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Metals and backwardation

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In two earlier articles this year we have examined the differences in size and structure of the base and precious metals markets and also the choice of metals and other commodities going into various commodity indices. This paper pulls together themes that have been touched on in the previous pieces, as well as introducing fresh analysis of the forward price curves for the different metals.

We have already pointed out that gold is more liquid than any of the other precious or base metals markets, but noted that the weighting given to gold in the main traded commodity indices is low in relation to the size of the market. One of the main reasons for this discrimination against gold is that returns on investment in commodity "baskets" depend partly on profits made on rolling futures positions when the markets are in backwardation. Because there is such an ample far forward supply of gold, such roll yields are not available. In this paper we present the facts on the existence and frequency of backwardations in the metals markets. We also describe how forward price curves or "price fans" may point to long-term equilibrium prices. The article concludes with some comments on the implications of backwardations for investment in metals.

Why do backwardations occur?

The Economist newspaper's online A-Z of economic terms describes a backwardation as follows:

> *"When a commodity is valued more highly in a spot market (that is, when it is for delivery today) than in a futures market (for delivery at some point in the future). Normally, interest costs mean that futures prices are higher than spot prices, unless the markets expect the price of the commodity to fall over time, perhaps because there is a temporary bottleneck in supply. When spot prices are lower than futures prices it is known as contango."*

This is an over-simplification, partly because it is aimed at a non-specialist audience but mainly because the existence of contangos is explained in terms of interest/storage costs. Where futures markets are not based around physical storage of commodities, most notably in the case of energy futures, this argument does not apply. Nevertheless the Economist definition is interesting because it suggests that, firstly, backwardations are abnormal and, secondly, that their existence indicates that the markets expect prices to fall over time. If this is true, then roll yields could be more than offset by declines in either spot prices or the whole price curve over time. Metals markets are based around the availability and financing of physical stocks, so let us see if these points really do apply.

Prices and liquidity

A liquid market/contract can be described as one in which buying and selling can be easily accomplished because of the many participants willing

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and able to trade substantial quantities of the commodity at small price differences. Gold is the outstanding example of such a market, capable of absorbing large-scale activity 10-15 years forward, although far forward prices/lease rates are not transparent. On the other hand this is not possible in other precious and base metals.

In this article we focus on the London markets for base and precious metals. On the London Metals Exchange (LME) the focus of attention is on cash (spot) and 3-months prices for which official prices are reported twice a day. The use of the 3-months price comes traditionally from the time taken to ship copper from Chile and tin from Malaya to London in the 1870s. Subsequently further forward trading has developed, with official 15 months prices for all metals and 27 months prices for aluminium, copper, nickel and zinc reported. Since 2002 official prices on the two largest contracts, copper and aluminium, have been quoted 63 months forward. The point to note is that price transparency and market liquidity at further forward dates is proportional to the size of the underlying physical markets: The biggest markets – copper and aluminium – are more actively traded further forward, while for the smallest metals, tin and lead, there is no officially reported trading more than 15 months ahead (and probably very little over the counter business either). However for all six contracts, as shown in **Figure 1**, most trading activity is concentrated on the nearby dates.

Precious metals forward prices are calculated using London fix/closing prices and the Libor and London lending rates out to 12 months. Trading well beyond 12-months for precious metals is more than possible, especially in gold, but there are no 'official' lending rates published.

Snapshots of metals forward curves

Using LME average cash and forward prices out to 63 months and London fixes/closing prices for precious metals and calculating forward prices using market lease rates out to 12 months, the resultant forward curves for these ten metals are shown in the following charts **(Figures 2 - 6)**.

