WORLD GOLD COUNCIL
gold:report
MAY 2005

Commodity returns and the Economic Cycle

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Introduction

The purpose of this paper is to explore the nature of the relationship between spot returns on the seven metals included in the Goldman Sachs Commodity Index (GSCI) and the economic cycle. These metals, included in the index on the basis of the dollar value of annual production and liquidity, are aluminium, copper, lead, nickel, zinc, silver and gold. Investors in commodities need to understand the dynamics of supply and demand and how these may impact on price. Given current enthusiasm about the extent to which economic growth in China is likely to continue to underpin a commodity bull market, it is extremely important that newcomers to commodities markets are in a position to discern the extent to which Chinese economic growth can be expected to boost demand for particular commodities, and whether such demand can in turn be expected to lead to sustained increases in the prices of these commodities. This paper does not set out to provide a comprehensive set of solutions, aiming instead to ask some of the right questions and provide some useful starting points for the identification of commodity price drivers and further analysis.

When reading the summary information about each of the metals, the following key questions should be borne in mind:

- Which economies are the major consumers of each metal and does their economic growth have a direct, contemporaneous impact on demand for each metal?
- What are the main uses of each metal and how can this help us form a view on the outlook for demand?
- To what extent does demand drive price?
- To what extent is supply constrained and how important is this with respect to price movements?

We begin by analysing the regional composition of demand for each metal, in order to evaluate whether there is any contemporaneous relationship between economic growth and spot returns. To this end, we use world refined consumption data for 2003, as reported by the World Bureau of Metal Statistics, for aluminium, copper, lead, nickel and zinc[2]; and fabrication demand for gold and silver, also for 2003.[3] End-use data for each of the metals would have been ideal, but is only available for a restricted number of countries. However, in the case of gold, we are able to draw a comparison between fabrication demand and consumption demand by sector, which serves to provide some insights that could be extended to other metals, were the data available. Some end-use data is available for zinc and lead.

By constructing a weighted GDP index, based on the real quarterly growth rates of the five main consuming countries in each case[4], we cover at least half of the demand for each metal. Table 1 reports

[1] Please read the disclaimer on page 15
[2] World Metal Statistics Yearbook 2004, published by World Bureau of Metal Statistics, www.world-bureau.com
[3] World Silver Survey 2004, published by GFMS – www.gfms.co.uk - and The Silver Institute – www.silverinstitute.org ; World Gold Survey 2004, published by GFMS
[4] Quarterly data was not available for the time period covered for China and India; annual data was used for these countries

the weights used for each metal and the total percentage of demand accounted for by the five countries. Consumption demand for the seven metals is concentrated in a handful of countries – in all cases, a dozen countries accounted for more than 70 per cent of consumption demand. It is possible that including a wider range of countries in the GDP-weighted index would produce more precise results. It is probable that there are differential lags between price movements and economic growth. In this analysis, we tested only for contemporaneous relationships between changes in metal prices, based on quarterly averages, and real GDP growth rates, and were restricted to a relatively short time period, i.e. starting in the first quarter of 1994. Although one could test for lags using Granger causality tests, a sample of 44 data points would simply not be adequate to draw any meaningful inferences. Ideally, one would break down the sectoral demand for each metal by country, to avoid the implicit assumption that economic growth impacts equally on each sector of demand.

However, the data that we do have to hand does enable us to conclude that

Table 1: Weights of consumption-weighted GDP index[5]

Aluminium	%	Copper	%	Lead	%	Nickel	%	Zinc	%	Silver	%	Gold	%
USA	21	China	20	USA	22	Japan	15	China	21	USA	20	India	19
China	19	U.S.A.	15	China	17	China	11	USA	12	India	14	Italy	11
Japan	7	Japan	8	Germany	6	S. Korea	9	Japan	7	Japan	13	Turkey	9
Germany	7	Germany	7	S. Korea	5	Taiwan	8	Germany	6	Italy	6	USA	7
S. Korea	4	S. Korea	6	Japan	5	Germany	8	S. Korea	5	China	6	China	7
Total	**57**		**55**		**54**		**50**		**50**		**60**		**53**

Figure 1 – Aluminium: GDP v. price

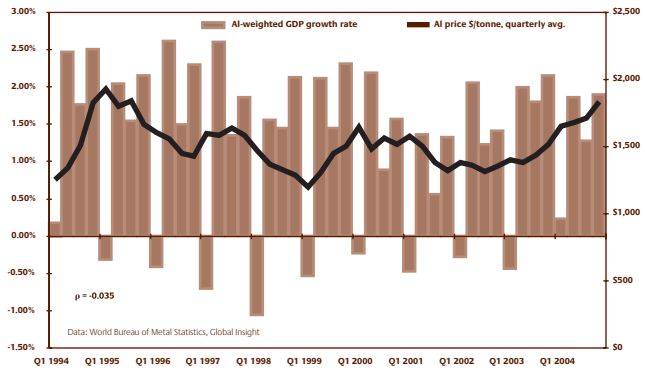


Figure 2 – Copper: GDP v. price

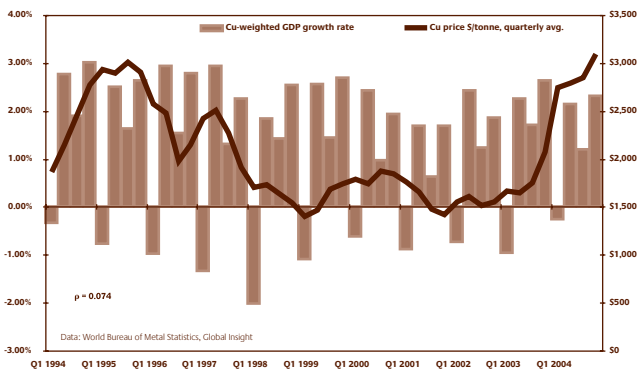


Figure 3 – Lead: GDP v. price

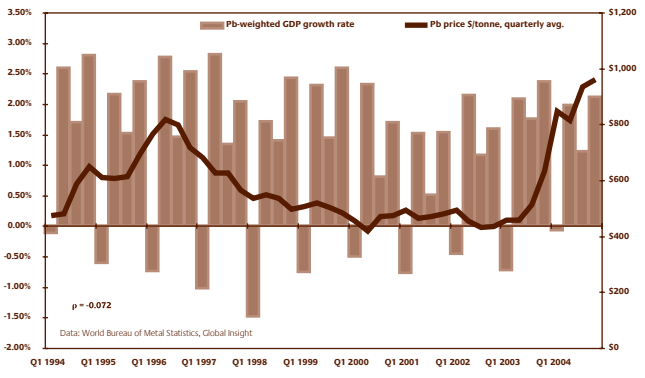
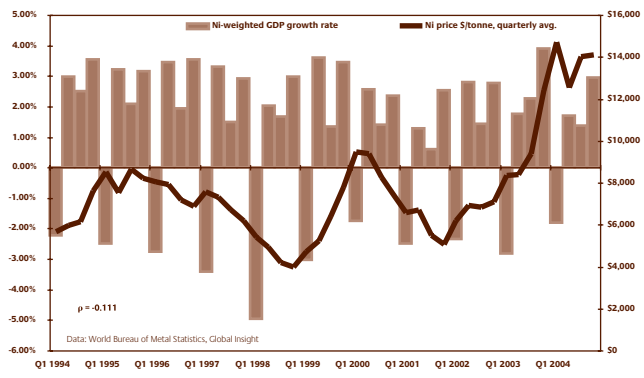


Figure 4 – Nickel: GDP v. price



[5] Fabrication demand data was used for both gold and silver

there was little apparent direct, contemporaneous relationship between economic growth and price movements over the period covered. Table 2 contains an analysis of growth rates in demand by volume and by value in US dollars, as well as the evolution of prices for the seven metals from various years in the 1990s through to 2004. Exploration of the salient features of each metal in turn provides us with some insight as to why this might be so.

