Myths Exposed on what controls Base Metals and Gold Prices

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SUMMARY
Accurate forecasts for medium-term commodity prices and exchange rates are essential for resource companies considering commitment to large capital expenditures. The inaccuracy of traditional forecasting methods is well known because they tend to be extrapolations of the current trend. The inevitable reversal catches too many companies by surprise.

I show commodity medium term prices are not strongly linked to economic health, instead are controlled in an inverse sense by valuation changes of the United States dollar. A probabilistic projection for future valuations of the United States dollar is presented, based on the successful analytical techniques of the petroleum exploration industry.

I show the United States dollar is significantly undervalued at present. The probabilistic extrapolation of the US dollar valuation indicates likely appreciation will put downward pressure on commodity prices for the next 2-5 years - base metals P50 price likely to average around 40% lower than start of 2010; gold P50 average of USD 500.

Key words: commodity prices, probabilistic forecast, US dollar.

INTRODUCTION
Accurate forecasts for medium-term commodity prices are essential for resource companies considering commitment to large capital expenditures. Typically commodity price forecasts tend to be extrapolations of the current trend, which work fine until a turning point occurs. Forecasters can do a lot better than this, if it is realised that the primary control on medium-term prices is change in valuation of the United States dollar (USD).

Conventional wisdom is that base metal prices are set primarily by the interaction of supply and demand factors. Gold price is supposedly set in accordance with inflation rates, exchange rates and the well-being of the global geopolitical situation. Since quite different factors affect base metals and gold prices, there should not be a strong link between these prices. I show these views are myths not substantiated by objective analysis of past commodity prices.

I demonstrate that the major underlying control on commodity prices is appreciation and depreciation of the USD. While this is not a new premise, it does not appear to be widely known in the resources industry. I analyse USD monthly variations, demonstrating the strong inverse relationship between the USD and commodities priced in USD.

I present 5-year probabilistic projections for USD valuation and hence future commodity prices. If the USD premise is correct, the USD is likely to appreciate significantly in the next 2-5 years. This will likely hold stable, or even decrease, commodity prices - a contrary expectation to most commodity price forecasts.

METHOD
Base metals and gold USD prices for the last 30 years are sourced from the Reserve Bank of Australia (RBA) statistical tables, including the Index of Commodity Prices (ICP). This index has the weighted average price of a basket of base metals, detailed in Table 1, in the proportion each metal represents of Australian base metal exports.

I show the United States dollar is significantly undervalued at present. The probabilistic extrapolation of the US dollar valuation indicates likely appreciation will put downward pressure on commodity prices for the next 2-5 years - base metals P50 price likely to average around 40% lower than start of 2010; gold P50 average of USD 500.

Table 1. Relative proportions of base metals in the Reserve Bank of Australia Index of Commodity Prices.

<table>
<thead>
<tr>
<th>Base Metal</th>
<th>Proportion (Sep 2009)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium</td>
<td>42.3%</td>
</tr>
<tr>
<td>Copper</td>
<td>28.9%</td>
</tr>
<tr>
<td>Lead</td>
<td>12.4%</td>
</tr>
<tr>
<td>Zinc</td>
<td>10.3%</td>
</tr>
<tr>
<td>Nickel</td>
<td>6.2%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 1. Relative proportions of base metals in the Reserve Bank of Australia Index of Commodity Prices.

United States economic data and dollar valuations are sourced from time series of the Federal Reserve Bank of St Louis: CPIAUCSL for inflation; GDPC1 for real GDP quarterly percentage change; TWEXMMTH for USD Trade Weighted Exchange Index.

Figure 1 shows base metal and gold USD monthly prices since 1980. Observe both base metals and gold had a low price point in mid 1980s, rose to a high around 1988, then fell to a low around 2002. Prices then rose strongly particularly since 2006. While base metals have since lost much of this recent high, gold continues to maintain stratospheric prices.
MYTH #1  BASE METALS PRICE

Typically forecasts for base metal prices consider supply (existing and new production) and demand (global economic activity) factors. By correlating base metal price changes with United States economic performance (taken as a proxy for world economic health), I examine the accuracy of this assumption.