What is interesting is that the base metals forward prices are generally sloping down (backwardation) while precious metals are all pointing up (contango), but keep in mind that these are just snap shots on particular days. One point to note about some of the base metals charts (notably lead and aluminium) is that the spot prices are more volatile than the forward ones, as day-to-day availability of metal can vary considerably. But more importantly, and bearing in mind the Economist definition, do these forward curves suggest that the markets

Figure 1: LME open interest by prompt dates

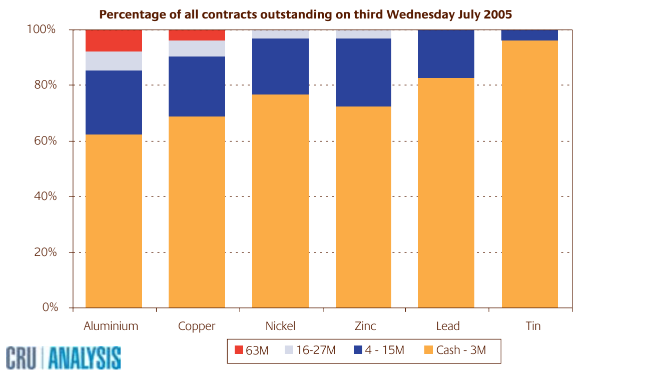

Figure 2: Current LME forward price structure

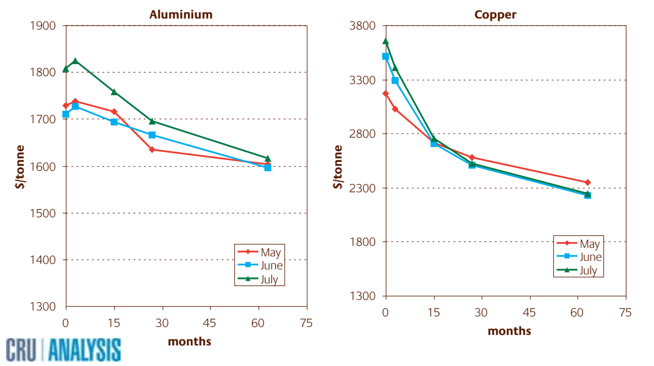

Figure 3: Current LME forward price structure

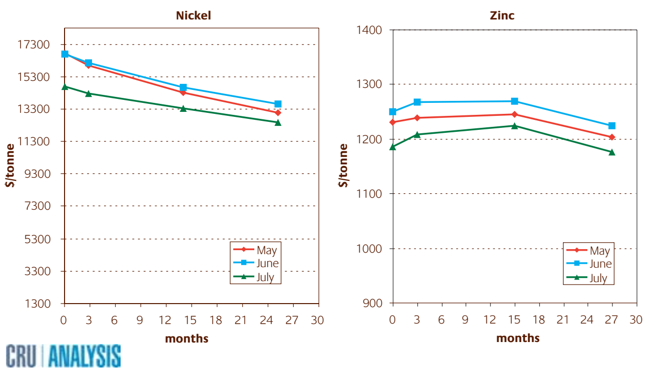

Figure 4: Current LME forward price structure

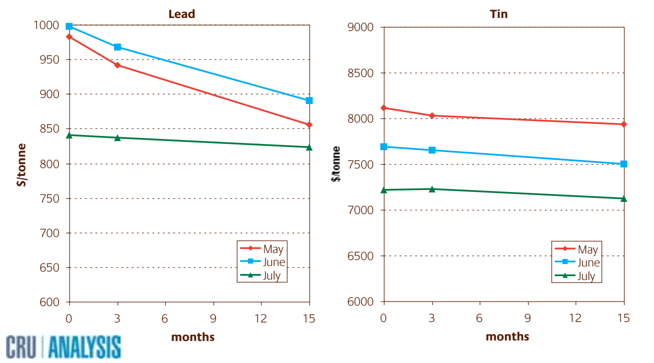

Figure 5: Current gold and silver forward price structure

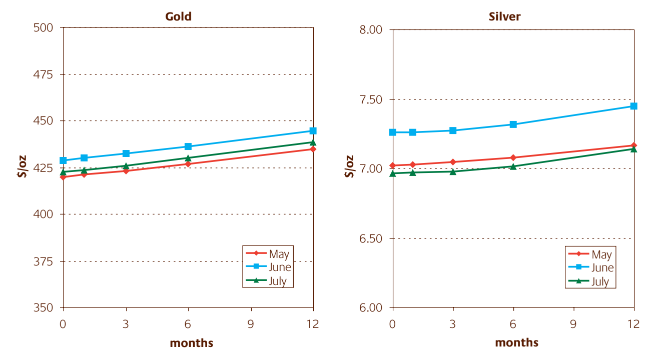

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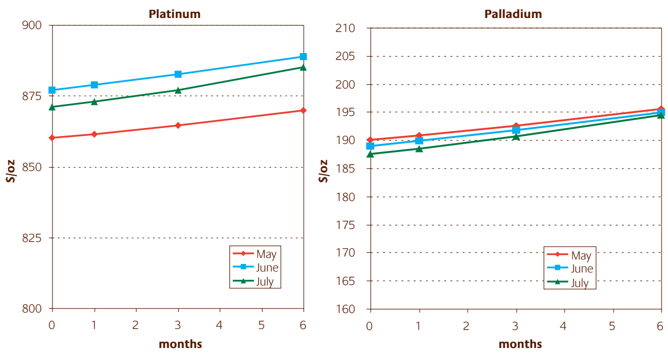
Figure 6: Current pgm forward price structure



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expect base metals prices, but not precious metals prices, to fall? At the moment this is the case. The LME metals, perhaps especially copper and lead, are generally viewed as being at or near cyclical peaks, before moving towards over-supply and lower prices in the next few years. However current availability of stocks has been very limited. The other part of the story is that the larger base metals markets have reasonably well developed ideas of the long-term "equilibrium" levels to which prices might be expected to gravitate, and these long-term prices are all below current spot prices. On the other hand, as discussed further later, this is probably not the case in gold and other precious metals.