Figure 5 – Zinc: GDP v. price

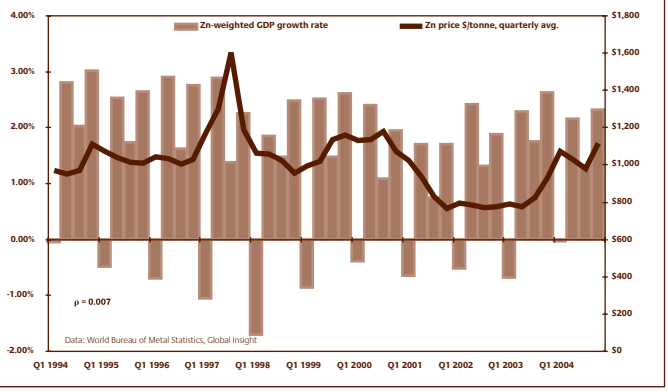


Figure 6 – Silver: GDP v. price

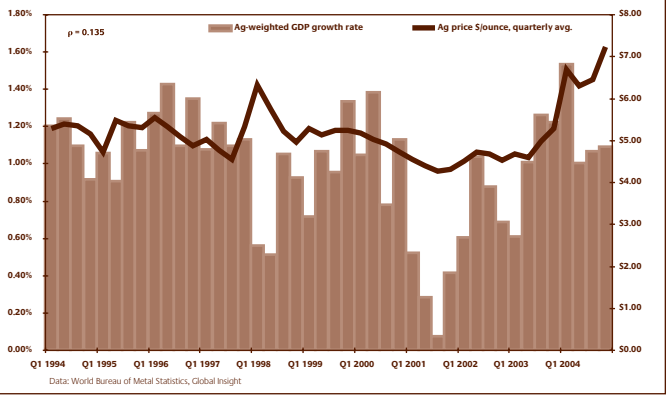
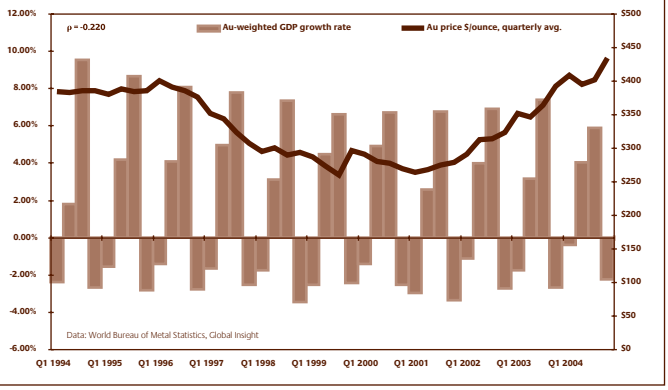


Figure 7 – Gold: GDP v. price



gold

Table 2

Growth Rate Demand (volume)

	Aluminium	Copper	Lead	Nickel	Zinc	Silver	Gold
1991	na	0.32%	-2.50%	na	-0.09%	na	7.29%
1992	na	-0.97%	-1.01%	na	0.37%	na	11.27%
1993	na	2.79%	1.64%	-2.22%	1.79%	na	-7.99%
1994	na	5.35%	4.46%	10.45%	4.23%	na	3.41%
1995	na	2.87%	5.27%	12.62%	7.31%	1.43%	8.95%
1996	na	5.25%	0.60%	-2.22%	1.48%	3.60%	-3.22%
1997	6.04%	4.10%	1.44%	5.80%	3.66%	5.62%	17.61%
1998	0.62%	2.34%	0.33%	-0.60%	1.48%	-1.61%	-7.65%
1999	6.11%	5.27%	3.65%	5.93%	3.90%	4.76%	2.50%
2000	5.67%	6.23%	5.29%	4.31%	6.24%	4.52%	0.27%
2001	-5.03%	-3.94%	-0.86%	-0.49%	-0.48%	-4.41%	-6.47%
2002	6.71%	3.50%	1.26%	4.91%	3.41%	-2.90%	-9.63%
2003	8.12%	2.80%	2.31%	5.95%	3.99%	1.57%	-5.77%
2004	8.90%	8.42%	2.87%	1.23%	6.32%	na	5.77%
CAGR over period	4.64%	3.17%	1.77%	4.15%	3.12%	1.40%	1.17%

Growth Rate Demand (value)

	Aluminium	Copper	Lead	Nickel	Zinc	Silver	Gold
1991	na	-12.69%	-40.34%	na	-31.04%	na	1.57%
1992	na	-3.39%	-3.66%	na	10.93%	na	6.08%
1993	na	-14.88%	-27.22%	-30.21%	-23.72%	na	-3.48%
1994	na	24.24%	34.31%	28.52%	8.06%	na	9.95%
1995	na	26.78%	19.33%	38.67%	10.51%	-0.25%	8.92%
1996	na	-19.37%	21.10%	-11.42%	0.92%	3.64%	-2.23%
1997	12.10%	3.46%	-20.09%	-2.23%	28.82%	-0.36%	1.85%
1998	-15.79%	-29.72%	-16.30%	-40.89%	-23.85%	10.79%	-19.56%
1999	6.40%	0.14%	-1.43%	32.38%	9.04%	-1.27%	-2.92%
2000	18.61%	20.56%	-4.77%	40.33%	10.86%	-0.77%	0.47%
2001	-12.05%	-17.90%	3.89%	-37.85%	-24.60%	-16.90%	-9.40%
2002	-0.02%	2.27%	-3.83%	17.81%	-9.55%	2.21%	3.70%
2003	13.95%	16.21%	15.37%	41.12%	10.19%	7.48%	10.20%
2004	27.06%	56.01%	57.26%	37.54%	29.82%	na	17.66%
CAGR over period	6.28%	3.69%	2.40%	10.34%	0.46%	0.51%	1.63%

US$ Price (growth rate)

	Aluminium	Copper	Lead	Nickel	Zinc	Silver	Gold
1991	na	-13.01%	-37.85%	na	-30.95%	na	-5.72%
1992	na	-2.42%	-2.65%	na	10.56%	na	-5.19%
1993	na	-17.66%	-28.86%	-27.99%	-25.51%	na	4.51%
1994	na	18.89%	29.85%	18.08%	3.84%	na	6.54%
1995	na	23.92%	14.06%	26.04%	3.20%	-1.68%	-0.03%
1996	na	-24.62%	20.50%	-9.20%	-0.56%	0.04%	0.99%
1997	6.06%	-0.64%	-21.53%	-8.04%	25.16%	-5.98%	-15.77%
1998	-16.41%	-32.06%	-16.63%	-40.29%	-25.33%	12.41%	-11.91%
1999	0.29%	-5.13%	-5.08%	26.45%	5.14%	-6.02%	-5.42%
2000	12.94%	14.32%	-10.06%	36.02%	4.61%	-5.29%	0.19%
2001	-7.02%	-13.96%	4.74%	-37.36%	-24.13%	-12.48%	-2.93%
2002	-6.73%	-1.23%	-5.09%	12.91%	-12.96%	5.11%	13.33%
2003	5.83%	13.41%	13.05%	35.17%	6.20%	5.91%	15.97%
2004	18.16%	47.60%	54.39%	36.31%	23.50%	na	11.88%
CAGR over period	1.64%	0.53%	0.63%	6.19%	-2.66%	-0.89%	0.46%

Notes to Table 2

1. Source data: The Silver Institute/GFMS for silver; GFMS for gold; Commodities Research Unit (CRU) for all other metals
2. 2004 demand data for silver will be released in May 2005
3. 2004 gold data is an estimate based on the GFMS Gold Survey 2004, Update 2 published in January 2005. Demand for the purposes of this calculation includes fabrication demand and bar hoarding but does not include the 179.5 tonnes held in Exchange Traded Gold funds by the end of 2004. These funds included the Central Fund of Canada, Central Gold Trust (Canada), Gold Bullion Securities (Australia and United Kingdom), NewGold (South Africa) and StreetTracks Gold Shares (United States)
4. na = not available
5. CAGR = compound annual growth rate
6. Annual growth rates represent annual growth rate between previous year and stated year

Aluminium

Based on five-year averages, the aluminium market, in terms of annual world consumption demand, is worth US$ 39.662 billion, with 2004 reaching a record US$ 51.655 billion.[6]

The largest sources of demand for aluminium are transportation, building construction, beverage cans and other packaging, of which transportation has grown most over the past decade, accounting for 25 per cent of demand in 1994 and 29 per cent in 2004, with commensurate declines in construction and packaging. The use of aluminium in car manufacturing is growing because lighter body weights make it possible to improve fuel economy and enhance performance. Aluminium comprises about 80 per cent of an aircraft's unladen weight and is used more and more for high-speed trains, subway trains and freight cars, as well as ferries. Figures 8 and 12 illustrate the main end-uses of aluminium and the main users of aluminium in the manufacturing of end products.