Figure 2 shows nominal and real base metal price index compared with quarterly changes in US real GDP since 1980. Observe the low correspondence between these timeseries (eg mid 1980s had strong economy yet stable base metal prices; weaker economy since 2005 yet higher metal prices. The rolling 5-year correlation between real GDP and real base metal price averages 0.0 – they are uncorrelated.

Myth #1: that base metal prices are dictated by supply and demand (economic strength) is not substantiated.

MYTH #2  GOLD PRICE

Change in gold price is usually ascribed to inflation and geopolitical concerns. By correlating gold price changes with inflation and noting times of major geopolitical concern, I examine the accuracy of this link.

Figure 3 shows nominal and real gold price compared with US rolling annual inflation. There is some correspondence between gold price and inflation, but the rolling 5-year correlation averages 0.2, indicating a weak link at best. Note that times of major geopolitical concern did not translate into consistent increases in gold price.

Myth #2 – that gold price is dictated by inflation and geopolitical concern is not substantiated.

MYTH #3  COMMODITY PRICES

Figure 1 shows since the early 1980s to present that the monthly ratio of 10 oz gold USD price divided by the base metals USD price index. The ratio has been remarkably stable, averaging 59 ± 18, particularly during 1988 – 2006. At end February 2010, the ratio of 87 is well above average, indicating either base metals could rise in price and/or gold fall in price. Analysis in this paper suggests the latter is far more probable.

Conventional wisdom is that base metal prices are set primarily by the interaction of supply and demand while gold price is influenced by inflation rates and status of the global geopolitical situation. Since different factors affect base metals and gold prices, there should not be a strong link between prices. The ratio of their prices would be expected to vary widely at times, yet this has not happened.

Myth #3 – that base metal and gold prices are controlled by different factors is not substantiated.

US DOLLAR CONTROLS COMMODITY PRICES

I contend that USD valuation changes are a strong medium term control on the prices of base metals and gold. It is accepted that speculators control short-term price movements, but eventually reality returns to pricing.

To examine the USD affect on commodity prices, consider the United States dollar Trade Weighted Index (TWI) which is the weighted average of exchange rates of a home and foreign currencies, with the weight for each foreign country equal to its share in trade with the home country.

Figure 4 shows base metals and gold prices, with gold price plotted as one-fifth ounce, and the USD TWI plotted as inverted scale on the right-hand side. Observe the close inverse relationship between the USD TWI and commodity prices, especially during 1988 – 2005.

During 2006-2008, worldwide euphoria over China’s industrialization caused a spike in commodity prices. Base metal prices have since reversed much of this spike while gold appears to be over-priced based on currency considerations. The USD TWI suggests a more appropriate gold price is around US$500 per ounce.

The overall close relationship during 1988-2005 for USD TWI and commodity prices suggests parties setting the commodity prices wanted a stable return – as the USD depreciated, prices
of commodities rose commensurately and vice-versa. The power of the USD is a consequence that more than half of the total currency is circulating abroad (Regional Economist, April 2006). The USD is the least worst of world currencies, which is why commodity prices are, and will continue to be, struck in USD.

**WHAT CONTROLS USD MOVEMENTS?**

If the USD and commodity medium-term prices have an inverse relationship, then forecasts for commodity prices should be based on expectations of currency movement. To do this, we need an understanding of the magnitude and length of past appreciation and depreciation movements, together with health of the US economy.

![Image](https://via.placeholder.com/150)

**Figure 5.** US dollar valuation changes are not strongly influenced by strength of the US economy.

I contend the evidence is strong that commodity supply/demand does not underpin medium-term price trends. Consider the near-constant ratio for price of base metals divided by gold since 1982 (Figure 1). These commodities have significant unrelated supply/demand factors – if so, why the near constant ratio? If demand for base metals were a significant factor, then why does price fall during the mid-late 1990s when economic activity was strong (refer Figure 2)?

Next I consider how strong an influence is US debt. I look at how changes of the Current Account - the difference in import/export for trade in goods and services and earnings on investments - influences currency valuation. The Current Account is expressed as a percentage of real GDP to normalise the comparison. An increasing Current Account means debt is decreasing (in theory currency should appreciate) and vice-versa.