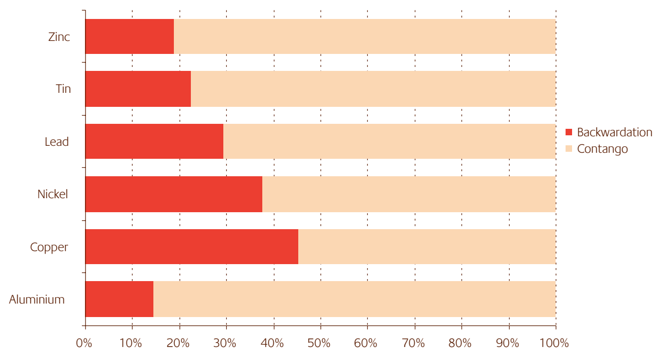
For base metals the long-term equilibrium price is considered to be determined by factors such as trend growth rates in world consumption, marginal costs of production and technology changes. Opinions on these factors do change, but only infrequently. In contrast, there is a vast array of factors influencing the current state of the market and the immediate outlook, so more volatility is natural. The forward price curve is the line joining these two ends of the spectrum. In 'normal' conditions it is upward sloping, but when there are short-term restrictions on availability the curve inverts into backwardation, being an 'abnormal' market condition.

The prevalence of "abnormal" market conditions

Our price data series, illustrated in **Figures 7 and 8**, show that 'normal' conditions apply about three-quarters of the time over all the metals. By grouping the metals, normal conditions persist about 70% of the time in base metals, almost all the time for gold and silver and around 50-60 % of the time for pgms (although platinum has been much more susceptible to backwardations than palladium).

Gold and silver find it difficult to cast off their historical monetary role and tend to trade more like currencies than commodities. Almost all the gold produced over the years is still available to the market today, leaving gold to remain in permanent contango. Silver might be a little further along the road to breaking with its monetary past than gold, suffering some liquidity concerns going out from around two years. Looking at longer-term data on a 3-month basis, silver has had four periods of backwardation in the last 10 or so years and gold has had only two such periods.