Figure 8: Global demand for semis by end-use 1994-2004

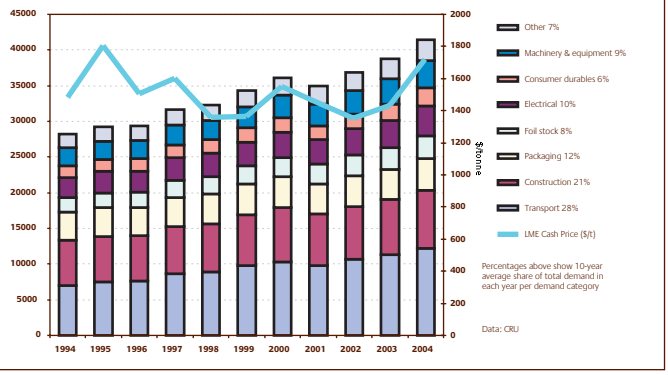


Figure 9: 2003 Bauxite production by region

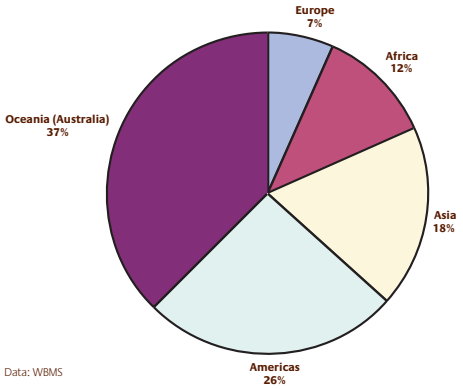


Figure 10: 2003 Alumina production by region

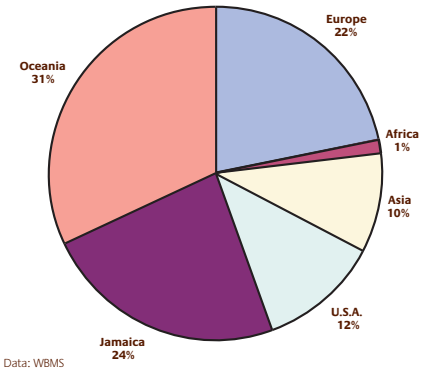


Figure 11: 2003 World refined aluminium production

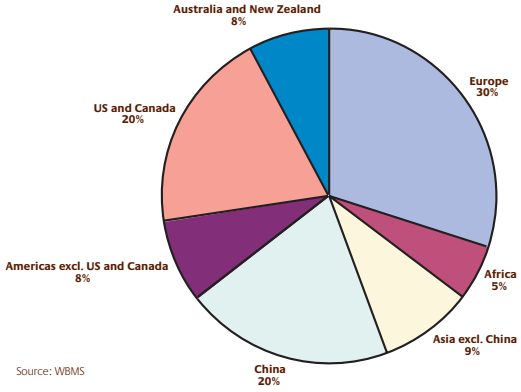
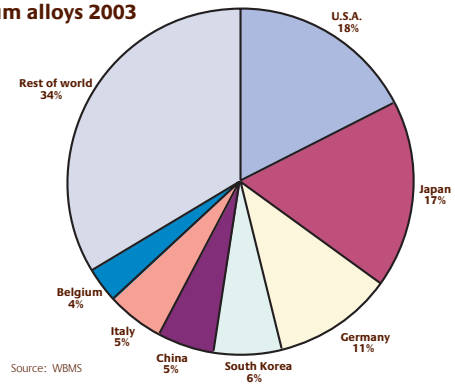


Figure 12: Principal importers of unwrought aluminium and aluminium alloys 2003



[6] Source: CRU

Substitutes for aluminium include copper in electrical applications; wood and steel in construction; and glass, paper and plastics in packaging applications.

Although aluminium is the most common element in the earth's crust, it does not exist as a metal in its metallic state and has to be extracted from ore – usually bauxite. Bauxite ore is refined into alumina (aluminium oxide trihydrate), which is then converted into metallic aluminium using electrolysis. It takes two or three tonnes of bauxite to produce one tonne of alumina, and two tonnes of alumina to produce one tonne of aluminium metal.[7] The production of aluminium metal is an energy-intensive process and uses a lot of electricity, although the energy-efficiency has improved by around twenty per cent over the past twenty years. The Aluminum Association estimates that it takes 7 kilowatt hours to produce a pound (0.455 kg) of aluminium metal, compared to 12 kilowatt hours fifty years ago. Although bauxite is mined mainly in tropical and sub-tropical areas in Africa, the West Indies, South America and Australia, it is processed elsewhere (see Figures 9, 10 and 11). The location of processing plants is often linked to the availability of cheap electric power. A further point worth noting is the importance of secondary supply: over sixty per cent of all aluminium is recycled, a percentage that the industry expects will increase over time. It costs far less to produce aluminium (and other metals) from scrap than it does to produce it from scratch.

Copper

It is widely believed that copper demand is closely linked to the economic cycle or, put more strongly, that global economic growth is the principal factor that drives demand for copper – demand for copper is strongly pro-cyclical. Note that this is not the same as saying that copper prices are pro-cyclical. More than forty per cent of demand derives from the construction industry, with electrical and electronic products accounting for an additional 27 per cent, with total demand accounting for US$ 29.782 billion on average per year (5 year average). The combination of price and demand trends in 2004 led to a huge increase in the value of copper demand with the total for the year worth US$ 48.044 billion.

