LBMA

Alchemist

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In this issue

Out of this world – 65 million years ago the earth was alive with dinosaurs. Then, in a geologic instant, it wasn't, as an earth-shattering asteroid vaporised an ocean and blotted the sun. As our article, It Came from Outer Space, tells us, the asteroid also carried iridium, a metal boasting the kind of cosmic qualities not seen since kryptonite. With a melting point 1200 degrees higher than that of platinum this, the most corrosive-resistant of all metals, finds modern use in technologies ranging from spark plugs to satellite thrusters.

The bad news is that there's not much of the stuff. The good news is that more is on the way: on the 13th of April 2029 – a Friday, of course – the 350-metre asteroid Apophis, ferrying a 5000-year supply, will stop by. Or maybe that's the bad news, depending on your position. A complete update, and travel advice, on page 3.

It Came from Outer Space

The Facts and Impacts of Iridium, that Rarest of Precious Metals

By Wolfgang Wrzesniok-Rossbach, Head of Sales & Marketing, Heraeus Metallhandelgesellschaft m.b.H.

Of all the precious metals that are traded on the international financial markets, probably none has ever offered a more spectacular show, nor had a more lasting – and quite literally earth-shattering – impact on our planet, than iridium, the rarest of the seven traded precious metals.

Above: Satellite thruster *(photo courtesy Astrium GmbH, Space Transportation)*

Iridium made up a sizable portion of the massive asteroid that is said to have struck earth 65.5 million years ago, perhaps causing – or at least speeding up – the extinction of the dinosaurs and of many other species.

Traces of that massive strike are still found all over the world today, in a small band of sediments from that age that also contains a concentration of iridium many times greater than normal. As iridium is abundant in most asteroids and comets, in 1980 scientists used the presence of iridium in that deposit as proof that a large asteroid must have struck the earth at the end of the Cretaceous period.

The publication of those scientific findings came 177 years after iridium had been discovered as an element. Officially, iridium was first recovered in 1803 by British scientist Smithson Tennant, who separated the metal, alongside osmium, from the residue that was left after dissolving platinum in aqua regia. Tennant named the new element after the Greek word for 'rainbow coloured', iridos, because many of its salts are highly coloured.

77 Iridium

Ir

atomic mass 192.217
boiling point 4527°c

Iridium has a melting point of 2446 C (4435 F) – 1200 degrees higher than that of platinum. It is also eight times stronger than platinum and six times harder, and is the most corrosive-resistant of all metals. This last was one of the reasons why, in 1889, an alloy of 90% platinum and 10% iridium was used to construct the standard metre bar and kilogramme mass. The original metre bar was later replaced, but the kilogram prototype is still the international standard of mass, kept in a vault at the Bureau International des Poids et Mesures (BIPM) near Paris.

The concentration of iridium in the geological signature resulting from that prehistoric asteroid is far too small to be mined; industrial users therefore rely on supplies from ore, which is more accessible and easier to mine. In that respect it certainly helps that the very dense, extremely hard, silvery-white metal is found uncombined – but together with – platinum and other platinum group metals in alluvial deposits. It is also obtained as a by-product from nickel mining.

As with most platinum group metals, the main source is South Africa, which probably accounts for at least 90% of global supply, with the remainder coming from Russia and North America. In total, only about four tonnes of iridium are produced (and used) each year. On a global basis, that amounts to less than 0.00067 gram per person.

Below: Spark plug using 80/20 platinum/iridium alloy *(photo courtesy Robert Bosch GmbH)*

The 'Space Cat' (and More Common Uses for a Rare Metal)

Given that iridium is so rare, it finds its way into a surprisingly large number of industrial applications. However, all of them require only small individual quantities of the metal. The first practical application for iridium was in the manufacture of durable tips for fountain pen nibs and, alloyed with osmium, in compass bearings. In 1908 iridium was used for the first time to make crucibles and other high-temperature apparatuses.

Later the metal began to be used for electrical contacts – for example, in spark plugs, where iridium electrodes require less voltage to spark and burn more of the fuel in the cylinder. Since they are extremely resistant to erosion, the spark plug will not need to be changed as often. Iridium also proved useful to the jewellery industry, where it is alloyed with platinum.

Today iridium has wide application – in catalysts for carbonylation of methanol to

produce acetic acid…for producing antimatter in supercolliders…crucibles for growing crystals for laser technology…in support of high-dose radiation therapy for the treatment of cancer…and in electrodes for the chlor-alkali and electrochemical industries.

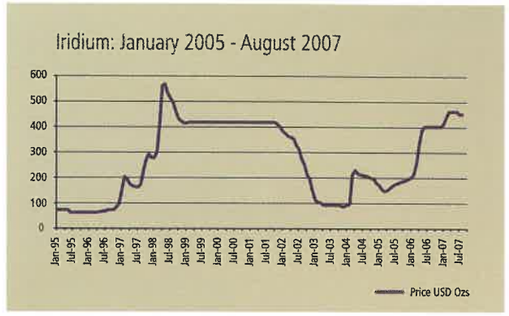
One of today's most exotic uses relates directly to iridium's past. Tens of millions of years after the metal literally fell from the heavens, it is being regularly sent back into space – as a chemical catalyst in altitude and orbit control systems for satellites, where the rocket fuel hydrazine is injected in chambers containing the iridium-based so-called 'space-cat'. In the catalytic reaction the fuel decomposes to gas, which then drives the station-keeping thrusters of the satellite. Compared to the mountainous amounts contained in meteors, today's space-bound doses are more homoeopathic, amounting to perhaps five kilograms a year.

Even though there are many and diverse applications for iridium, the metal is in no danger of becoming a second rhodium insofar as price is concerned. For the most part industrial end-users have been very aware of the fact that the introduction of any major new use would require far greater quantities of the metal than are available each year. Any attempt to change the finely balanced environment of supply and demand risks sending the price sky-high, making the new technology immediately uneconomical.

Electrodes containing iridium
(photo courtesy Heraeus)

Iridium crucibles
(photo courtesy Heraeus)

UV cleaning of platinum-iridium mass standards



Driving the Price: Catalytic Converters

But one of the few exceptions to this rule, in which the availability of the metal was probably heavily underestimated, happened in 1996, when Japanese carmaker Mitsubishi Motors introduced iridium for the first time in the automotive catalysts of its GDI engines. Iridium catalysts had some notable advantages: they were less vulnerable to sulphur contained in the fuel and the cats did not produce nitrous oxide.

However, within two years the sudden rise in demand resulting from that new application had sent the price sky-rocketing to $575 per ounce, ten times the level at which the metal had been trading in 1995. The price later stabilised just above $400 an ounce, and remained there for a number of years. When Mitsubishi phased out the iridium-based catalyst in 2000/2001 as a result of its inability to meet the new tougher emission laws in Japan and Europe, demand from the automotive sector collapsed, and the price tumbled back below $100 an ounce. During the last three years the value of iridium has recovered once again, this time driven by a combination of higher physical offtake as a result of the boom in global economic growth as well as by speculative demand, mainly from institutional investors.

Currently the metal trades at $450 an ounce – far above the long-term average, but still $200 shy of the highest price ever achieved. Back in 1980, when gold briefly traded at $850, the white metal temporarily reached $675 an ounce, its own all-time high.

Given the rareness of the metal and the multitude of its uses, might now be a good time to place a bet on the iridium price by going long? Well, it's difficult to choose the best time to enter a position, but managing to exit it in good time is at least as important.

Friday the Thirteenth, 2029

On Friday the 13th of April 2029, the small asteroid Apophis will pass earth in the range of just 30,000 kilometres – a mere one-tenth the distance from the earth to the moon.

Scientists have already analysed the composition of that 350-metre-long icy messenger from the beginning of our solar system. Apparently it contains about 20,000 tonnes of iridium, or 5,000 years of current global production. That sounds like a literally massive reason to be sure to clear an iridium account kept at one of the fabricators in plenty of time.

But while it's possible that in 2029 the technology to mine the ore on the asteroid may not have been perfected, iridium bulls shouldn't get too excited. Apophis will be back in 2036, and, according to NASA, in that pass its path may bring it even closer to earth. ■

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is Head of Marketing and Sales at Heraeus Metallhandelsgesellschaft. He is responsible for the client relationship management and research activities of the Hanau, Germany-based trading desk.
He was previously a Director for Dresdner Bank AG and its investment banking arm, Dresdner Kleinwort Wasserstein. He spent 21 years with Dresdner in Frankfurt and Singapore as precious metals and derivatives trader and, later, as head of the precious metals and commodities desk in Frankfurt.

Exchange Traded Commodities

Led by Gold, ETCs Opened the World of Commodities to Investors

By Nik Bienkowski, Head of Listings and Research, ETF Securities

The introduction of Exchange Traded Funds – ETFs – in the early 1990s revolutionised the mutual funds industry. Now Exchange Traded Commodities – ETCs, a part of that revolution – are transforming the way investors think about the commodities markets.

Commodities – along with real estate and hedge funds – have attracted increased interest as investors seek non-correlated assets to improve portfolio diversification. Around 2000, commodity markets went through some fundamental changes. Tight supply, caused by falling capex and record low inventories for some commodities, coupled with increasing demand for raw materials from emerging markets such as China and India, provided the foundations of the current bull market.

ETCs were designed to tap into that pool of increasing demand, and they have experienced spectacular growth. Global ETC assets have grown to over $28 billion since March 2003, and products are now available to suit most commodity investment strategies.

ETFs: Providing Investors with New Asset Classes

ETFs are similar to mutual funds, but trade on an exchange. Since their inception, ETFs have made a huge impact on investment and portfolio management. Currently almost $700 billion of assets is held in 950 ETFs globally across 41 different exchanges – this amount is expected to reach $2 trillion by 2011 (source: Morgan Stanley, *ETF Report*, August 2007). ETFs cover the traditional asset classes of equities and fixed income as well as the alternative asset classes of real estate and commodities. With these various asset classes covered by a wide variety of ETFs, a diversified portfolio can be constructed in as little as four or five easy transactions.

The primary advantage of ETFs was to provide easy, real-time access to mutual funds, which in turn provide portfolio diversification benefits in a single trade. By trading intra-day and not at day-end prices – as mutual funds do – ETFs could be used to take advantage of daily market movements and for hedging. New ETFs are continually being listed to provide all investor types with access to new investments that were previously barred to many, and certainly were not available through domestic brokerage accounts – for example, emerging markets.