Figure 6 shows the currency monthly variation compared with quarterly values for Current Account as a percent of seasonally adjusted GDP. Observe there is not a strong relationship between decreasing debt and rising currency or increasing debt and decreasing currency. In fact, the correlation between Current Account as percentage of GDP and USD TWI is -0.1. They are not correlated, despite what is commonly presented in the media.

![Image](https://via.placeholder.com/150)

**Figure 6.** US dollar valuation changes are not strongly influenced by increasing or decreasing debt.

I suggest it is unreliable to predict medium term currency movements using US economic strength and debt.

**PROBABILISTIC PREDICTION OF PRICES**

Given that conventional measures (supply/demand, etc) are not reliable for commodity price prediction, we need to look elsewhere for the underlying factor. I suggest the USD is the best factor for an outlook for medium term commodity prices.

![Image](https://via.placeholder.com/150)

**Figure 7.** Monthly valuation changes of the US dollar Trade Weighted Index strongly conform to a normal distribution.

The variation in value of the USD Trade Weighted Index since 1973 has been analysed. Figure 7 shows the probability of monthly changes in 1% bands from -6% to 6%. Observe the distribution very closely conforms to a normal distribution with mean -0.064% (= -0.76% pa) and 1.73% standard deviation.

Figure 8 shows the USD Trade Weighted Index since 1973. Observe an overall fall in value, consistent with the calculated -0.76% annual decline. Figure 8 also shows the position of ±1 standard deviation. At end of 2009, the USD was close to 1 standard deviation below average.

A forward analysis has been performed of the TWI monthly series, whenever it was close to 1 standard deviation from average with a look ahead to future values over the following 1-5 years. The results are expressed as probabilities, ranging from P90 (90% certain the TWI will equal or exceed the P90 value), P50 and P10 valuations for the USD. These are shown
in Figure 8. Observe that on a P50 basis, the USD is likely to appreciate beyond the median value in about 3 years.

CONCLUSIONS

It has been demonstrated that conventional commodity price forecasting techniques are not reliable for medium term prices. Short term prices are even more inaccurate, given the actions of speculators and momentum.

Instead forecasts could well consider the petroleum industry probabilistic methodology. A probabilistic prediction of the USD Trade Weighted Index is combined with commodity prices in Figure 9.

It is apparent that the likely appreciation of the USD over the next 2-5 years should put downward pressure on commodity prices.

I conclude that on the balance of probabilities, during the medium term (2-5 years), the RBA Index of Commodity Base Metal Prices could average around USD80 (compared with current USD127); gold could fall to around USD500 per ounce. These predictions would be disappointing to people hoping for a speedy return to the heady days of 2006-08. One comfort – price in Australian dollars (AUD) should increase.

Predicting commodity prices will not rise significantly over the medium term is contrary to that of most forecasters, who expect that increasing demand from the world economies will increase commodity prices. The trouble with this prediction is that economic health is only weakly linked to currency movement and commodity prices. There is another, more important, factor in play – the USD valuation.

In summary, medium term USD commodity prices are driven by the strength of the USD rather than by supply and demand. Short-term commodity price trends, such as the recent base metal surge and decline during 2006-08, are not controlled by currency but speculators.

The USD is currently significantly undervalued, measured against its TWI. It is forecast to rise in the medium term, resulting in USD commodity prices falling and the AUD weakening against the USD. These two effects need to be considered by Australian-based resource companies with USD revenue but costs, dividends, financing and share prices in AUD.

REFERENCES

Federal Reserve of St Louis http://research.stlouisfed.org/fred2/


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![Figure 8. USD valuation predictions with 90%, 50% and 10% confidence.](image-url)

**USD Trade Weighted Index 1973 - Jan 2010**

![Figure 9. A probabilistic extrapolation of the US dollar valuation indicates the likely appreciation will put downward pressure on commodity prices for the next 2-5 years. Base metals P50 price likely to average around 40% lower than start of 2010; gold price average USD 500.](image-url)

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