Figure 13 – Copper – demand and price 1994-2004

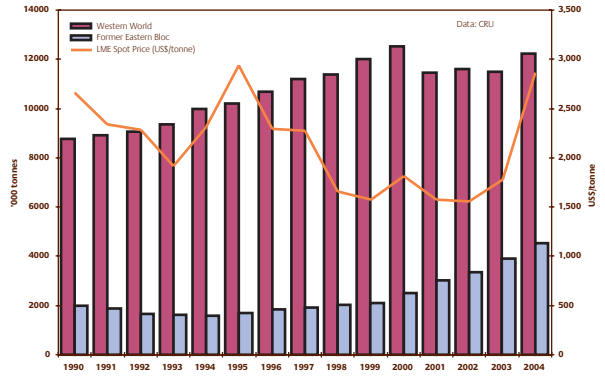


Figure 14 – Copper – consumption by end use sector

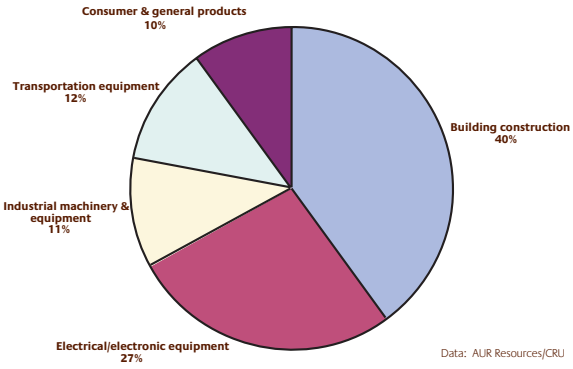


Figure 15 – Copper – supply/demand "gap" and price

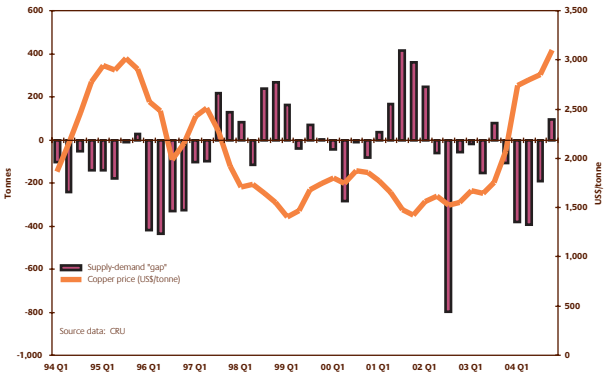
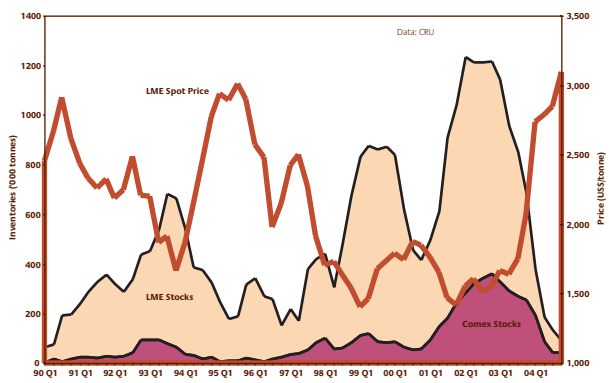


Figure 16 – Copper – inventories and prices



[7] Sources for this section: www.world-aluminium.org ; www.aluminum.org, CRB 2003 Yearbook Articles

An average single-family unit uses 439 pounds of copper:
195 pounds – building wire
151 pounds – plumbing tube, fillings, valves
24 pounds – plumbers' brass goods
47 pounds – built-in appliances
12 pounds – builders hardware
10 pounds – other wire and tube

General levels of copper use in major appliances:
52 pounds – unitary air conditioner
48 pounds – unitary heat pump
5.0 pounds – dishwasher
4.8 pounds – refrigerator/freezer
4.4 pounds – clothes washer
2.7 pounds – dehumidifier
2.3 pounds – disposer
2.0 pounds – clothes dryer
1.3 pounds – range

An average multifamily unit uses 278 pounds of copper:
125 pounds – building wire
82 pounds – plumbing tube, fittings, valves
20 pounds – plumbers' brass goods
38 pounds – built-in appliances
6 pounds – builders hardware
7 pounds – other wire and tube

Some 10,000 copper range hoods and 20,000 weather vanes are produced annually, using about 7 pounds of copper each.

The average house has 12 locksets: 2 are keyed, the rest are passage sets. The average multifamily unit has 6 locksets – 1 keyed, the remainder are passage sets.

There are probably about a billion doorknobs in the U.S., weighing in with about 500-600 million pounds of copper.

There is an average of 50-55 electrical outlets per home and some 15-20 switches. That translates to between 2_ and 3 pounds of copper alloy for these uses per house.

Source: www.copper.org

The Copper Development Association, which is the primary marketing, engineering and information services arm of the copper industry, estimates the use of copper in an average single-family home of 2,100 square feet (195 m^2) to be around 439 pounds (199 kg), residential construction representing around two-thirds of the building construction market in the US, which in turn accounts for around 15 per cent of world consumption of refined copper each year.

But as can be seen from Figure 13, it is not primarily in the Western World that demand for copper is growing; as with so many commodities, the growth factor comes from the Eastern hemisphere, with Asia accounting for 47 per cent in 2003 contrasted with just 35 per cent just ten years before.[8] And there appears to be little direct correlation between this strongly growing demand and the copper price – throughout the 1990s Western World demand for copper grew steadily, yet price movements did not track this evolution, rising and falling, it would seem, in step to a different drum. In Figure 15 we illustrate the supply-demand "gap" and the evolution in the copper price, i.e. world refined copper production minus world refined copper consumption. A negative number for the supply-demand gap representing excess demand, one would expect this to impact positively on price (increase price), other things remaining equal. The suggestion of a pattern emerges on this chart, at least sufficient to indicate that a relationship exists, although one would be hard put to identify lags and responsiveness. The pattern appears far clearer when one looks at Figure 16, which compares LME and Comex stocks with the evolution in the copper price since 1990. Analysis of inventories held on these two exchanges can therefore provide investors with valuable information that is available with considerably less of a lag than other supply and consumption data, although the latter remains crucial to validate longer-term trends.

[8] Source data: World Bureau of Metals Statistics Yearbook 2004

Lead

In the absence of alchemical aspirations, it is difficult to get very excited about lead. Nonetheless, lead and zinc are the two most widely used non-ferrous metals after aluminium and copper, and lead consumption accounts for around US$ 3.8 billion each year (five year average). The value in 2004 was 65 per cent higher than the five-year average, at US$ 6.3 billion. Lead consumption has grown steadily since 1990, as can be seen from Figure 17, although as is the case with the other metals, it is difficult to trace a direct relationship between demand and price, ergo spot returns. By far the biggest use of lead is in lead acid batteries, which accounts for a steadily growing share of demand (see Figures 18 and 19, and Table 3. Other than their use in vehicles, these batteries are also used in emergency power systems, for instance in hospitals, and in industrial batteries in computers and fork lift trucks. This share has remained remarkably constant over time.

The importance of recycling to the lead market is illustrated in Figure 20. More than 50 per cent of lead supply comes from recycling.

As we have already seen with copper, movements in LME stocks provide investors with a useful, timely price indicator (Figure 21). What we can also learn from lead is that increasingly, mine production alone is not a particularly useful proxy for supply, and is expected to become less useful over time as secondary supply from recycled scrap plays more and more of a role.

Figure 17 – World lead consumption v price

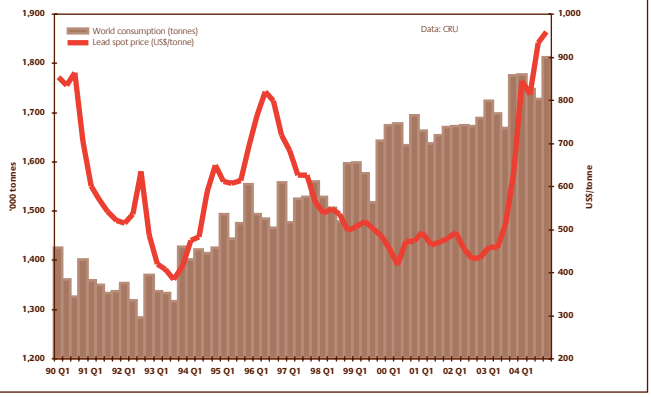


Figure 18 – Estimated World Lead Consumption by end-use (tonnes)

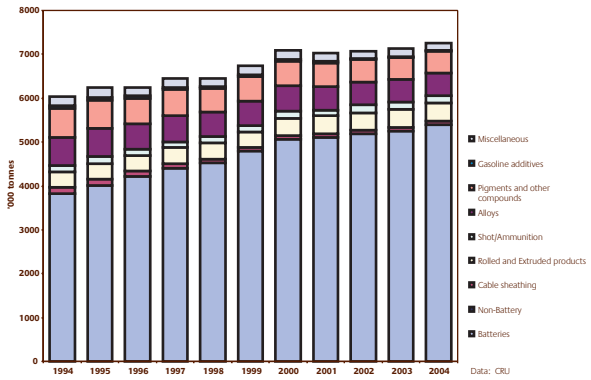


Figure 19 – Estimated World Lead Consumption by end-use (per cent)