The major common features of ETFs include:

- An exchange listing with the ability to trade continually
- A predetermined, transparent index-linked structure
- The ability to handle cash or physical creation in exchange for ETF units
- Redemptions by market participants, called 'Authorised Participants'
- Competitive pricing provided by multiple market makers.

A further benefit is that ETFs now provide the ordinary investor cost-effective access to new markets not previously accessible.

Opening Up Commodities Markets

Commodities markets are some of the oldest in the world, yet some of the last to be broadly available to investors. Gold has existed as a currency and an asset for thousands of years, and even though it was the first commodity to be securitised through an ETF structure, it was not available until 13 years after the first equity ETF was created.

Until the advent of ETCs in 2003, commodity markets were the exclusive realm of 'sophisticated' institutional investors – through purchasing the physical metal, trading in futures contracts or negotiating bespoke long-term agreements. Although these markets were viewed as less liquid, commodities now trade in the realm of $100 billion per day. And whereas originally commodity markets were heterogeneous, opaque and small, today they have become regulated, transparent and liquid. These characteristics have helped make commodities suitable for securitising and investment by a broader group of investors.

Investor appetite increased when commodity markets experienced a surge in interest around 2000. This led to the development of a wide range of structured products on commodities that provided investors with direct exposure to commodities without the need to take on equity market risk through mining companies. The resulting increased demand from a wider investor base in turn led to the development of the ETC, providing investors with a legal structure that was secure, listed and, perhaps most importantly, investable (many institutional investors are prevented from buying physical commodities, or even commodity derivatives). Thus the ETC was the only structure that could allow the broadest range of investor groups to access the commodities market.

Although the ETC market is only four years old, it has experienced tremendous growth. Figure 1 shows the growth of the global ETC market, initiated in 2003 by the first gold product, Gold Bullion Securities.

Fig 1 Growth of Gold ETCs & Other Commodity ETCs

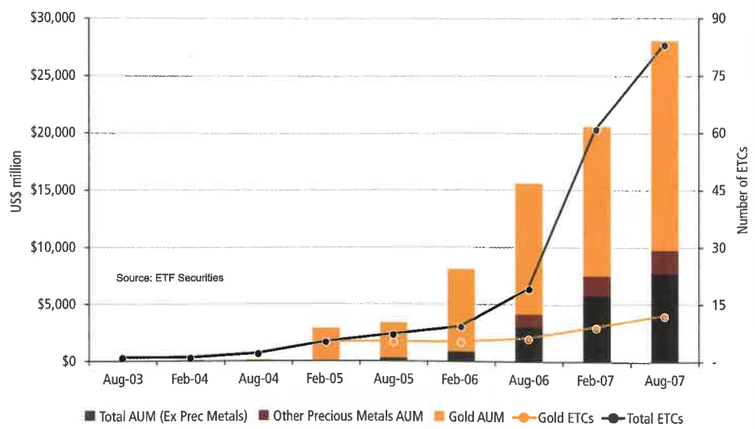
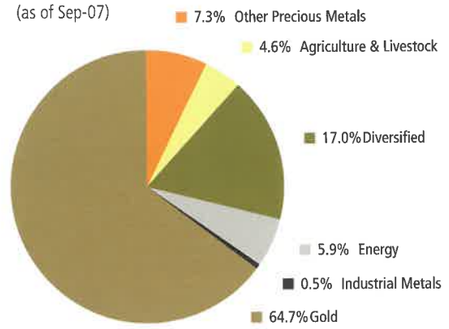


Fig 2 Breakdown of Global ETC Assets

(as of Sep-07)



Source: ETF Securities

In the past two years alone, global ETC assets have grown by over 1000%, with the number of products increasing from around 10 to over 80. ETCs have been listed on most of the world's major stock exchanges and now cover every major commodity group. At current growth rates, global ETC assets are likely to exceed $45 billion by December 2008.

Introducing the First ETC

After the introduction of ETFs in 1990, it took 13 years for the first ETC to be created. Figure 2 shows that approximately 65% of all ETCs are exposed to gold, with the remaining 35% exposed to other commodities. Gold's dominance is partly due to the fact that it was the first ETC to be created – gold's characteristics make it one of the easiest commodities to be securitised.

ETFs are generally created by physically delivering a portfolio of shares – e.g. 500 shares in the case of the S&P 500 – and issuing securities from the fund. Gold bullion is easy to purchase, does not decay and can be physically delivered to the fund's account. Furthermore, unlike most other commodities, it is relatively easy to define a homogeneous type of bar – for example, London Good Delivery bars. Another helping factor was that gold has been considered insurance for a diversified portfolio for many years.

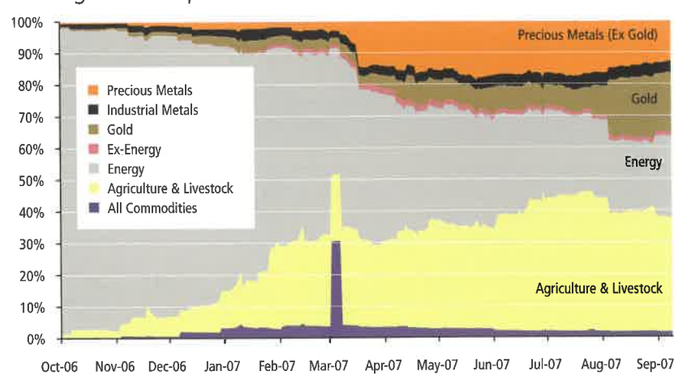
Despite gold's helpful physical characteristics, securitising gold was not an easy task. Complications inevitably arise when markets originally designed for equities are combined with those for commodities. Each market has its own separate rules, regulations, supervision, jargon and participants. In addition, many equity funds are prevented from buying physical metals and commodities. The solution to the introduction of the gold ETC required a legal structure that would allow investors who had been previously prevented from purchasing bullion to invest in ETFs. Gold Bullion Securities were the result, and from there, a global industry of ETCs was spawned – and whose market acceptance is increasing day by day.

Recent Developments in Commodities Investing

ETF Securities has over 40 ETCs, covering all major commodities and commodity sectors. Figure 3 shows the progression of demand across the various commodity groups for ETF Securities' ETCs. I use ETF Securities' platform as an example as it offers the widest range of products, thus it is easier to highlight any trends. A few interesting factors can be noted from the chart.

Agriculture and livestock make up a large portion of assets – approximately 40% – for a number of reasons, including the fact that agriculture and livestock are commodities that are typically hard to access, particularly through equities – a problem which ETCs were designed to solve – and due to the

Fig 3 Development of ETF Securities' Asset Growth



Quick Study ETCs – Et Cetera

Exchange Traded Commodities – ETCs – are listed securities backed by a commodity – either physical commodities or commodity futures. They enable ordinary investors to buy and sell commodities through regular brokerage accounts, providing cheap and easy access to an asset class (or sector) that has previously been difficult to access.

The steady growth in ETCs over the past few years is a result of the many benefits they provide to investors:

Exchange listed – commodities can now be held in ordinary brokerage accounts and self-managed pension funds

Broad appeal – because many investors were prevented from investing in commodities, particularly in physical form, ETCs provide access to new types of investors

A single market – in the case of the numerous ETC platforms being created on Europe's stock exchanges, the world's major commodities can now be traded in one time zone and on the same exchange. Previously some commodities were only traded on certain continents across a range of time zones and on multiple exchanges

Independent – ETCs can be created, accessed and traded by anyone

Increased availability – ETCs have brought the wholesale market to smaller investors. While minimum investment sizes were out of the reach of some investors, ETCs can be purchased in amounts ranging from $2.00 to $130.00, depending on the commodity

Safe – ETCs are regulated, and since they are backed by an asset (either physical or futures), there is generally little or no financial or credit risk

Simple – ETCs do not require any daily operational management – such as managing futures positions, rolling or margin calls

Cost effective – due to their passive and simple nature, costs are low and transparent, making wholesale prices accessible to all investor groups

Liquid – Like ETFs, ETCs are as liquid as the underlying asset and are not limited to on-exchange volumes

High correlation – ETCs provide near-perfect correlation to the underlying commodity – something not achievable through the purchase shares in commodity companies – providing an additional tool for managing portfolios

Portfolio management – ETCs can be used for asset allocation, core/satellite approach, cash equitisation, sector and style allocation/rotation, and risk management.

current agriculture boom, which is in turn caused by two factors: the alternative fuel story and the combination of record-low inventories in most agriculture commodities and increasing demand from a growing world population

Gold and other precious metals are the second largest group. ETF Securities' precious metals ETCs are the newest addition to their stable of ETCs, yet due to gold's long history as an investment, it has captured 20% of total assets in around four months; the other ETCs have been listed for over 12 months.

As global ETC growth continues, we would expect the allocation of other commodities to increase, and consequently gold's share will fall from 65% of total global ETC assets. However, we expect that gold's share will remain significantly above the 2% to 7% allocation gold currently commands in the major commodity benchmarks such as the S&P GSCI™ Commodity Index and the Dow-Jones AIG Commodity Index℠.

The ETF market has come a long way in the past seventeen years and now covers a vast range of assets, including many that had been difficult to invest in, such as emerging markets, commodities and other alternative investments. The development of ETCs has opened up some of the oldest markets in the world to ordinary investors, providing additional sources of diversification that can improve portfolio performance. Given the wide range of ETCs, investors can simply choose their preferred commodity for investment.

The growth in number of ETFs and assets invested is likely to continue, as markets around the world develop and as investors' knowledge of commodities increases. ■

Nik Bienkowski

helped create Gold Bullion Securities, the world's first gold ETC. Following on that success, he co-founded ETF Securities Limited, which created the world's first oil ETC and then in September 2006 launched an entire platform of commodity ETCs. This platform now includes over 50 ETCs and is listed on five European Exchanges.

As Chief Operating Officer at ETF Securities, Nik's responsibilities have included running the investment research team and product development. Prior to his work on ETCs, he spent five years working in the mining finance and pension consulting industries.

Membership Has Its Privileges. And Responsibilities.

The Potential Effect of the OECD on Trading Bullion in India

By David Gornall, Director, Head of Bullion & FX, Natixis Commodity Markets Ltd

As India moves through the process for OECD membership, we examine the steps the country needs to take in order to obtain full membership in the organisation, and the potential impact of such steps on the Indian bullion marketplace.

Founded in 1961, the Organisation for Economic Co-Operation and Development looked toward the developed nations as the mainstay of its membership. During the early years of its existence, the original membership base accounted for three quarters of global wealth.