Figure 7: Prevalence of "abnormal" market conditions: LME metals



Statistics based on daily LME cash and 3-months prices Jan 1989 – Jul 2005

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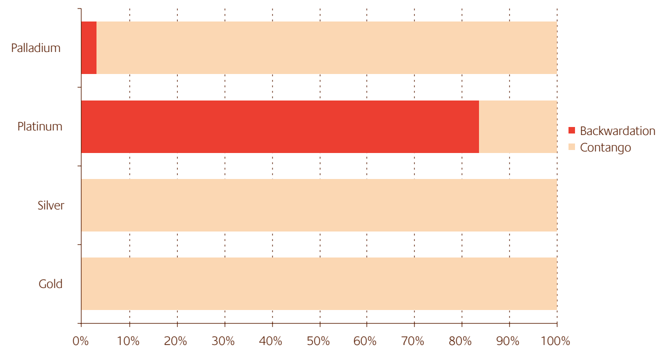
Figure 8: Prevalence of "abnormal" market conditions: precious metals



Prices are London spot and calculated 3-month prices. Gold July 1989 to July 2005, silver Jan 1999 – July 2005, pgms Jan 2000 – July 2005.

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It is worth mentioning in passing that if the LME metals are artificially "squeezed", resulting in large backwardations, then the exchange authorities have the ability to intervene in order to restore orderly trading conditions. There are no similar mechanisms for official intervention in the London precious metals markets.

Price fans

A few years ago CRU developed the concept of price fans, produced by grouping together historic spot and associated forward prices, to see whether they indicated a convergence of far forward prices around some fairly stable equilibrium level. The approach was initially used to analyse the US natural gas market and subsequently applied to base metals. We present below some examples of this for the largest base and precious metals markets.

The approach adopted has been to sort the data sets into appropriately-scaled cash/fix/closing price bands ($25/oz for gold and platinum, $100/t for aluminium and copper) and a forward curve plotted through the averages for each prompt date for each band. In order to produce a clearer picture of the price range to which the curves are gravitating, some base metals observations were extrapolated beyond the published price range of up to 27 months (up to 2002). This was done by following an observed pattern that the slope of the curves over one time period (e.g. 15 to 27 months) tended to be roughly half that of the preceding period (e.g. 3 to 15 months). We adopted the same strategy in precious metals to extrapolate out platinum prices to 12 months, as for the gold data.

The results are shown in **Figures 9 - 12**. There is a marked difference between the observed patterns in base and precious metals. The aluminium and copper price fans tend to gravitate towards longer term values of roughly $1,500/tonne and $2,000/tonne respectively. (We obtained similar patterns, not published here, for zinc and nickel, although there was very little sign of convergence/consensus on long-term lead and tin prices.) In contrast to aluminium and copper, the gold and silver charts look like a set of almost parallel lines, indicating a lack of consensus on long term prices. Whether the spot gold price is less than $300/oz or over $400/oz, the slope of the forward curve is little different. The platinum curves typically slope gently downward, but follow the same shape over a very wide range of spot prices.