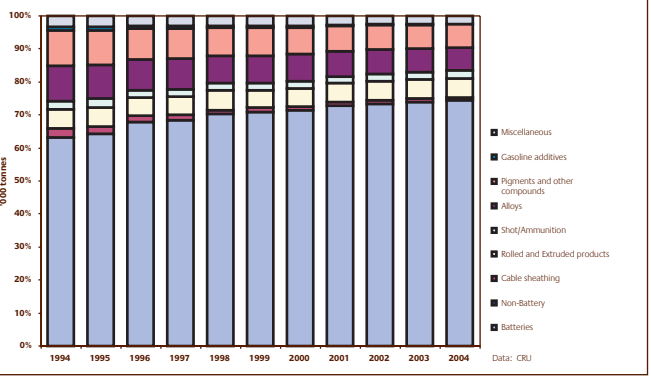
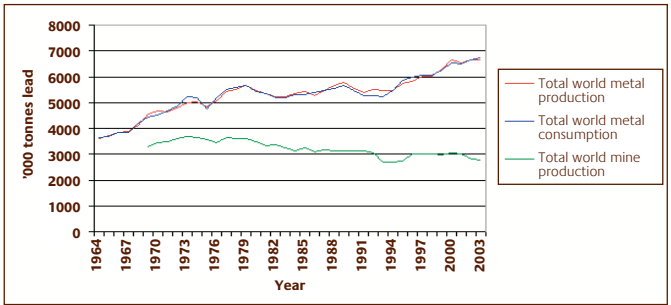


Figure 20 – The role of recycling



Source: Lead Development Association International - www.ldaint.org

Figure 21 – Lead: LME stocks v price

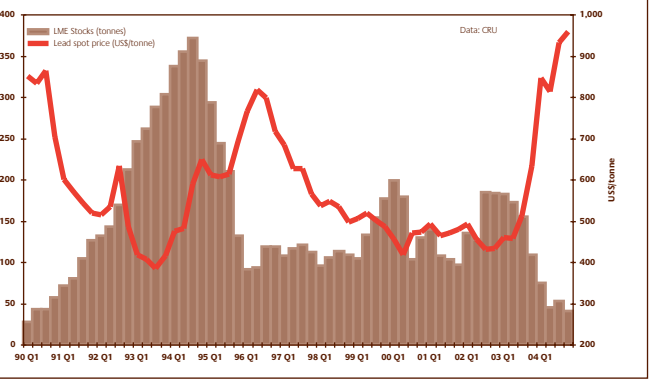


Table 3: Lead End-Uses

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Batteries	69%	70%	72%	73%	75%	75%	75%	77%	77%	78%	78%
Non-Battery	31%	30%	28%	27%	25%	25%	25%	23%	23%	22%	22%
Cable sheathing	03%	02%	02%	02%	01%	01%	01%	01%	01%	01%	01%
Rolled and Extruded products	06%	06%	06%	06%	06%	06%	06%	06%	06%	06%	06%
Shot/Ammunition	03%	03%	02%	02%	02%	02%	02%	02%	02%	02%	03%
Alloys	03%	03%	03%	03%	03%	03%	03%	03%	02%	02%	02%
Pigments and other compounds	12%	11%	10%	10%	09%	09%	09%	08%	08%	07%	07%
Gasoline additives	01%	01%	01%	01%	01%	01%	01%	00%	00%	00%	00%
Miscellaneous	04%	04%	03%	03%	03%	03%	03%	03%	03%	03%	02%

Source: CRU – Estimated basis actual tonnes and previous known usage

Nickel

As with aluminium, copper and lead, the value of annual nickel demand increased dramatically last year. The five-year average for consumption from 2000 to 2004 is US$ 10.75 billion, contrasted with US$ 17.5 billion in 2004 – a difference of just over 60 per cent. Nickel's physical properties – low thermal and electrical conductivities, high resistance to corrosion and oxidation, strength and toughness at high temperatures and the possibility of magnetizing it – make it a useful alloy with many other metals. Around 65 per cent of nickel is used to manufacture stainless steels, 20 per cent in the production of other steel and non-ferrous alloys. The balance of demand breaks down into 9 per cent used in plating and 6 per cent in other uses including coins and chemicals.[9]

Figure 22: World primary nickel demand (tonnes)

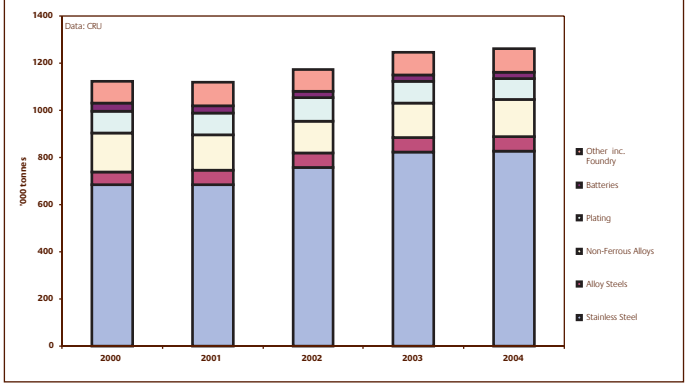


Figure 23: World nickel consumption v price

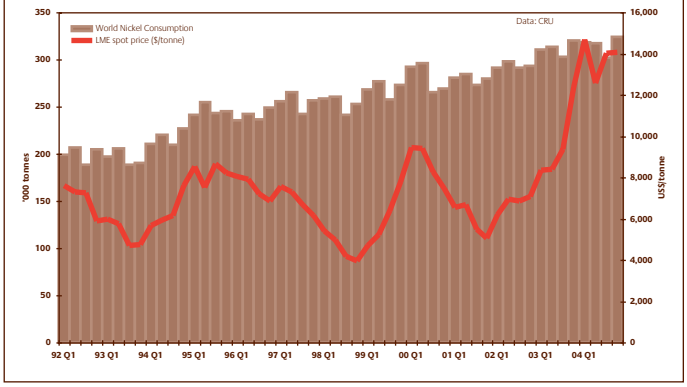


Figure 24: Nickel LME inventories v price

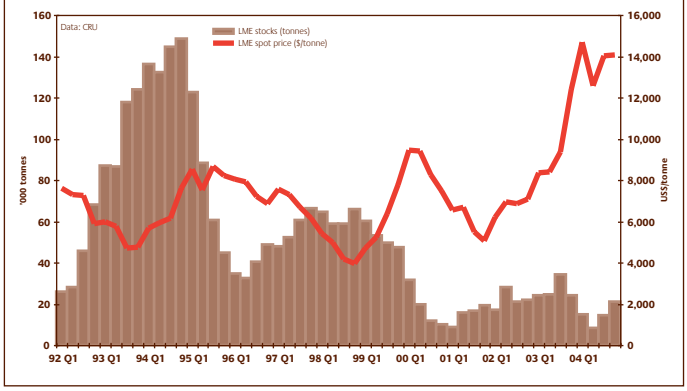
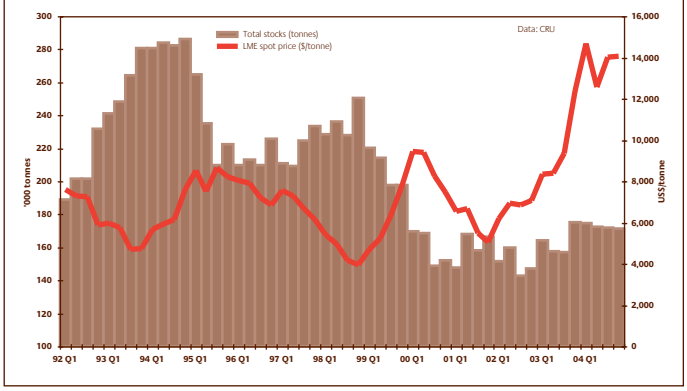


Figure 25: Nickel Inventories v price



[9] Source: www.insg.org

Consumption easily outweighs annual production, and the nickel market is heavily dependent on recycling – see Figure 26.