But according to the organisation, this figure has now fallen to 60% – and will approach 50% due to economic growth in non-member states, namely the BRIC countries (China's annual rate of growth was 10.7% last year, with India's 9.4%).

These phenomenal growth rates have given the BRIC nations the potential to become fully developed economies, and thereby potentially obtain membership in the OECD. Russia has now been invited to join, and preliminary discussions have started with India and China.

Criteria for Membership

India – or any other applicant – that applies for accession to the OECD must comply with 160 different 'codes'. Whilst not all of these are financial, it is these that will be the hardest for India to meet. The codes are based on principles such as the obligation not to discriminate, as well as ensuring that regional arrangements are compatible. However, these codes are not applied in the same way to each applicant.

In the last ten years the OECD has paid particular attention to member states' attitudes towards foreign financial institutions. The code of liberalisation of Current Invisible Operations legally binds governments in areas such as the setting up of foreign branches, and is set to go further in the future.

Making Headway – Often in the Right Direction

A recent publication by the World Bank, *Doing Business 2008*, ranked a number of nations in 'ease of doing business', meaning that those countries that were highly rated provide a regulatory environment conducive to the operation of business. It comes as little surprise that Singapore earned top honours for the second successive year.

While the good news for India was that it had climbed 12 places from the previous year, the bad news was that it was still quite low in the table, ranking 120th out of 178, playing second fiddle to states such as Bhutan, Mongolia, Ethiopia and Tonga.

If India does join the OECD, it will face a radical adjustment to modern developed-world principles of equal tax treatment and uniform import taxes. The reforms required to compete with the G7 countries are of course far deeper than reducing paperwork and co-ordinating the activities of the country's multiple regulators. The most pressing need is that for a positively reformed economy.

The competition is strong – including that from states such as Egypt, which led the field in another World Bank survey that measured the introduction of the most economic reforms over the year. Where was India on this list? We will never know, as it wasn't even worthy of a mention!

The story thus far paints a picture of a huge mountain to climb before India is ready to join. However, the growth rate of the Indian economy indicates that the country must be doing something right, and there is one bright spot for the country in the category of ability to conduct cross-border trade. What is its World Bank ranking here? Well – and this will be no surprise to the world's bullion dealers – it came in first.

The OECD and the Bullion Market

Membership has its advantages – or perhaps disadvantages, depending on the point of view. The code will almost certainly bring an end to certain practises in India's Special Economic Zones (SEZ) and other areas that have preferential import-duty procedures, such as Mumbai's SEEPZ (Santacruz Electronics Export Processing Zone). These zones are a regular feature in all countries, including the OECD nations, where it is simply necessary to fill in a bond to guarantee the re-export.

According to affiliates of the OECD, the following observation was recently made: 'It is doubtful whether export-related duty exemptions and preferential treatment of economic agents operating in the SEZs are the best way to promote economic efficiency and growth'. Clearly the Indians will find the treatment of duty exemptions a non-negotiable point when dealing with the OECD.

Indian views on the SEZs are, not surprisingly, somewhat different. Government sources say that there is no preferential import duty procedure for SEZs, as these are 100% export zones, which must export all the raw material they have imported. Consequently the duty normally applicable to imports of raw material for domestic consumption cannot be applied.

Any changes to this policy would allow non-exporters to import gold on the same terms as the exporters. Indian policy makers believe that this is already possible, stating that there is no differential import duty on gold. In fact it is one of the few commodities where the import duty is quantity based, not value based. However, they do agree that exporters have an easier route than internal consumers.

Another outcome of OECD membership may be an end to the nominated agency structure, where only certain permitted banks and government agencies can import gold directly from foreign suppliers.

Indians say that the first step here has been taken, where select entities are permitted to directly import gold for domestic consumption, and now compete with the RBI

authorised banks and government nominated agencies. Again, this move alone would not go far enough for OECD membership, as it only applies to a select few superstar trading houses.

Under the principle of non-discrimination, another major change for the Indian bullion market is possible. Foreign institutions are currently banned from owning memberships on Indian exchanges, which often leads to distorted local prices. It may well transpire that foreign membership of the local exchanges will broadly be permitted, thus bringing local prices for commodities more into line with international markets.

Although foreign financial institutions are allowed to become part owners of exchanges such as MCX and NCDEX, they may not trade on them, and eliminating this type of discrimination is one of the founding principles, or codes, of OECD members.

The View from India

The major problem that this would create for India can be seen by looking at the agricultural contracts, in particular wheat. As an importer, the Indian government is sensitive to criticisms from the electorate that allowing foreign membership will be perceived negatively should they then push up the price of wheat. In fact, the government is even concerned about this in the absence of foreign membership on exchanges, and has recently taken the step of delisting the wheat contract following a rise in price.

OECD membership may reduce the cost of borrowing to Indian consumers, as lower regulatory capital charges might apply. More good news: India would be able to finance its imports at OECD rates. As most of India's gold importers use letters of credit, they will find the process easier and cheaper once OECD membership is achieved.

How do Indians feel about joining the OECD? Do they welcome the idea of joining this exclusive club? Views are mixed. On the plus side, it might be the final nail in the currency coffin, enabling the policy planners to make the INR fully convertible.

However, others have noted that, thus far, with an increasingly less-regulated economy, the Indian growth rate has been impressive. Perhaps the proclaimed benefits of becoming an OECD member need to be re-assessed.

And as another local observed, it is worth remembering that the import duties in India have been progressively reduced, and the country is committed to reduce them further in line with the WTA dialogue – although the WTA does not impinge on OECD membership.

As Ever, Timing is Everything

It is difficult to predict how long it might take for India to join the OECD, although once the country accepts the codes of accession, membership would almost certainly follow, as no applicant has ever been refused once it has been through the code process.

However, India may not join under precisely the same rules as the others. Locals realise too that, along with China, their country is one of the major drivers of the current global economic growth – and they do not consider countries such as Egypt to be in the same category, even if they are good at economic reforms. As most of us in the bullion business have come to understand in trading precious metals with India, the OECD may have to display a degree of flexibility in welcoming India and China into the club.

Of course the timetable is ultimately linked to political will, and at the moment, observers are watching closely how the Indian political system tackles the recently concluded bilateral agreement with the US on nuclear energy. This move could precipitate a general election in India, as the country has never been a great fan of US-controlled pan-governmental organisations. For all of the conjecture about joining the OECD, the locals that I have spoken to unanimously agree that India has changed, will keep changing and will join the OECD if the criteria can be negotiated. It is a question of when, not if.

However, they do not see membership as a necessary stepping stone to becoming a developed nation. In one Indian observer's words, perception is often more important than reality. ■

David Gornall *started his career in 1979, trading silver at Lonconex Limited, part of the Primary Industries/Golodetz commodity trading group. After a spell at Morgan Guaranty Trust of New York, he moved to Sogemin, trading in the LME ring and heading the bullion and FX desk. In 1992 he joined NM Rothschild to start their LME base metals operation, before returning to Sogemin – now Natixis Commodity Markets – where he is a main board director responsible for Bullion and FX trading.*

London Precious Metals Clearing Limited *(LPMCL) is responsible for the daily clearing of gold and silver in the London Market. The six Clearing Member Banks of LPMCL have developed an Unallocated Precious Metals Accounts Agreement, which they intend to use as the basis for providing unallocated precious metal accounts to their customers. This document can be viewed on the LPMCL website,* ***www.lpmcl.com.***

LPMCL intends to launch a similar agreement for allocated metals in due course.

Note: The cut-off time for the six Clearing Member Banks accepting customer instructions for the transfer of gold and silver on ***Monday 24 December and Monday 31 December 2007 will be 2:00 pm London time.***

All That Glisters is Not Au/Ag/Pt/Pd/Ru/Rh/Ir/Et Al

The Art and Science of a Precious Metal Laboratory

By David Court, Laboratory Manager, Alex Stewart Assayers

The precious metals trade is diverse, and this is no less true when we look into the analysis of the metals and minerals involved. The chemistry of precious metals can be both complex and intriguing, and often chemists will build an enviable knowledge and understanding after years of working in laboratories.

Over recent years, higher metal prices, efficient lines of communication and the advance of technology into laboratories has had a positive effect on the analyst, and there has been a need for laboratories' performance to keep up to pace. Quality and reliability of assay results are the most important factors due to the fact that exchange splitting limits* on all metals – and especially precious metals – have tightened, necessitating that assay results be precise and accurate. Any delay can be costly to all parties involved.

The analysis of precious metals covers a wide spectrum, from poor-grade materials containing only parts per million (ppm) to metals of 99.999% purity.

Our laboratory reflects this: the diverse range of precious-metal-bearing materials that we assay includes sweeps, jewellery scrap, resins, catalysts, bullion, doré, electronic scrap, solutions, conductor pastes, concentrates and residues, in addition to the occasional non-standard specialized alloys /products.

Assaying of such materials involves different analytical techniques according to the particular criteria of each sample, including the base carrier (the substrate of the material) and precious metal contained.

To establish the composition of the sample, it is often necessary to carry out a preliminary fact-finding assay or trial. Once the matrix of the material is known, the chemist can make a judgment and choose the most appropriate assaying method to be applied. This approach is essential, and highly skilled chemists complement any decision within a modern laboratory equipped with reliable instrumentation.

This preliminary assay is especially significant in the assaying of the platinum group metals (pgms), as the ratio of the precious metals contained in the sample will dictate the analytical procedure.

Even the most modern and up-to-date techniques are dependent on the representative sample for analysis being true and homogeneous. The extreme importance attached to obtaining a sample that accurately represents the total original material cannot be stressed too strongly – errors made during the sampling process cannot be corrected in the course of analysis. The sample must be in a state that will support the expected accuracy and precision of the method and instrumentation.

In addition to the preliminary fact-finding assays previously mentioned, preparation of the material or sample may be required prior to commencing the actual analysis. Some samples received in the laboratory will have already been prepared and be in a suitable condition for analysis, the first stage invariably being moisture determination. However, laboratories will also receive materials in various shapes and in conditions ranging from natural state to partially prepared – for example electronic scrap, ores, catalysts and production residues that will require extensive sample preparation. This may involve melting, matting, milling, screening, leaching and drying before the sample is suitably prepared and ready for assaying.

Techniques used for precious metal analysis may include:

- Fire Assay
- Inductively Coupled Plasma Optical Emission and Mass Spectrometry (ICP OES and ICP MS)
- X-Ray Fluorescence Spectrometry (XRF)
- Gravimetric Analysis
- Microwave Digestion.