Conclusions and implications for investment

In this article we have only looked at a

Figure 9: Aluminium price fan: forward versus cash prices

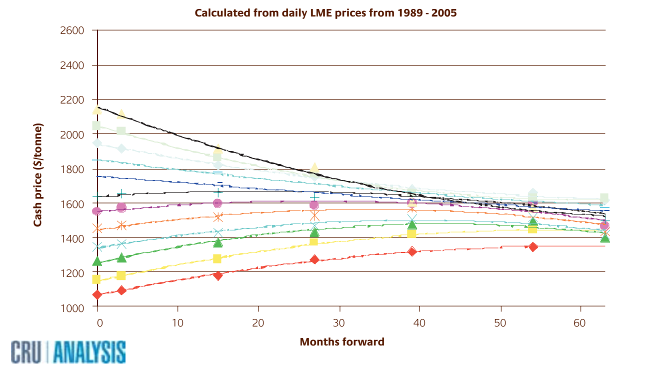


Figure 10: Copper price fan: forward versus cash prices

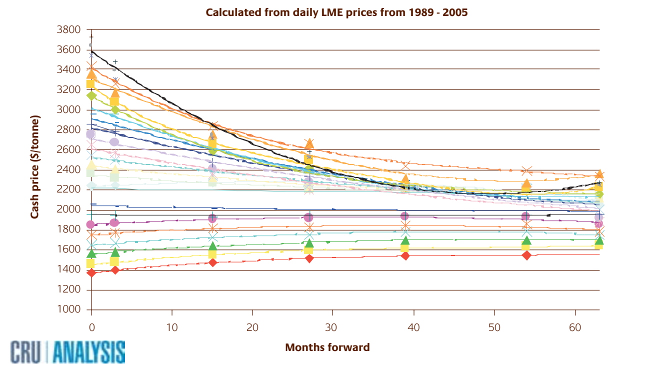


Figure 11: Gold price fan: forward vs cash prices

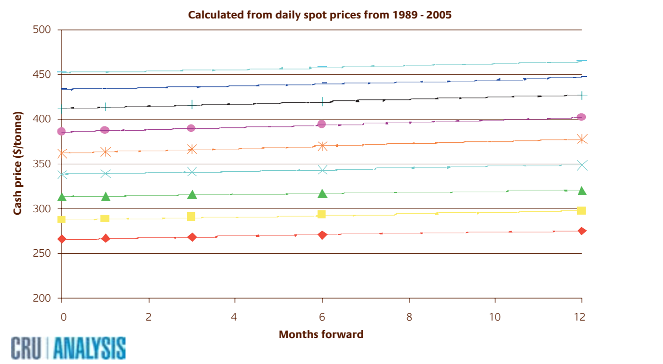
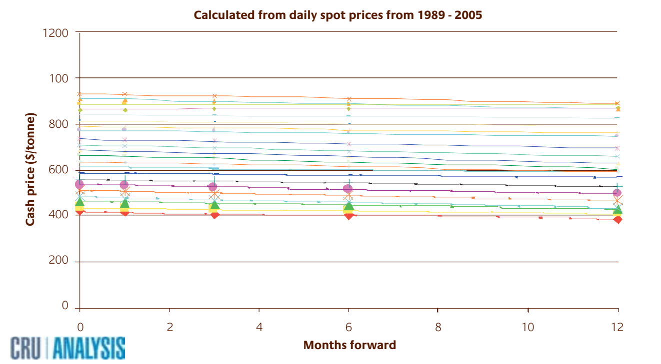


Figure 12: Platinum price fan: forward vs cash prices



limited range of commodity markets, confining the analysis entirely to non-ferrous metals. For this sub-group we have identified how much of the time the different markets are in backwardation and also examined whether forward price curves point to long-term prices that the markets will tend to gravitate towards. This latter issue is a more complicated version of the simple Economist idea that a backwardation indicates a market expectation that the price of a commodity will fall over time.

In base metals, 'abnormal' backwardations occur on average about 30% of the time, and most of the LME metals price fans cluster to some extent around consensus views on long term prices. In precious metals there is a dichotomy between gold and silver and pgms in terms of the frequency of backwardations, but none of the markets seems to have a well-defined long term equilibrium price.

The findings have some relevance for commodity selection/weighting in the construction of investment-oriented commodity indices. It is too simple to suggest that backwardations indicate expectations of falling prices and that therefore profits from roll yields may be more than offset by declining prices. Nevertheless in base metals markets (and for other storable, cyclical commodities exhibiting similar price fan effects) the existence of a backwardation does indicate that, in the long-term, prices will tend to revert to a long-term trend/equilibrium level. In these cases, money made in holding and rolling a long position, perhaps via an index product, could be lost when the market returns to 'normal'.

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