past decade is that the markets have become far more liquid, thus facilitating the performance of desirable features reviewed above, like physical trade, inventory holding and hedging. Financialization has also increased the depth of markets, reducing the scope for an individual agent to squeeze a market, or manipulate it in other ways to his own advantage.

Speculation and short run price instability

The above discussion should have, at least tentatively, discarded the claim that financial inflows have a sustained impact on commodity price levels. But what about the impact of short run moves in and out of commodity markets by speculators, defined here as agents purely interested in short run price moves, for exacerbating price instability?

The basic theoretical presumption is that under normal circumstances, speculation will even out price variations (Telser, 1981). At the height of an industrial boom with prices deemed to be excessive, speculators will implement forward sales, and so dampen the price level. The obverse will occur in the depth of recession. By buying forward, speculator activity will tend to strengthen prices. If the speculators are right, there will be a win–win situation. Their activity will yield profits, while at the same time reducing price fluctuations. But speculators’ foresight may of course be wrong, in which case they lose and the price instability is accentuated. Such miscalculations, along with a herd instinct, may result in untenable price bubbles, leading to serious price instability with adverse consequences for the commodity producers and users, as the bubbles form and when they burst. The frequency of stabilizing or destabilizing speculation, respectively, is an unresolved issue, but clearly, it is unlikely that speculators would go on with their activity, and proliferate, if, on balance, they were incurring losses.

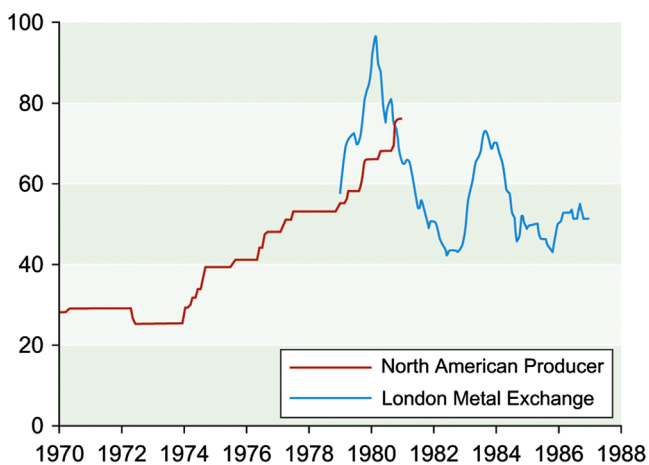
The tentative inference that can be drawn from the above discussion may seem to be contradicted by the observation that commodities traded on the exchanges tend to have less stable prices than commodities which are not, and so less subject to speculators’ interest. But then, the causality could be the other way round. Exchanges perform especially valuable functions (hedging) for commodities with inherently volatile prices, and their services are simply not needed for materials whose prices are stable, like in the cases groundnuts and tobacco in the US, both of which have been subject to governmental price stabilization schemes. Exchange traded commodities can in fact constitute a kind of “adverse selection” insofar as price stability is concerned.

Sometimes the critique of exchanges for causing short run price instability appears outright unreasonable. This would be the case for the claim that hedging, which removes the price risk otherwise faced by commodity producers or users, fosters reckless speculative behavior among these agents, and so contributes to an increase in the price swings.

The critique of exchanges launched by the producers of aluminum and nickel before the demise of the producer dictated prices for these two metals contended that producer prices were more stable than prices set at the exchanges. Insofar as it goes, this contention was correct, as demonstrated by Slade (1991), who compared the consecutive and contemporaneous performance of the two pricing systems in many commodity markets: producer prices were indeed more stable than exchange determined prices, at least in the very short run. This is apparent for aluminum and nickel prices, reproduced in Figs. 2 and 3 on the following page. But then, neither Slade nor the criticizing aluminum and nickel producers took an explicit account of the stabilizing facility of hedging, exclusively available to trade on the exchanges. Neither did they consider the hidden rebates that destabilized the realized prices in producer determined systems. Slade (1991) nevertheless ends her study by the unprejudiced statement that “the price instability that is associated with exchanges is a cost that must be balanced against the considerable benefits of well-organized futures markets.”

There was no corresponding critique of exchange pricing in oil when Saudi Arabia abandoned its reference price in 1986 in an attempt to arrest its oil sales decline, and exchange determined pricing was then gradually adopted by the cartel members (Mabro, 1987). The plausible reason for the absent critique was that the maintenance of the Saudi reference price until the end of 1985 had created extreme imbalances and tensions in the market. When it was given up, prices on NYMEX fell by more than 60%, from \$32 in September 1985 to \$12 in March 1986 (Brown, 2006), a disruption caused by the producer pricing system, and far more violent than any price instability internally generated by trade on the exchanges.

What inference can then ultimately be made about the speculators' contribution to price instability? The disappointing conclusion about the impact of speculation on the stability of prices determined by the exchanges is that, although exaggerated negative assertions are common, we are not sure. Much depends on what stability aspects are being measured. This uncertainty is succinctly summarized in a study of the US Commodity Futures Trading Commission (Haigh et al., 2005): “The role of speculators in the futures markets has been, and continues to be, the source of considerable controversy.”



Source: Slade (1991).

Fig. 2. Monthly aluminum prices, US cents per lb.