A description of some of these principles and techniques follows.

Recovered gold

All photos courtesy Alex Stewart Assayers

**Exchange splitting limits: Splitting limits are specified in the contract between the seller of the material and the buyer. If the difference between the assay obtained by the buyer and that obtained by the seller is within the specified limit, the two parties agree to split the difference. If the difference is outside those parameters, the matter then goes to umpire – an independent assayer – which is also named in the contract.*

Fire Assay

Fire assaying, a technique that has been used throughout the world for centuries – it is recorded as long ago as the ancient Egyptians – is still the most generally accepted method of analysis for gold and platinum group elements. It has stood the test of time due to some distinct advantages, notably large sample weights and separation of the precious metal from the base carrier, which reduces interference.

Fire assaying is used for the determination of gold, silver and pgms in all types of materials, ranging from bullion, jewellery and ores to concentrates and electronic scrap. The methods have been modernised, and aligning this technique alongside the latest instrumentation can provide the most accurate results.

In principle the weighed sample is fused at a temperature in excess of 1000 degrees Celsius in a flux made up of various constituents, the purpose of which is to reduce the metal oxide constituent (usually lead, but it could also be nickel, copper or tin from its oxide to the metal).

In the smelting, a slag phase is also created, which will aid the removal of base metals and gangue materials (sand, rock and other impurities) from the metal button, which then collects the precious metal and sinks to the bottom of the crucible. When fusion is complete, the crucible contents are poured into a cast-iron mould and the button containing the precious metals and the slag are separated. The slag is washed again with additional flux to ensure complete collection of the precious metal, and is discarded.

Depending on the metal oxide used as the collector in the flux, different chemical processes take place.

If lead is used, the next stage is to remove the lead, through a technique known as cupellation, wherein the button is placed on a cupel (a porous pot made from magnesium oxide) in a muffle furnace with good airflow at a temperature of approximately 950 degrees Celsius. The cupel has an affinity for lead oxide, and acts as a filter, absorbing the lead oxide as it forms from the molten lead. This process leaves the precious metal bead on the cupel, which can be weighed accurately to obtain total precious metal weight. This bead is then treated further using nitric acid to determine the metals in the bead, usually silver, gold (gravimetrically), platinum and palladium (ICP).

Fire assay fusion furnace

In the assay of doré, the bullion samples are weighed and placed directly into lead foil and cupellated (they do not have to undergo fusion as they are already free from significant base metals). The beads can be weighed using accurate balances capable of weighing to seven decimal places. Parting in nitric acid separates the silver and gold from each other – the silver is dissolved and the gold remains as the metal, which is dried and annealed and weighed to calculate the percentage in the sample. Various corrections are necessary, made using standards of pure metal alongside the assays.

The noble metals are analysed more frequently by nickel collection. This technique uses nickel oxide as the collector, and it is possible to determine a range of metals in one procedure, namely platinum, palladium, rhodium, iridium and ruthenium. This method does not use cupellation to separate the collected precious metals, but instead dissolves the pulverised nickel button in acid. The nickel is removed by filtration, the remaining residue of precious metals is treated and the final determination of the solutions is made using instrumentation such as ICP.

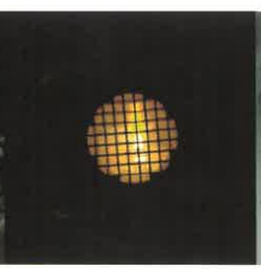
ICP OES: Inductively Coupled Plasma Optical Emission Spectrometry

ICP spectrometry analyses solutions of samples of known weights into known volumes by the most appropriate preparation method for the type of sample. The resulting solution from direct dissolution of the sample or from parting of the precious metal beads from fire assay is then analysed directly on an ICP spectrometer. This method requires comparative standards and reference samples and has the advantage that it can measure a range of elements simultaneously.

Opening the fusion furnace

Pouring fire assay fuse

Inductively coupled plasma

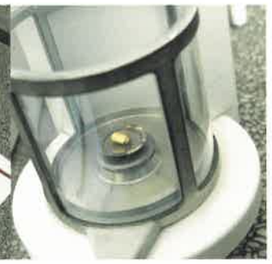


Buttons prepared for cupellation

XRF automatic sample changer

Solutions being analysed by ICP

Seven-decimal-place micro balance with platinum basket used for gold bullion assay



Gold cornet weighed on balance

ICP spectrometry is an excellent method for measuring pgms in solution. It is an emission technique, which requires the sample to pass through a nebuliser to create a fine mist. This is then swept into the plasma via a spray chamber and a torch. The plasma itself is a high-energy source that causes the atoms and ions within the sample to absorb energy and reach higher energy states. They then revert to their normal energy states in the cooler part of the plasma, thus giving off energy in the form of light, which is then measured by the spectrometer.

The great benefit of ICP is that linear calibrations can be obtained over orders of magnitude not possible by other comparable techniques. This, coupled with the fact that modern spectrometers use CCD (charge coupled device) detectors to measure light over the whole spectrum range, means that fast multiple-element-wavelength determinations can be made from just one solution containing ppm levels up to higher concentrations.

ICP as a technique does have a number of interferences, which the analyst needs to be aware of. Matrix interferences can be overcome by making sure that the samples and standards have the same acid strength and alloy base.

An internal standard should also be added to the solutions – pgm elements have both atomic and ionic wavelengths, which can behave differently in the plasma, so an internal standard should match these characteristics.

Matrix effects can also affect the background of a spectrum, therefore suitable background correction should also be applied to each elemental wavelength being measured. Inter-element interferences can be problematic and need to be overcome (they are reduced using correction factors).

Pgm samples are run with calibration check standards, reference materials and drift-correction software to ensure the high quality of the analysis reported from the ICP instruments.

XRF: X-Ray Fluorescence Spectrometry

XRF is an excellent method for the qualitative and quantitative determination of the major and important trace elements in many materials.

During x-ray fluorescence analysis, the sample material is irradiated with x-rays, which excite secondary x-ray fluorescence. The secondary x-ray has characteristic wavelengths produced by the elements of the sample material. The separation of individual wavelengths of the fluorescent x-ray emission is done by Bragg diffraction from crystals of particular lattice spacings. Through measurement of these characteristic wavelengths, the qualitative composition of the sample can be determined.

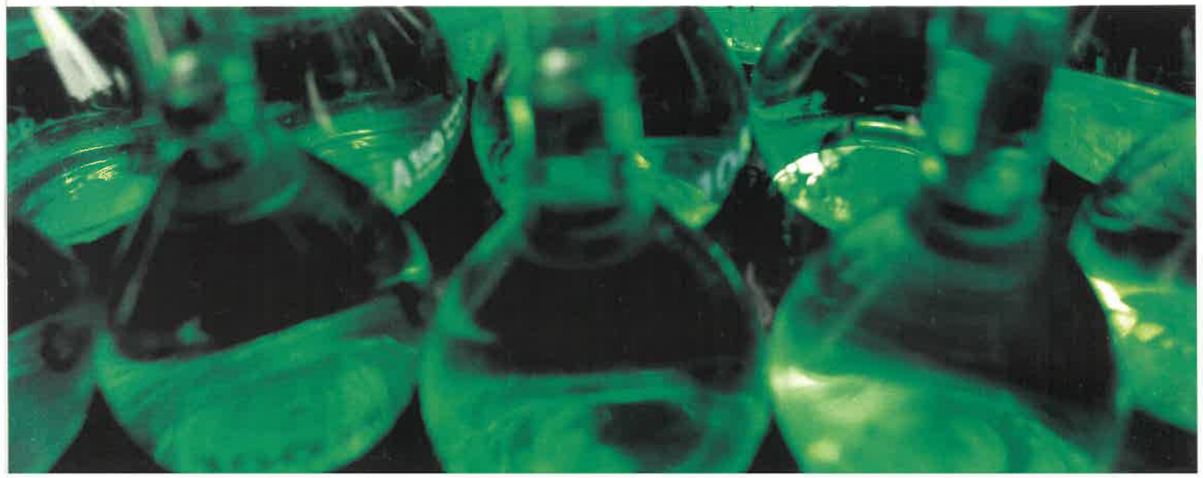
The intensity of the fluorescent radiation allows the determination of the element concentrations in the sample. In quantitative analysis, intensities are compared with standards of known composition.

The advantages of XRF in comparison with wet chemical methods are the accurate analysis of samples that contain minerals, e.g. zircon, that are difficult to dissolve and samples that contain elements that are unstable or volatile in solution.

XRF is a non-destructive technique and can be used to identify and determine the concentrations of elements present in solid, powdered and liquid samples. It's also capable of measuring all elements from trace levels up to 100% while carrying out accurate, reproducible analyses at very high speed.

In practice, samples should be presented to the spectrometer in homogeneous reproducible form. Metals may be ground or milled to give a flat surface. Powders are reduced to a controlled particle size and pressed into pellets for convenience of handling. Fusing with a suitable flux, producing a glass-like bead, is a valuable technique to eliminate errors with materials that exhibit varying mineralogical composition or are difficult to present in other forms. Liquids and loose powders are simply supported on a plastic membrane in the base of suitable sample cups.

Solutions prepared for AA (Atomic Absorbtion)



Gravimetric Analysis

Gravimetric methods are used routinely in laboratories worldwide – probably the most familiar being the gravimetric assay for gold and silver previously described. Gravimetric methods for pgms are a little more complex, and are gradually being replaced by instrumental techniques in commercial laboratories.

One example is the treatment of the solution from parting. After removal of the gold and silver, the palladium can be determined gravimetrically by precipitation using dimethylglyoxime (DMG). The method was used extensively in laboratories prior to the growth of instrumentation and is still used today as an alternative or support to instrumentation.

There are many classical gravimetric techniques for determining the noble metals; these invariably involves the separation of the individual metals using reduction or precipitation, sometimes taking many hours /days to complete. The skills and experience of the precious metal chemist are paramount when using these methods.

Often in analysing bullion material containing different levels and ratios of platinum, palladium, rhodium and iridium by wet chemistry, the samples may not be readily soluble in any particular acids and, even if left for days in acid with heating, will show no signs of dissolution. Not so long ago, these samples would have given the chemist some serious problems, but as mentioned earlier we now have microwave digestion to assist in the analysis. This technique dissolves the sample in laboratory microwave equipment using heat and pressure, and in considerably less time. Once in solution, the analysis can then proceed using the appropriate instrumentation or gravimetric technique.