Stainless steel generally contains 8 per cent of nickel[10], and the importance of this use of nickel makes an analysis of stainless steel demand trends crucial to understanding the evolution of the nickel market. Between 1994 and 2003, Chinese consumption of stainless steel (volume basis) grew at a rate equivalent to 18.4 per cent per year, contrasted with a world consumption growth rate of 4.2 per cent.[11]

Figure 26: Nickel primary production v consumption demand CRU

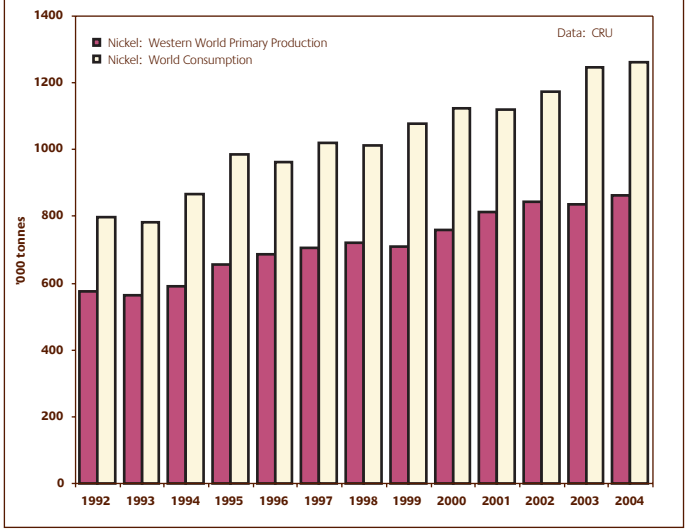
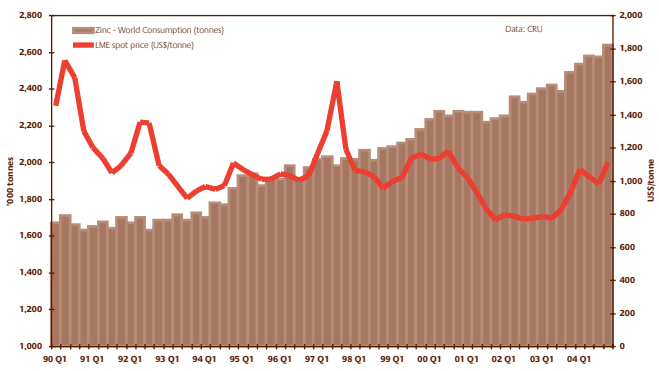


Figure 27: Zinc world consumption v price



Zinc

The use of zinc as a protective coating for other metals, such as iron and steel, in a process known as galvanizing, accounts for more than half of zinc consumption. Zinc is also used as an alloy with copper to make brass.

Annual consumption of zinc in volume terms has in fact declined since 1990, although in value terms it increased at a rate equivalent to 0.46 per cent over the period and was worth US$ 10.8 billion in 2004, contrasted with a five year average of US$ 8.9 billion.[12] Once again, China has been a major source of the growth in demand for zinc, accounting for no less than 21 per cent of consumption demand in 2003. Between 1994 and 2003, Chinese consumption of slab zinc increased by 162%, equivalent to a compound annual growth rate of eight per

Figure 28: Zinc LME stocks v price

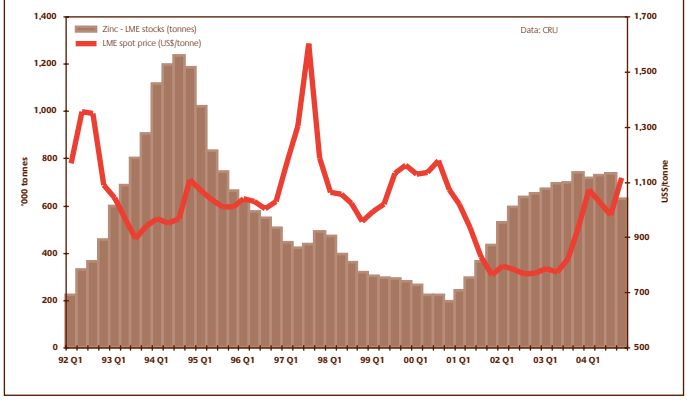
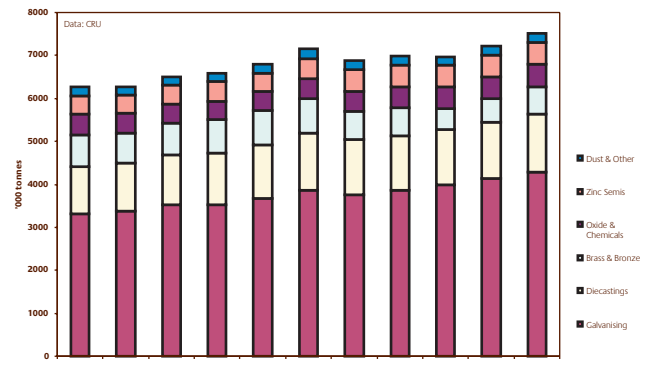
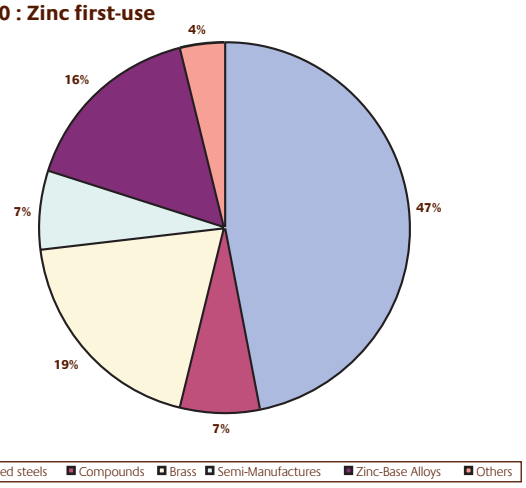


Figure 29: Zinc consumption by first use



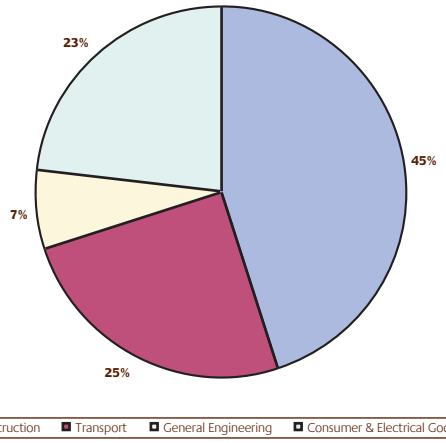
[10] Source: International Stainless Steel Forum; www.worldstainless.org
[11] Source data: World Bureau of Metal Statistics Yearbook 2004
[12] Calculations based on CRU data – see Table 2

Figure 30 : Zinc first-use



Source: ILZSG / Brook Hunt / Outokumpu / CRU
Reproduced from The Zinc Guide 2004 - www.zinc-guide.org

Figure 31: Zinc end-use



Source: ILZSG / Brook Hunt / Outokumpu / CRU
Reproduced from The Zinc Guide 2004 - www.zinc-guide.org

cent.[13] The use of zinc in construction alone is probably sufficient to explain the steady growth in demand over the past fifteen years.

As with the other industrial metals covered thus far, there appears to be little direct relationship between GDP growth in the five main consuming countries and spot returns; similarly, fluctuations in the zinc price are not mirrored in world consumption trends. Unlike copper, lead and nickel, the relationship between LME zinc stocks and price movements is not very clear-cut.