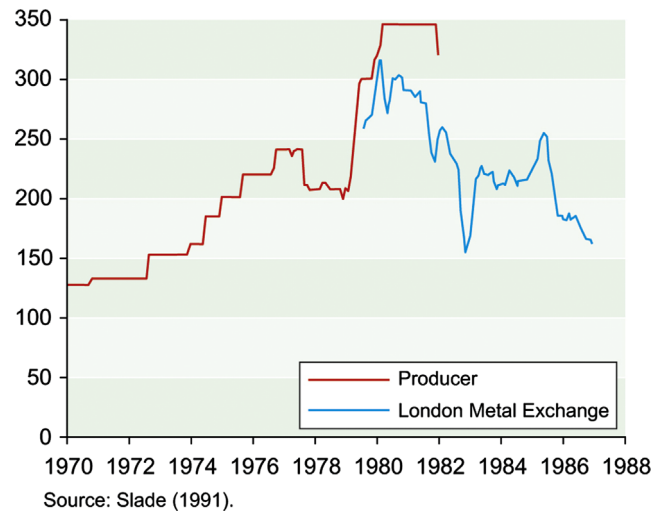


Fig. 3. Monthly nickel prices, US cents per lb.

Producers' and consumers' sentiments towards the expanding role of exchanges for trading in and pricing commodities

The rod for comparison of commodity pricing systems in this study has been between producer dictated prices and prices determined on commodity exchanges. Table 1 above gives an indication of the trend in the evolution of systems for commodity trading. It lists no less than twelve important commodities introduced on the exchanges over the past few decades. Clearly, no similar list could be presented for commodities where producer dictated prices were launched.

Producer prices are typically applied in markets where supply is concentrated, preferably with a leading producer who dares take pricing decisions and who is prepared to face the consequences. I have shown the process of disintegration of producer dictated prices in three commodity markets, primarily in consequence of the emergence of new suppliers prepared to underbid the producer price to assure their own sales, an ensuing reduction of concentration on the supply side, and a loss of market share of the leading producer. It would appear that supply diversification and competitive conditions are gradually gaining ground in international commodity markets, thus undermining the prospects of existing or potential producer pricing systems. Existence of trade on an exchange offering a ready physical disposal option has greatly facilitated the entry of the new suppliers, and strengthened their contest of the established producer pricing order.

The opposition to a shift from producer dictated prices to quotations determined by exchanges has been voiced exclusively by the leading producers responsible for price setting. The true motive for the opposition was a perceived loss of market power and control with monopolistic elements, but statements made in public emphasized the purported deficiencies of price setting on the exchanges, in particular increased short run price instability and a disconnect of price levels with market fundamentals, both assertions that have been undermined by serious academic analysis.

The emerging new suppliers and the commodity consumers have seen the shift of the pricing system for the three products under scrutiny mainly as an improvement of the market's function. The ready adjustment and flexibility of prices determined on the exchanges were believed by these actors to lead to superior price discovery continuously reflecting market conditions and assuring market equilibrium where supply equaled demand. They also perceived and appreciated the other advantages offered by commodity exchanges, such as a readily available sales and purchase outlet; an inventory function; and a valuable and versatile facility for hedging.

It is noteworthy that the critique of the leading aluminum and nickel producers was acquiesced once they realized that there was no practical way back to the old system, and that they then became active and enthusiastic users of the exchange (Déja vu, 2007). The conversion was more or less immediate in the case of oil, where the disruption of producer quotations came with a big bang in the mid-1980s, as the demanded volumes for OPEC oil collapsed (Fattouh, 2011).

Developments in the market for iron ore in the 2010s can be reviewed against the context provided in the present study. There were no producer set prices for iron ore. But several aspects of the system with long contracts with pre-set prices strongly resembled a producer-determined pricing system. Furthermore, although the prices emerged from negotiations between sellers and buyers, at least since the turn of the century three dominant suppliers had developed considerable market power which afforded them substantial influence over the price level.

In the case of iron ore, it was the leading producers that took the initiative for breaking the system, primarily because the inflexibility of the earlier pricing system permitted new suppliers to underbid them and so steal part of their market when demand fell in 2009 during the financial crisis (Humphreys, 2011b). Shorter pricing periods have been introduced in attempts to increase flexibility, and there are efforts to give a greater role to the so far thin index tracking spot quotations in the pricing of contracts (Thomson, 2012). Against the background of experiences in other commodities, it is somewhat intriguing that the hesitation and doubt in the case of iron ore has come from the steel companies, the raw material buyers. The steel producers' cautious attitude towards the ongoing change might be due to this industry being unaccustomed to exchange trade; after all, steel is predominantly sold at prices managed by the steel companies.

None of the pricing systems reviewed in an early part of the present study is perfect. All of them have weaknesses and deficiencies. This is certainly also true of the pricing function of commodity exchanges. Nevertheless, after the extended discussions contained in earlier parts of this study, I would venture the view that, on balance, the commodity exchanges appear to be superior to their alternatives as institutions for price setting in primary commodity markets.

This view leads me to the following perspective on the future evolution of iron ore pricing. It is still far from clear what the end result of the iron ore producers' initiative will be. Even though the product is not ideal for trade on exchanges, given the diversity of qualities entering trade, there is a likelihood that a uniform contract will be defined and that spot and futures trade in iron ore, too, will be introduced on a commodity exchange. This would provide a clear way forward for the pricing of this commodity, and would further add to the importance of exchanges as instruments for commodity pricing.

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