As mentioned, this is only a brief insight into a few of the operational aspects of a modern laboratory, and there are many other techniques and instruments in daily use. Technological advancements will continue and, naturally, commercial methods and procedures will utilise these to keep up with the unrelenting pace whilst still offering markets reliable independent service. ■

David Court

joined the independent analysis and supervision company Alex Stewart Assayers in 1978, the year of its founding. In the 30 years since, he has been involved in myriad projects, including the setting up of a specialist gold assay laboratory in Dubai. Today he is responsible for the laboratory operations at the head office in Knowsley, Liverpool.

Additional background information for this article was provided by Andrew Smith, Precious Metals Business Development Manager, Alex Stewart (Assayers) Ltd.

Obituaries

Terry Smeeton

A Consummate Central Banker

By Ian Plenderleith, Executive Director for Market Operations at the Bank of England, 1994 – 2002

Terry Smeeton was a personal friend, and a long-standing and greatly respected colleague at the Bank of England. I, and the market, will miss him.

In long and distinguished career at the Bank of England – culminating as Head of the Foreign Exchange Division – I saw first-hand how Terry's experience and knowledge of the gold and foreign exchange markets was of immense value to both the Bank and to the markets as a whole.

Terry was, in the finest traditions of the Bank, a consummate professional, possessing a deep understanding of the markets, of the way they worked and of the people who worked in them. Given that, he was a key participant in the Bank's market operations for many years – widely respected by those in the markets. He was also closely involved in the international dialogue amongst central banks, maintaining excellent relationships with central banks around the world, where he had many good friends.

Throughout his career, Terry was immensely loyal to the Bank of England, and cared passionately for the values – integrity, competence, straight dealing and steadfastness – the values that all central banks should stand for. He was a truly professional central banker. And I believe he, like I, would have regarded that as the ultimate accolade for a distinguished and fruitful career.

Anthony John McMurray

Experience, Trustworthiness and Loyalty

By Akin Akintola, last Managing Director of Engelhard-CLAL UK

Tony McMurray died on the 26 September 2007 while on vacation in Malta. He was 59. He will be remembered for his all-round knowledge of the precious metal industry (most especially bullion), as well as his dependability and a now rare ability to judge 'what makes a good Good Delivery bar'.

Tony was for many years the UK Operations Manager for Engelhard-CLAL UK. He was with the group for over 30 years, and when that company closed in 2004, Tony joined Baird & Co as their bullion manager. He was tireless in his services to the gold and silver bullion markets throughout his career, witnessed by his serving as an adviser to the LBMA.

Tony enjoyed sports, and was always so much fun to be with: when he was around, laughter was never far away.

Tony is survived by his wife Christine (nee Cole), whom he married in 1981, and by a son and daughter. He is missed by us all.

Margins and Mining

An Overview of Gold Cost Pressures

By William Tankard, Senior Metals Analyst, GFMS

With the gold price recently buoyed to a 27-year high, one could reasonably expect producers' margins to be accordingly higher. But the picture is more complex: rising costs – due in part to the widespread commodities boom – have so far erased much of the benefit.

Photos courtesy: Ben Roberts Photography

Over the past ten-year period and particularly relevant for the late nineties when gold prices were declining, producers have for the most part shown an ability to rein in costs and maintain profitable operations. As a result, costs have tended to follow a similar trend to the US dollar gold price (Figure 1). But there have been periods when cash margins were squeezed – for example during 1997, as the dollar gold price slid sharply lower to average just $331/oz, as clearly illustrated by the narrowing 'corridor' between the gold price and cash costs. When prices started to recover in 2002, margins did improve, but costs again tracked the price, erasing part of the gains.

More recently, as Figure 2 shows, although cost increases have continued, the global average has been outpaced thus far by the rising gold price. Simple cash margins (gold price less total cash cost) improved through to the end of 2005 and have remained broadly stable over the past year at just short of $300/oz. However, it is interesting to also consider the effects of producer hedging and how the average price realised by producers has been impacted by deliveries into hedge positions. In recent times, producers' average realised prices have tended to be at increasing discounts to spot gold for the quarter, as the price gap between expiring committed positions and the current gold price has continued to widen – but also as a result of elevated buy-back activity. The effects of this discount can be seen in Figure 3, with average margins (accounting for hedging) somewhat lower at between $200 and $300/oz.

A key consideration when assessing marginality is the dollar exchange rate. A good example of the influence of exchange rates on domestic margins can be seen in South Africa in the early part of the decade. Following the spike in early 2001, the firming South African rand was partly responsible for applying severe pressure to local producers' cash margins (Figure 4). Miners were purchasing certain materials and paying their staff in rand – at a time when wages were increasing – while selling their gold on the international market for dollars.

Fig 1 Historical World Total Cash and Total Production Costs

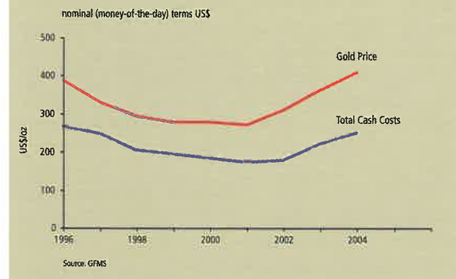
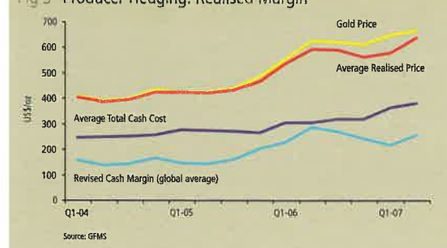


Fig 2 World Cash Margins

Fig 3 Producer Hedging: Realised Margin



In more recent times, as costs have continued to increase, the other major costed countries have almost caught up with South African costs, which have actually shown the greatest resistance to inflation as the country's high-cost mines have been downsized or closed and, in the instance of certain Harmony assets, implemented the 'Conops' continuous mining strategy in an attempt to decrease unit mining costs. As a result of this inflationary resistance, the major costed countries are much more closely grouped than they were three years earlier.

Dealing with Declining Prices...

What measures can producers take to deal with declining prices?

High-grading is commonly used to minimise unit costs. In an underground mining environment, as is the norm in South Africa, this would involve mining from the highest grade ore faces available and maximising the proportion of underground volumes – rather than ore blending with low-grade stockpiles. For open-pit operations, mining would be focused on exploiting the best ore benches and delaying non-essential stripping activities.

Other strategies that can be used involve the running down of inventories of supplies such as reagents and spares, and cutting back on exploration activities so as to keep sustaining expenditure as low as possible. The unpalatable prospect of mine closure at marginal operations and associated staff retrenchments provides another cost-cutting opportunity, where necessary.

Of course, whilst sometimes necessary for survival, such underinvestment practices will later prove a hindrance when the climate improves, at which point it may be necessary to catch up on, for example, ongoing reserve replenishment, open-pit stripping or mining from lower grade ore benches. Quite aside, given the option, good mining practice would involve the exploitation of lower-grade areas (unsustainable under less favourable conditions) in order to extend the economic life of a mine.

...Facing Rising Costs...

What factors determine operating costs? These vary from country to country and mine to mine, but can be divided into three main categories: labour, energy and consumables. Labour costs can exert considerable pressure in certain countries – for example, in Canada, where unit wage costs are significantly higher than the global average. In the labour-intensive deep level mining environment of South Africa, labour costs can account for nearly half of operating costs. Some countries are experiencing severe staff shortages – for example, in Western Australia the unemployment rate has dropped to 1%, which has applied further pressure to recruiting costs.

There is also considerable pressure from the second critical element: energy costs. As shown in Figure 5 of the GSCI Energy Index, these have skyrocketed with, for example, a four-fold rise in the price of crude over the past decade.

Lastly, the cost of consumables has also been rising, affecting a host of supplies – for example, a typical producer's steel and cyanide costs increased by 30% last year.

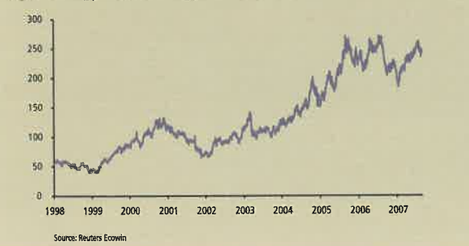
Although there is an absence of consistent cyanide price movements within the public domain, production costs within the sodium cyanide industry can be inferred from critical raw material inputs – gas, ammonia and caustic soda prices.

Quite another issue reported by producers is the global shortage of ultra-large tyres, an important fitment of mining plant used at open-pit operations. Although plans to expand production capacity of these essentials have been underway for over a year, producers reportedly continue to feel the squeeze. Those producers fortunate enough to have secured a steady supply have intimated a greater-than-doubling in purchase price (year-on-year).

Fig 4 Exchange Rate Factors: Rand Pressure

Source: GFMS

Fig 5 Energy - GSCI Energy Index 1998-2007



Source: Reuters Ecowin

It should be noted that, while some of these increasing costs of consumables would not alone have a material impact on industry costs, the cumulative effect of across-the-board rises is marked.

...And Mitigating Those Costs

Some factors, or indeed defined strategies, have acted to mitigate rising costs. Consolidation within the industry can result in operating advantages – for example, through several mines sharing a processing plant or by adding flexibility to the mining plan. Hedging can be used to reduce exposure to volatile energy prices or currency risk. And out of necessity due to remoteness and/or in order to avoid national grid energy charges, some producers have constructed proprietary power sources (for example, both Barrick and Newmont in Nevada), while Lihir have developed a geothermal plant at their operations in Papua New Guinea, from which the company also realises carbon credits.

Worthy of a mention, the current bull market for commodities means that by-products have become an increasingly important offset on the balance sheet of low-cost mines. Silver and copper are the most common in gold mining, although metals such as zinc and, particularly in South Africa, uranium can also be significant.

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In summary, world total cash costs have inflated at an average annual rate of roughly 15% since 2002, but this has been outpaced by an 18% annual increase in the gold price over the same period. Looking ahead, there is no relief in sight from escalating costs: skilled staff, from exploration geologists to mining contractors, will remain in short supply as companies strive to maintain strong teams at the increasing list of mines and projects across the commodities complex. Meanwhile, it seems unlikely that producers will see significant relief from energy prices, presently touching record highs.