Silver

Demand for silver is worth around US$ 4.187 billion each year, with industrial applications accounting for the largest "market share" at around 40 per cent, followed by jewellery and silverware (32 per cent) and photography (24 per cent). Investment demand for silver in the form of coins and medals is tiny by comparison although it has picked up a little since the second half of the 1990s. Industrial uses for silver include batteries, bearings, brazing and soldering, catalysts, electrical uses, electronics, electroplating, medical applications, mirrors and coatings, solar energy and water purification.[14] As might be expected, demand for silver in photography has declined over recent years due to the expansion of digital photography, a trend that is expected to continue. Industrial demand for silver increased by 25 per cent from 1994 to 2003, equivalent to a compound annual

Figure 32 – Silver fabrication demand (Moz)

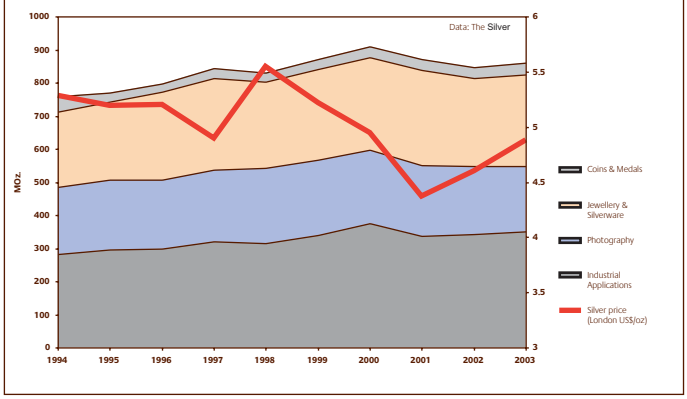
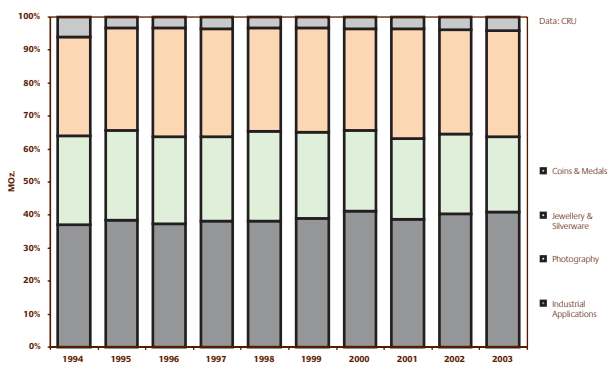


Figure 33 – Silver fabrication demand (percentage)



[13] Source data: World Bureau of Metal Statistics Yearbook 2004
[14] The Silver Institute – www.silverinstitute.org

Figure 34 – Silver – Comex stocks v price

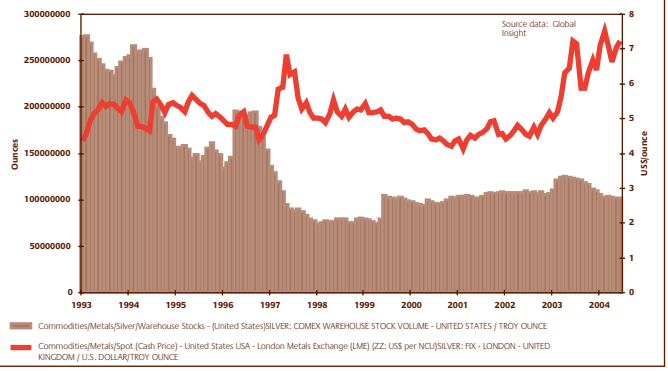
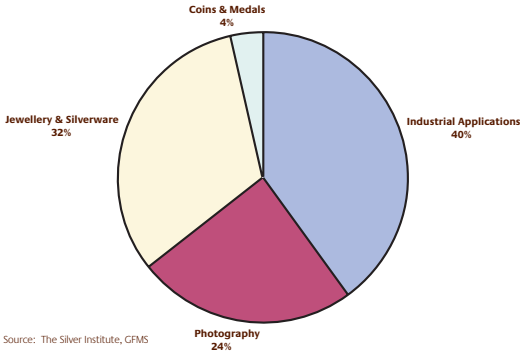


Figure 35 – Silver industrial demand: 5 year average (pie chart)



growth rate of 2.2 per cent, although this masks considerable year-on-year fluctuations in the fortunes of the precious metal. Electrical and electronics, on the one hand, and brazing alloys and solders, on the other hand, have accounted for more than 50 per cent of industrial uses of silver over the past years, on average (41.5 and 11.4 per cent respectively).[15]

Like zinc, there appears to be little relationship between silver inventories on Comex and the silver price, as indicated in Figure 34. On the supply side, as with the other metals, recycled metal constitutes a significant share of supply each year: around one fifth.

Gold

Demand for gold jewellery, industrial applications and world investment has been worth US$ 38 billion on average over the past five years. Of the metal markets covered in this paper, and also including platinum and palladium, the gold market is the third largest based on the value of mine production (Figure 40). The diverse nature of the demand for gold, and the quality and depth of readily available supply and demand

Figure 36 – Gold demand by category v price (tonnes)