In the medium term, the dollar gold price should continue to support healthy producer margins. GFMS still expect price rises next year from the current 27-year (nominal) price record, with the prospect of a new all-time record in 2008 not to be dismissed. However, it should be borne in mind that a gold price rise driven solely by dollar depreciation would do little to aid margins further, as under such a scenario producers' simultaneously strengthening domestic currencies would be likely to erase much of the benefit.

We believe that producer hedging will remain in the spotlight over the next couple of years. While slimmer or completely eliminated hedge books are increasingly allowing producers to take full advantage of higher spot prices, there remains a valid argument that it will only be a matter of time before a meaningful return to producer hedging occurs: the GFMS outlook for the yellow metal is not of sustained four-figure prices.

Under such an environment of declining prices (during which time costs could continue to rise appreciably), it is reasonable to expect producer hedging to shed its taboo status as producers seek to protect the healthy margins some have come to enjoy. ■

William Tankard *is senior metals analyst at GFMS Ltd, where he is responsible for gold, silver and PGM research relating to global mine production, costs and producer hedging. He joined the company in 2005. He holds a Natural Sciences (Hons) degree from Durham University, where he specialised in geology.*

Changing Your Future by Challenging Your Mind

Third LBMA Bursary Awarded to Wits University

Established 84 years ago in Johannesburg, the University of Witwatersrand has built a reputation as a centre for excellence in education and research that extends far beyond the country's borders. To date, the school, commonly known as 'Wits', has produced 89 Rhodes Scholars and four Nobel Prize Laureates. More than 20 of its alumni have been knighted in the United Kingdom.

As in the past, the LBMA's bursary of £18,000 was made available to students in the university's School of Geosciences. The two major criteria used by the school in selecting the recipients were academic excellence in undergraduate years and demonstrated financial need. To prevent conflict of interest, any students who had already received bursaries from other companies were disqualified.

Following these criteria, 13 students were selected. Their profiles appear below.

Mr Gary Trower is a mature student with a strong interest in human origins, and his share of the bursary has afforded him the opportunity to study towards an honours degree in palaeontology. In the past, he has worked on a series of contracts for the national museum in Bloemfontein and has spent time learning from the San people in the central Kalahari.

Ms Thabile Mlaba, from Durban in KwazulaNatal, comes from a family of twelve with a single breadwinner. She is hardworking and determined to succeed. She hopes one day to become an executive in the South African mining industry.

Mr Asinne Tshibubudze is from rural Venda in the north of South Africa. He comes from a family of 15, with a single breadwinner. Asinne likes academia and has been working on a gold project in West Africa for his honours degree, which he hopes to obtain in December 2007. After that, he wishes to pursue an MSc and PhD degree in exploration geology, with financial support from BHP Billiton.

Mr Malaza Jaha grew up in a squatter camp outside Barberton, Mpumalanga, one of South Africa's oldest gold mining areas. Through sheer determination and hard work, he entered the Honours Geology programme at Wits. After his graduation, he hopes to start a career in the mining industry.

Mr Pieter-Ewald Share graduated with a first class BSc degree in geology and physics from the University of Port Elisabeth, and is now working towards his Honours degree in geophysics. He wants to pursue post-graduate work and possibly and academic career.

Originally from Namibia and now resident in South Africa, **Mr Ralf Hansen** is a BSc graduate from the University of Pretoria, having achieved top marks in geology and physics. He joined Wits to do an honours in geophysics, after which he would like to continue his studies for a higher degree.

Mr Papi Kekana comes from rural Gauteng, west of Johannesburg. He had to overcome a severe chronic illness and shortage of money to graduate with an honours degree in geology in September 2007. Papi is now working for a gold mine in one of South Africa's greenstone belts. He hopes one day to complete an MSc in structural geology.

Mr Lebogang Ledwaba is from Johannesburg. He has three siblings, with his mother as the sole breadwinner. After obtaining a BSc in physics, he entered the honours programme in geophysics. After graduation, he would like to work in the exploration sector with one of the consultant firms in Johannesburg.

Ms Vuyokazi L. Bangani is from a rural area in the Western Cape. She obtained her first degree in physics and the University in Fort Hare, paying for her studies by sharing her grandmother's pension. Her dream is to work as a geophysicist.

Mr Rodney Segage is from Johannesburg and is studying towards an honours degree in geophysics. After his graduation, he would like to work in the mining industry near Johannesburg.

Mr Kudzanayi Mgodi is a hard working and academically very strong third-year geology student from Marondera in northeast Zimbabwe. Kudzi's brother has been paying for his studies to date. His share of the LBMA bursary will allow him to obtain a BSc this year, and he hopes to complete an honours in geology next year.

Ms Nyiko P. Makhubele grew up with her mother and four siblings in rural South Africa, and she has been working part-time to pay for her studies. An enthusiastic and hard-working student, Nyiko hopes to pursue a career in the mining sector.

Mr Richard Munyai comes from a poor background in rural Venda in the north of South Africa. Due to a lack of surety, study loans have been hard for him to obtain, and Richard has therefore worked hard throughout his undergraduate years to pay for his studies. He has hopes of doing a higher degree one day, but in the immediate future, and once hehas obtained an honours in geology, Richard will start work with a platinum exploration company so that he can support his siblings to further their own studies. ■

Moving Averages

When to Buy. When to Sell. And How to Tell the Difference.

By Jeffrey Rhodes, Chief Executive Officer, INTL Commodities DMCC

When asked by the Dubai Gold and Jewellery Group to participate in a panel discussion about the price of gold at last April's Fifth Dubai City Gold Conference, I had a degree of apprehension at the array of experts with whom I would share the stage.

The session was chaired by my old friend Colin Griffith, Chairman of the Dubai Gold and Commodity Exchange and Executive Director of Gold at The Dubai Multi Commodity Centre. As Colin introduced the panel of Paul Walker, Paul Van Eden, Harish Pawani and Richard England, I wondered what on earth I could add to the collective knowledge and insight of this select band of gold practitioners.

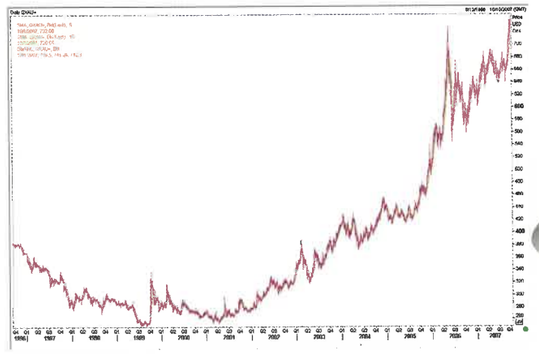
Given the universal bullishness that permeated the market at that time – and has re-emerged with a vengeance, despite a period of weakness in the immediate wake of the US sub-prime credit crisis – it would be very difficult to think of a contribution other than simply stating: 'gold is going higher'.

Indeed, I did say at the time that $730 was firmly on the radar screens, but added my usual 'trees don't grow to heaven' warning. It was certainly no great surprise that the gold price suffered from its typical summer dip, although circumstances this year were unusual in that physical demand held up quite well, and it was the funds that were heading for the exits as global equity markets plunged over fears of a credit crunch.

Of course, the view that I was bullish for gold would hardly be earth shattering. But nor was it unique: as it turned out, each member of the panel, in turn, predicted a higher gold price by varying degrees.

So I chose instead to offer an additional insight into a simple but effective technical trading tool that has served me well over an extended career in the gold market. While the presentation I gave was far from rocket science, it did seem to be well received, and I have reproduced my 'technical trading tip' in this issue of the *Alchemist*.

Chart 1 Ten Year Gold Price



Moving Averages, Sitting Ducks

As precious metal market participants very well know, technical analysis has gained in importance as increased interest from investment funds has led to a significant growth in program trading, which is typically chart driven. Whether or not a dealer considers himself or herself to be a technician, it pays to pay careful attention to significant chart points.

But in order to do that, it is first necessary to determine where those chart points are – which can be far from straightforward. For many (including myself) the study and analysis of chart patterns can be both complicated and confusing.

Moving averages – one of the most popular technical indicators – are a good starting point, in that they provide a signal of when a strong trend is starting (and when it is losing momentum) and can be used for either long-term or short-term trading. I have personally found that a simple focus on two short-term technical indicators, the 9- and 18-day moving averages, can provide highly reliable trading signals.

The method is quite simple: when the 9-day moving average crosses up through the 18-day moving average, a buy indication is flagged. Conversely, when the 9-day moving average dips down through the 18-day moving average, it's time to sell.

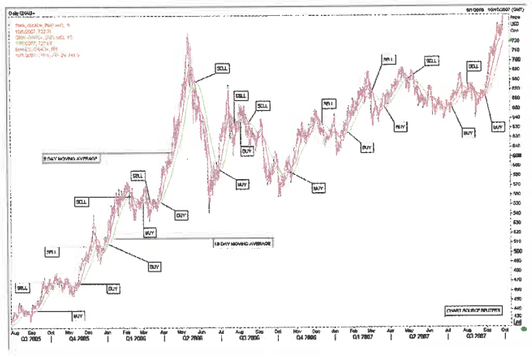
Chart 1 shows the movement in the gold price over the last ten years – roughly the period of time that I have been in Dubai. Over that time, I am sure that following the 9/18-day crossover approach has yielded excellent results. Unfortunately, however, the relative values of the short-term moving averages are impossible to pick out on this long-term daily chart.

A short-term chart shows the 9/18-day moving average crossovers much more clearly, as can be seen in Chart 2, which covers the past two years. This 'trading tip' plainly picks up all the major price moves and captures significant value in a trending market (although this indicator is less reliable during periods of price consolidation).

This simple technical trading tool identified two major moves: the sharp increase in price from $480 to $730 that started at the end of 2005 and picked up pace in March 2006 was captured, as was the reversal back to $540 two months later.

And the current bull-run that has *so far* reached $790 – and promises much more –

Chart 2 Two Year Gold Price



Crossover Date	Trading Signal	Crossover Price	Maximum Price Move	Gain (Loss) USD	Percentage Gain (Loss)
7-Sep-05	Buy	440	475.00	35.00	7.95%
21-Oct-05	Sell	470	(455.00)	15.00	3.19%
17-Nov-04	Buy	468	541.00	73.00	15.60%
22-Dec-05	Sell	508	(503.00)	5.00	0.98%
2-Jan-06	Buy	510	575.00	65.00	12.75%
13-Feb-06	Sell	560	(535.00)	25.00	4.46%
28-Feb-06	Buy	553	570.00	17.00	3.07%
13-Mar-06	Sell	553	(548.00)	5.00	0.90%
24-Mar-06	Buy	553	730.00	177.00	32.01%
24-May-06	Sell	680	(543.00)	137.00	20.15%
30-Jun-06	Buy	587	676.00	89.00	15.16%
26-Jul-06	Sell	632	(626.00)	6.00	0.95%
7-Aug-06	Buy	637	655.00	18.00	2.83%
17-Aug-06	Sell	635	(560.00)	75.00	11.81%
20-Oct-06	Buy	586	650.00	64.00	10.92%
13-Dec-06	Sell	635	(602.00)	33.00	5.20%
22-Jan-07	Buy	625	689.00	64.00	10.24%
6-Mar-07	Sell	667	(632.00)	35.00	5.25%
23-Mar-07	Buy	653	693.00	40.00	6.13%
1-May-07	Sell	681	(639.00)	42.00	6.17%
9-Jul-07	Buy	653	687.00	34.00	5.21%
2-Aug-07	Sell	669	(641.00)	28.00	4.19%
31-Aug-07	Buy	665	771.00	106.00	15.94%
AVERAGES				**$51.65**	**8.74%**

was clearly signalled when the 9-day MA crossed up through the 18-day at $665 at the end of August.

***

Over the last two years, there have been 23 crossovers, with the league table of results reading nine away victories (i.e. a gain $50 or more), eight home wins (a move of between $25 and $50), three score draws ($15 - $25) and three no-score draws (less than $15). The best returns were made between March and June 2006, when the 9-day MA moved up through the 18-day MA on 24 March to yield a maximum gain of $177, followed by a reversal of momentum on 24 May with the decline in price stretching to $137. At the end of June, another 9/18 day crossover captured an $89 rally. The average gain produced by the short-term momentum crossovers was about $52, or 8.74%, a good return for any investment portfolio.

It is clear that every major move in the market was captured by this reliable, albeit simplistic, approach, although however good a system appears on paper, its application in live markets is always much more difficult. Also I must stress that while this works for me, the old adage of 'it's the workman, not his tools' definitely applies to this trading tool and it should certainly carry a 'this could damage your wealth' warning.

But to echo Napoleon's sole criteria in selecting generals – good luck. Which happens also to be the key attribute of any dealer. ■

Jeffrey Rhodes *is CEO of the commodity trading company INTL Commodities DMCC, a joint venture set up in February of this year.*

Over a career spanning 30 years and four continents, he has helped his employers – Credit Suisse, Samuel Montagu and, most recently, the Dubai Branch of Standard Bank Plc – to develop precious metals portfolios in the Middle East and India, particularly in Dubai's expanding physical gold market.

Jeff is a member of the Dubai Gold Advisory Group, a past chairman of the LBMA's Public Affairs Committee and was the founding editor of this publication.

Market Moves

Sean Browne to Standard Chartered, London

Sean Browne has joined the metals trading team at Standard Chartered Bank as Metals Option Trader. He began his career in the metals industry in 2001 at Standard Bank, spending the last seven years moving between the trading desks of the bank's London and Johannesburg operations. He was most recently responsible for the base and precious metals option books in South Africa.

Michael Cuoco to Credit Suisse

Michael Cuoco has joined Credit Suisse in London to support its metal-trading venture with Glencore International AG. Working with Kamal Naqvi, he will be responsible for sales to hedge funds and other institutions.

Prior to joining Credit Suisse, Michael was the Research Analyst at Mitsui Bussan Commodities Ltd. He has also spent time, in research and sales capacities, respectively, on the commodity desks at Framework Investment Group and JP Morgan.

Warren Holt to Standard Chartered Bank London

Warren Holt has been appointed Director on the metals trading team, where he will be responsible for spot and forward precious metals trading. Warren joined Standard Chartered from HSBC London, where he had traded gold, silver and PGM forwards. He began his career at Mase Westpac Hong Kong in 1987, before moving to the London office, where he remained throughout the subsequent Republic National Bank of NY and HSBC mergers.

Martin Jackson to Merrill Lynch Singapore

Martin Jackson has taken a position at Merrill Lynch Singapore, where he will be responsible for base and precious metals trading in the Asia and Pacific region.

From 2001 until this appointment, Martin worked at UBS in London and, later, Singapore, in various sales and trading roles in the metals and FX arena.

Martin Turner to Sempra

Effective July 16th, Martin Turner has joined Sempra Metals Limited to trade gold spot and forwards and strengthen the existing trading team.

He brings a wealth of experience to his new role at Sempra from his previous roles at Market Makers. Martin worked most recently for Marex, and previously spent several years as a trader for Chase, N M Rothschild, and, before that, Credit Suisse and Phibro.

LBMA News

By Stewart Murray, Chief Executive, LBMA

MEMBERSHIP

Members

INTL Commodities Inc was admitted as a Full Member on 1 September 2007.

The telephone and fax numbers for Marex Financial have changed to +44 20 7377 2550 and +44 20 7650 4444, respectively.

Associates

Allgemeine Gold- und Silberscheideanstalt was admitted as an Associate on 1 October 2007.

GOOD DELIVERY LIST

Gold

Following the sale of the Johnson Matthey Hong Kong gold refinery to the Metalor group, as of 5 May 2007, Metalor Technologies (Hong Kong) Ltd has been added to the Gold Good Delivery List. Johnson Matthey Hong Kong has been moved to the Former List.

The location of the refinery remains unchanged at Kwai Chung. The new bar marks are METALOR, and the assay mark is M over HK (vertically) within an inverted triangle with the words ASSAYERS and MELTERS along the sloping sides of the triangle.

COMMITTEES

Management

The Management Committee has met only once in the past quarter – in late-September. In addition to discussing and approving the membership applications noted above, the Committee discussed at some length the arrangements for sponsorship of such applications by Members. It was agreed that, as a general rule, sponsors should have a bullion-based relationship with applicants of at least 12 months before agreeing to sponsor them.

The Committee also discussed the ongoing questions related to the Good Delivery status of bars coming out of deep storage. In order to clarify the nature of the discussions that have taken place recently, the press release (shown opposite) was issued on 3 October.

Physical

The Physical Committee is now supervising the start of the second three-year cycle of proactive monitoring, following the completion of the very successful first cycle. The Committee has also been monitoring six applications for the Good Delivery List, together with enquiries from four companies that have not yet reached the stage of formal applications.

Public Affairs

The main focus of the Public Affairs Committee in the past quarter has been the LBMA's Annual Conference, which takes place in Mumbai from 18 to 20 November.

A date for your diary – The next event on the Committee's agenda will be the annual bullion market party, which is scheduled for 28 February.

Any suggestions for venues or themes for the event would be gratefully received.

Membership

As a result of the resignations of Adrien Biondi and Oliver Weldon from the Committee, all Members were invited to put forward the names of staff to join the Committee. There was an unprecedented response – in the form of seven nominations. Following discussion by the Management Committee, Nick Frappell of Sempra and Peter Roberts of Mitsubishi accepted invitations to join the Membership Committee. Our thanks go to Messrs Biondi and Weldon for their service.

Accommodation

After five years on the third floor at 13/14 Basinghall Street, the LBMA Executive has recently relocated to a new and larger suite in the same building – just one floor down. As well as providing room for future growth – in the form of one additional workstation – the biggest benefit is that the boardroom on the second floor can accommodate up to 18 people (a requirement that arises surprisingly often). Address and contact details remain unchanged. ■

End-of-Year Fixing Schedule – 2007

There will be no PM fixings on

Christmas Eve, Monday 24 December

and

New Year's Eve, Monday 31 December

PRESS RELEASE Good Delivery Status of Bars in Deep Storage

In view of recent press comments, the LBMA wishes to clarify the situation concerning the Good Delivery status of bars reappearing in the market after being held for a considerable number of years in deep storage at central bank vaults, including that of the Bank of England.

The LBMA would like to make it clear that this issue does not concern the quality of the gold. It relates solely to the physical appearance of the bars.

During the past decade, a significant quantity of central bank gold has been sold, primarily through the loco-London market. The net amount sold by the official sector has, according to GFMS, been mostly between 400 and 500 tonnes each year.

From time to time, the commercial vaults that were the counterparties of such sellers have observed that some of the bars being delivered to the clearing members in settlement have failed to meet the LBMA's current standards for physical appearance.

Bars that do not meet the LBMA's specifications for physical appearance will not be accepted by the London Bullion Market, and any client delivering such a bar would have to do one of the following:

- Replace it with an acceptable bar
- Recast the bar into an acceptable form at a Good Delivery refiner
- Accept a small discount to the current gold price commensurate with the cost of such re-casting. The cost of the re-casting operation, including transport to and from a Good Delivery refiner, is significantly less than $1 per troy ounce.

Rather than waiting for bars to reappear from such deep storage, with the possibility of them being rejected on a case-by-case basis by commercial vault managers, the LBMA and the Bank of England have discussed how any bars not meeting the minimum appearance standards can be identified within the Bank's own vaults.

Among other requirements, such as the ability to be safely stacked, the LBMA's Good Delivery specification indicates that irregularities – such as surface cavities, cracks, holes or blisters – should be avoided, particularly on the top surface of a bar.

The reason for this is that debris and/or water can accumulate in such irregularities, which can affect the weight of the bar. Many bars judged to be perfectly acceptable might have very small flaws of the type described above (these having been produced when the bar was originally cast). However, a bar will only be considered to be unacceptable if it contains a flaw of greater than a certain size. Judgement on where the dividing line between acceptability and unacceptability for such flaws lies with the vault managers in the clearing banks within the London Bullion Market who, as a group, have developed considerable experience and expertise on this issue.