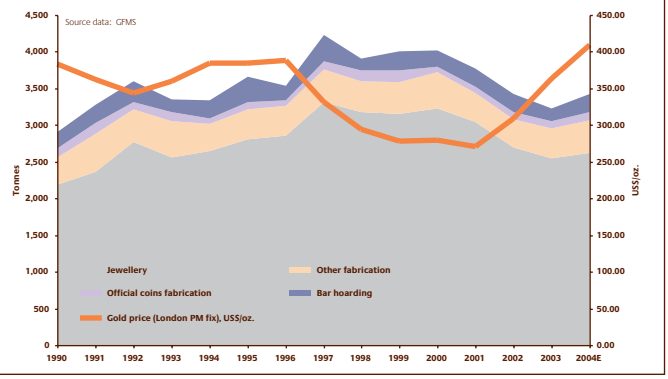


Figure 37 – Gold: Comex stocks v price

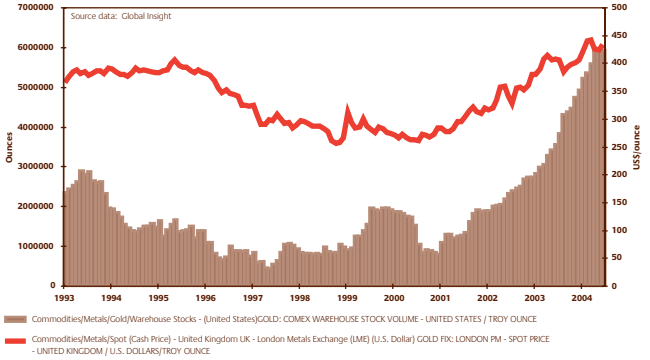


Figure 38 – Gold jewellery demand, quarterly, by country

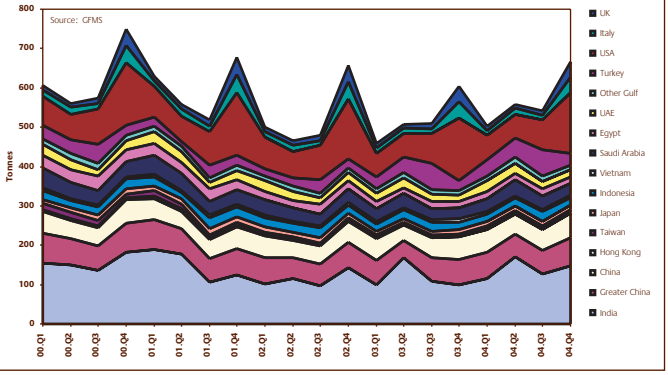
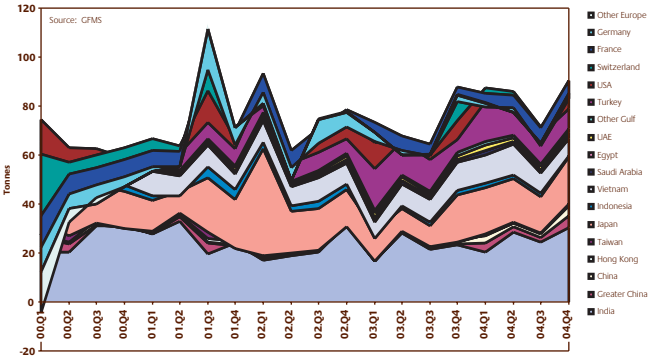
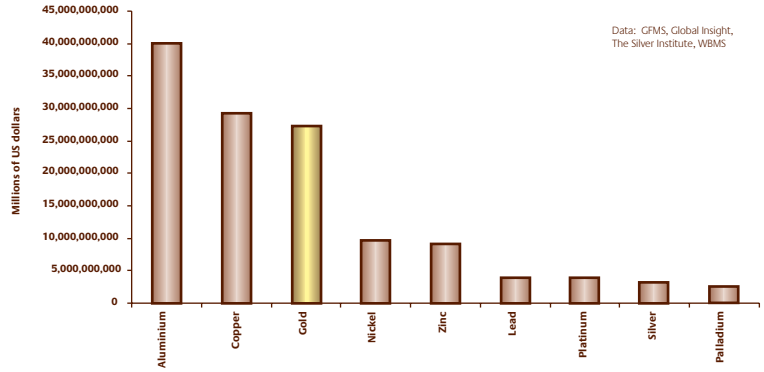


Figure 39 – Gold retail investment demand, quarterly, by country



[15] Source: World Silver Survey 2004, published by The Silver Institute/GFMS

Figure 40 – Relative size of metal markets; Mine production value 5-year average (2000-2004)



data, provides an interesting opportunity to use a matrix analysis that could be adapted for a variety of commodities – see Table 4 below.[16]

Jewellery is by far the largest category of gold demand. Comparison of fabrication demand with consumption demand provides information about the flows between "first-use" and "end-use", which is helpful when thinking about the outlook for the category as a whole (see Table 5). For example, Italy is one of the top five gold jewellery manufacturing countries, accounting for 10.8% of total identifiable demand from all sectors, and in 2003 produced 328.8 tonnes of gold jewellery. However, that same year Italian consumers purchased only 82.3 tonnes (or a quarter) of that output. The drivers of gold demand vary by sector, i.e. demand for gold in electronics is driven by factors unrelated to the factors driving investment demand.[17] Similarly, the nature of the gold jewellery market is different in what are commonly termed the high "caratage" markets than in Western markets.

Mine production provides the lion's share of gold supplied to the market each year – 66 per cent – but recycled gold – gold scrap – accounts for one fifth, with sales of gold by central banks and similar organisations making up the balance of 14 per cent. Analysts have different views on how gold that is effectively (withdrawn from or) supplied to the market due to the (de)hedging programmes pursued by gold mining companies should be incorporated into measures of supply and demand. For the purposes of the calculation here (de)hedging has not been included in total supply.

Like copper, lead and nickel, there appears to be a fairly direct relationship between Comex warehouse stocks and gold price movements, as shown in Figure 37, suggesting that Comex warehouse stocks may be a useful proxy for short-term supply-demand balances.

Table 4: Gold demand by sector and by country

Sector share of country demand as a percentage of total identifiable demand

	Jewellery fabrication	Electronics	Dentistry	Other industrial and decorative applications	Total industrial applications	Official coins	Identified bar hoarding outside Europe and North America	Identified investment demand	Total
India	16.0%	0.1%		0.6%	10.7%		2.1%	2.1%	118.7%
Italy	10.8%	0.0%	0.1%	0.2%	10.3%	na	na	0.0%	111.1%
Turkey	17.0%	na	na	Na	10.0%	1.5%	na	1.5%	118.5%
United States	14.7%	1.4%	0.5%	0.2%	12.1%	0.5%	na	0.5%	117.3%
China	16.3%	0.3%	na	0.1%	10.4%	0.1%	0.1%	0.2%	116.9%
Japan	10.9%	2.6%	0.6%	0.2%	13.4%	na	1.1%	1.1%	115.3%
Saudi Arabia & Yemen	13.5%	na	na	Na	10.0%	na	0.2%	0.2%	113.6%
South Korea	11.7%	0.8%	0.1%	0.1%	11.1%	na	0.1%	0.1%	112.8%
Indonesia	12.7%	na	na	Na	10.0%	na	0.1%	0.1%	112.8%
CIS	1.7%	0.4%	0.1%	0.1%	0.6%	0.0%	0.0%	0.0%	2.3%
Rest of world	24.5%	1.4%	0.7%	0.9%	12.9%	1.2%	1.9%	3.0%	130.5%
Total	**79.8%**	**7.0%**	**2.0%**	**2.5%**	**11.5%**	**3.4%**	**5.4%**	**8.8%**	**100.0%**

[16] A range of gold market data, including prices, supply and demand statistics, and investment analytics are available on the World Gold Council website – see www.gold.org/value

[17] Investment demand referred to here includes identifiable physical demand: official coin fabrication plus identified bar hoarding outside Europe and North America. It does not therefore include other forms of gold investment and specifically does not include gold held in the form of exchange traded securities, which accounted for 179 tonnes by the end of 2004

Table 5: Gold jewellery: fabrication v. consumption demand

Jewellery fabrication v. jewellery consumption

	India	Italy	Turkey	United States	China	Japan	Saudi Arabia & Yemen	South Korea	Indonesia	CIS		Rest of world	Total
Country share of total fabrication demand (%)	018.7	011.1	008.5	007.3	06.9	05.3	03.6	02.8	02.8	02.3		030.5	0,100.0
Jewellery consumption (tonnes)	479.0	082.3	155.8	348.0	201.1	41.3	128.2	47.0	82.0	na		na	na
Jewellery fabrication (tonnes)	527.0	328.8	213.0	143.3	194.0	33.5	110.3	52.6	84.4	51.9		793.8	2,532.6

Source: data compiled from GFMS Gold Survey 2004

Conclusion

Although intuitively it makes sense for there to be a relationship between economic growth and demand, the extent to which this impacts on metal prices is not clear, certainly not within the same quarter. There is plenty of scope to deepen such analysis, assuming that the data required to do so is available. It would certainly be of value to the investment community, whose interest in supply and demand for commodities is precisely based on how these dynamics impact on returns. Furthermore, when it comes to incorporating commodities in asset allocation analysis – both strategic and tactical – one needs to form a view of expected returns. Historical returns can provide us with a starting point, but are far from sufficient when it comes to modelling optimal allocations for the next period of three to five years or longer.

With respect to supply and demand, it is very clear that, when it comes to the metals, it is not sufficient to examine primary supply, i.e. mine production, because an increasing proportion of supply is derived from recycling. Inventories on the exchanges – LME and/or Comex – may provide useful indicators for price trends for a number of metals because they are a ready indicator of the supply and demand balance. An understanding of growth trends in end uses of each metal, as well as the potential for new applications to expand demand, is crucial when forming a longer-term view. For example, it is not unreasonable to expect that the use of aluminium in car bodies will increase over time. Similarly, given continuing economic growth and industrialisation of China, it is difficult to dismiss the impact that the development of Chinese infrastructure will have on the demand for inputs required for construction, in particular.

The same methodology can be applied to the analysis of gold supply and demand as for the other metals, and the yellow metal exemplifies the need to understand the drivers of each segment of demand: demand drivers for jewellery differ across nations, but these are also very different from the drivers behind industrial demand for gold, particularly electronics, and the drivers behind investment demand.

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