The purpose of the discussions that have been held between the LBMA and the Bank of England has been to provide a guide that all central banks, including the Bank of England, can use to identify any bars that would not be considered as acceptable by the London market. ■

DIARY OF EVENTS

November

6
Silver Investment Summit (UK)
London
T/F: +44 (0) 20 8400 9883
www.silversummit.co.uk

6 – 7
Silver Users Association Fall 2007 Conference
Washington, DC
T: +1 703 930 7790
F: +1 703 359 7562
www.silverusersassociation.org

13
46th Minesite Mining Forum
London
T: +44 (0) 20 7395 1935
F: +44 (0) 20 7395 1931
www.minesite.com

13 – 15
China Mining 2007
Beijing
T: +86 10 5822 1789
F: +86 10 5822 1796
www.china-mining.com

18 – 19
Hard Assets Investment Conference
San Francisco
T: +1 314 824 5516
F: +1 314 824 5603
www.iiconf.com

18 – 20
The LBMA Precious Metals Conference 2007
Mumbai
T: +44 (0) 20 7796 3067
F: +44 (0) 20 7796 2112
www.lbma.org.uk

20 – 22
Mines and Money 2007
London
T: +44 (0) 20 7216 6077
eileen.smith@mining-journal.com
www.minesandmoney.com

December

4 – 5
Gold and Precious Metals World Asia 2007
Hong Kong
T: +65 6322 2701
F: +65 6223 3554
yeelim.tan@terrapinn.com
www.terrapinn.com/2007/gold

6 – 7
China Gold and Precious Metals Summit
Shanghai
T: +86 21 5161 5300
F: +86 21 5180 9518
www.chinagoldsummit.com

11
47th Minesite Mining Forum
London
Details as above

12 – 14
Commodity Investment World USA 2007
New York
T: +1 212 379 6320
F: +1 212 379 6320
michael.weinberg@terrapinn.com
www.terrapinn.com/2007/ciwusa

January 2008

13 – 20
Vicenzaoro I
Vicenza, Italy
T: +39 0444 969 111
F: +39 0444 969 000
info@vicenzafiera.it
www.vicenzafiera.it

22
48th Minesite Mining Forum
London
Details as above

February

4 – 7
Mining Indaba 2008
Cape Town, South Africa
T: +1 314 824 5516
F: +1 314 824 5603
www.iiconf.com

20
49th Minesite Mining Forum
London
Details as above

20 – 22
CIS Precious Metals Summit
Moscow
T: +44 (0) 20 7490 3774
maria@adamsmithconferences.com
www.adamsmithconferences.com

Gold's 'Perfect Storm'

Editorial Comment by John Reade, Precious Metals Strategist, UBS Investment Bank

Gold prices have gone from strength to strength since mid-August, taking out the previous rally high of $730 set in May 2006 – and hitting a new 27-year high of $771 on 18 October. Gold has also set a series of all-time monthly closing highs over the past three months, indicating just how short-lived was the move up to $850 in 1980.

Although certain factors spell the likelihood of a correction in the short term, we have turned much more positive on the medium-term outlook for gold for a mixture of fundamental, financial and market-specific reasons.

Fundamentally Fitter

Fundamental supply and demand factors alone will not drive the gold price higher, but they do provide the floor for investors and speculators to build on. And the fundamentals for gold have clearly improved over the past twelve months, largely a result of changes to two traditionally price-sensitive elements: higher jewellery demand and lower scrap supply.

Jewellery clients – who were largely absent from the market in the second half of 2005 and the first half of 2006 – returned as strong buyers in September of that year. Jewellery demand has remained strong ever since, largely driven by demand from rapidly growing emerging markets. Over roughly the same time frame, scrap supply has fallen.

Part of the reason that these sectors have adjusted to higher dollar-denominated gold prices is due to a weak dollar: the currencies of important gold consuming countries such as India and China have strengthened over the past twelve months. While Middle Eastern nations' currencies are generally pegged to the US dollar, demand there has been helped by lower gold price volatility and booming oil-price-fuelled growth.

The Gathering Storm

A number of commentators, including Greg Wilkins, CEO of Barrick Gold Corp, have described the current environment as the 'perfect storm for gold'. There are certainly a large number of gold-supportive factors:

- A weak US dollar
- Concerns about the creditworthiness of the financial sector
- High commodity prices fuelling fears of lurking inflation pressures
- The prospects of widespread central bank easing.

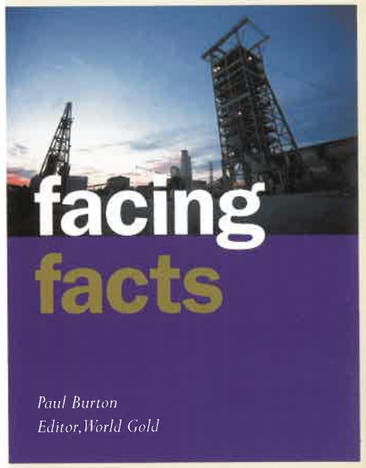
Of course, there is no single reason why investors buy gold. Despite this, summarising the current state of gold buyers' motivations is quite simple. As far as we can tell, all types of investors have bought gold for all of the above reasons. Some are scared about the dollar; others worried about the credit crunch; some have bought gold because it is going up and some because they are worried about inflation (the word stagflation has increasingly been mentioned after the Fed cut 50bp and crude oil hit new highs).

Thus far, we judge that the buyers of gold have been confined to the usual suspects. Based on volumes and holdings, gold has yet to become a mainstream investment alternative. Nor does it have the potential to become one, based on UBS economists' broad forecasts of a stabilising US dollar, slower US and global growth (but no recession) and limited further fall-out from the credit crunch.

But this may not matter: the gold market is a small one. Total holdings in all seven ETFs that we track are about 26 million ounces, worth about $20 billion, and net US futures positions are about the same size. Thus comparatively small investments (in a global asset allocation context) can move gold higher. With many investors motivated to buy gold, further net investment and speculative buying will probably occur over the next year.

Positioned for Upside Performance

The speed of the up-move in gold, combined with the break of last year's highs, makes the gold market vulnerable to the upside. Although positioning in the US futures markets makes a correction almost inevitable at some point, once this has occurred – and when the jewellery market returns from its current absence – we believe that investors and speculators will be sufficiently motivated to push gold higher. UBS may not forecast a sharp sell-off in the dollar or a deepening credit crunch, but that will probably not prevent gold buyers from anticipating one. ■



Fall Fashion in Denver: Sackcloth and Ashes

Each year, in the second half of September, executives from most of the world's top gold producers gather in Denver to present to an audience of institutional investors who control billions of dollars in investment funds. It is the ultimate shop window for the companies to show off their wares.

And the timing couldn't be better as, once again this year, the forum coincided with a post-summer upturn in the gold price – which saw the price move steadily up through the $700 mark to eclipse last year's $730 high mark to reach a new 27-year high.

And gold shares, which had been lethargic for much of the year, suddenly burst into life, with the FTSE Gold Mines index on its way to a 24% rise month-on-month and the XAU up a very healthy 20%.

So the atmosphere in Denver – with sixty of the world's top gold and silver companies mingling with some of the weightiest fund managers from across the globe – was expected to be good. But we were treated to the rather sobering experience of a number of company executives having to stand up and talk of damage limitation.

The highest profile company to wear sackcloth and ashes was hometown favourite Newmont Mining, the second largest gold company in the world.

New chief executive Richard O'Brien was immediately on the back foot as he outlined the company's new strategy to 'rebuild the gold company of choice'. Newmont's costs have increased dramatically this year, principally because of operational problems in Nevada and a transition from simple oxide ores at Yanacocha. The company has also decided to go back to its mining roots by divesting its merchant banking business, which is the rump of the former Franco-Nevada company that Newmont acquired a few years ago.

The rebuilding plan, as elaborated by O'Brien, rests on three pillars: refocusing on operational planning and performance, disciplined project execution and a fresh approach to exploration and development.

The first two strategic thrusts need little explanation, as they make sense for any gold producer. But the third, 'a fresh approach to exploration and development', is intriguing when taken in conjunction with O'Brien's admission that Newmont is unlikely to replace its reserves this year, the first time since 2002 that it has failed to achieve this.

O'Brien told delegates that Newmont can't just rely on exploration to grow the company in future and that the 'new approach' would encompass exploration, organic project growth and M&A.

There is nothing unusual in that statement, as all major gold producers employ those tactics in some form or other. In the detail, though, came the revelation that Newmont will consider buying and developing smaller deposits to ensure growth. As a 'rule of thumb' the majors generally only consider orebodies with greater than 5 Moz in reserves.

Having said all that, Newmont has since made a C$1.5 billion cash offer for Miramar Mining, which holds over 10 Moz of gold in all resource categories at its Hope Bay project.

Aside from Newmont, Eldorado Gold has been forced to shut (the company hopes temporarily) its new mine in Turkey after its environmental approval was challenged, and Northgate Minerals' plans to build a new mine in British Columbia were scuppered by a provincial review body report that has recommended that permission be refused on environmental grounds.

We Interrupt This Bad News

But the news in Denver was not all negative. Yamana Gold's Peter Marrone was able to stand in front of the audience and confirm that his company's bid for Meridian Gold (and Northern Orion) was now likely to go ahead after the board of Meridian had accepted the revised terms of the acquisition.

The merger will create a new major gold producer capable of competing with the likes of Kinross Gold, Goldcorp and Harmony – although not yet commanding the market value that Gold Fields, AngloGold Ashanti, Newmont Mining and Barrick Gold can boast at the top of the industry.

It seems to be a time of change for the major producers, as not only are there new entrants to the 'club' but there are also personnel changes at top management level.

Newmont Mining, AngloGold Ashanti and Harmony either have, or will soon have, newly appointed chief executives. The majors have performed poorly in the markets over the past year, so these changes may have been precipitated by shareholder rumblings.

Certainly with Harmony, the resignation of chief executive Bernard Swanepoel can be directly attributed to Harmony's poor operational performance in the June quarter. The company took the extraordinary step of releasing a trading statement in early August warning that results 'differ significantly from those of the three previous quarters as well as from the analysts' consensus'. Swanepoel resigned at the same time. The fact seems to be that the poor results came as surprise – rather than that the degree of 'poorness' brought about his demise.

Swanepoel was one of the architects and pioneers of the revolution that swept aside the old regime in South Africa's gold industry in the mid- to late-nineties. When a shareholder revolt led to the breaking up of Rand Mines, it was Swanepoel who took Harmony and grew it from a single lease-bound mine into an international gold player that has ranked as high as the seventh-largest producer in the world.

Another South African change merchant is also leaving a gold major. Bobby Godsell is retiring as chief executive from AngloGold Ashanti.

Godsell was instrumental in the formation of AngloGold Ashanti as an independent company at the latter end of the South African revolution, building a company with a portfolio containing former Anglo American mines. This was the consolidation move that created a major global gold player, one that was able to compete in the marketplace with the North American majors such as Newmont and Barrick Gold.

Meanwhile, back in Denver where we started, there have already been some changes – and more are being rolled out – at Newmont. In July, Chairman Wayne Murdy relinquished the role of chief executive to Richard O'Brien, and will retire completely at the end of the year. A whole new management team has been put in place to drive the 'new approach' strategy as Newmont seeks to reclaim the industry leader position. ■

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