

**GLOBAL HEDGE BOOK ANALYSIS  
Q1-2006**

**G F M S**



**BRADY**



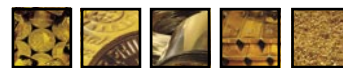
# Contents

Key Points	3
Summary and Overview	3
Market Commentary	4
Composition and Sensitivity of the Global Hedge Book	5
Company Activity	7
Outlook	8
Technical Annex	9
Glossary	10
About GFMS	11
About Brady plc	11

© Copyright May 2006. GFMS Ltd

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means without the prior written permission of the copyright owner. Brief extracts may be reproduced only for the purpose of criticism or review and provided that they are accompanied by a clear acknowledgement as to their source and the name of the copyright owner.

Whilst every effort has been made to ensure the accuracy of the information in this document, GFMS Ltd cannot guarantee such accuracy. Furthermore, the material contained herewith has no regard to the specific investment objectives, financial situation or particular needs of any specific recipient or organisation. It is published solely for informational purposes and is not to be construed as a solicitation or an offer to buy or sell any commodities, securities or related financial instruments. No representation or warranty, either express or implied, is provided in relation to the accuracy, completeness or reliability of the information contained herein. GFMS Ltd does not accept responsibility for any losses or damages arising directly, or indirectly, from the use of this document.



## Key Points

- **At a provisional 4.6 Moz (142 t), de-hedging surged in the first quarter, following a year of restrained activity in 2005.**
- **The bulk of the decline was due to a 4.4 Moz (136 t) or 10% cut to global forwards and loans.**
- **Non-vanilla option contracts were also substantially reduced.**
- **Total outstanding producer positions amounted to a provisional 50.3 Moz at end-March on a delta-adjusted basis.**
- **Quarter-on-quarter, the global marked-to-market position deteriorated by 37% to a negative \$10.6 billion at end-Q1.**

## Summary and Overview

Resurgent de-hedging was noted in Q1, with a provisional 4.6 Moz (142 t) removed from outstanding contracts, which left the global hedge book at end-March totalling 50.3 Moz (1,563 t). This significant reduction represented the largest quarterly fall since the fourth quarter of 2002, and was in strong contrast with the fourth quarter of 2005. In addition the corresponding period of 2005 de-hedging was also comparatively small, at 0.7 Moz (22 t), representing a six -fold increase year-on-year.

Most significant was Barrick’s extensive book restructure that was undertaken in the wake of the acquisition of Placer Dome. As a result, the

### Composition of the Delta-Adjusted Global Hedge Book

(Moz)	05.Q4	06.Q1	qoq
Forwards/Loans	42.46	38.09	-10%
Options	11.86	12.10	2%
Non-Vanilla Products	0.51	0.08	-85%
<b>Total</b>	<b>54.84</b>	<b>50.27</b>	<b>-8%</b>

Note: Totals may not add due to independent rounding. Numbers are provisional and may be revised. At the time of going to press some companies had not reported their hedge positions. In these cases GFMS have made estimates.

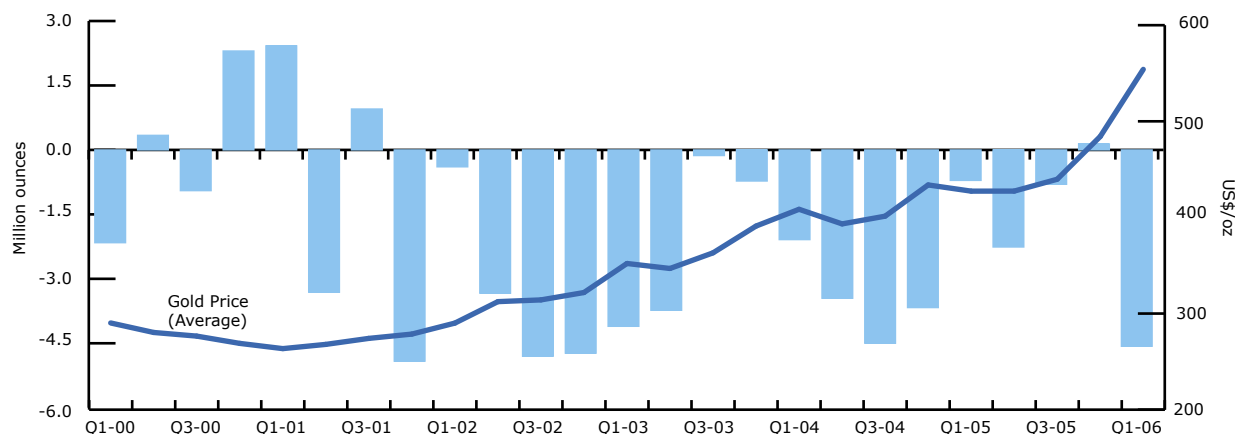
Source: GFMS

corporation’s de-hedging activities constituted 80% of the net reduction for the quarter. Inextricably linked to this, the forward contracts portion of the global book saw the most sizable contraction in volume terms, amounting to 4.4 Moz (136 t). Non-vanilla options also saw a considerable reduction in percentage terms, having been cut by 85%. In contrast, vanilla options were up by 2%, partly due to an increase to the delta net call position.

The gold price at the end of the quarter (used to value the options contracts) stood at \$582/oz, representing a significant rise of \$69/oz. This increase was reflected in the implied delta of the net vanilla options book which increased by close to 4% quarter-on-quarter.

Notably, despite the significant cut recorded to the global book, the higher gold price deteriorated the industry marked-to-market book value by a huge 37% quarter-on-quarter, to a negative \$10.6 billion. Broadly speaking, as a paper loss the marked-to-market shortfall is less dramatic than it may seem, although for Australian-listed companies, a recently implemented change by the Australian Equivalents of International

### Net Impact of Producer Hedging





Financial Reporting Standards (AIFRS) requires that marked-to-market adjustments be included in the quarterly balance sheet. In a similar vein, but on the positive side for producers, the average realised gold price for the quarter rose by a remarkable \$75/oz to \$533/oz, a shortfall of \$21/oz against the average London spot price, compared with a \$26/oz average shortfall in the previous quarter.

### Market Commentary

Gold's dramatic rally continued in the first quarter, with an intra-period gain of \$52/oz. On the basis of the London p.m. fix, a price low of \$524.75/oz was noted on 5th January, the third trading day of the New Year, with the high for the quarter (as well as for the past 24 years), of \$584/oz on 30th March, before dipping down by \$2/oz to end the quarter at \$582/oz, having averaged \$554.07/oz over the three months. This compared with an end-Q4 price of \$513/oz and a Q4 average of \$484.20/oz

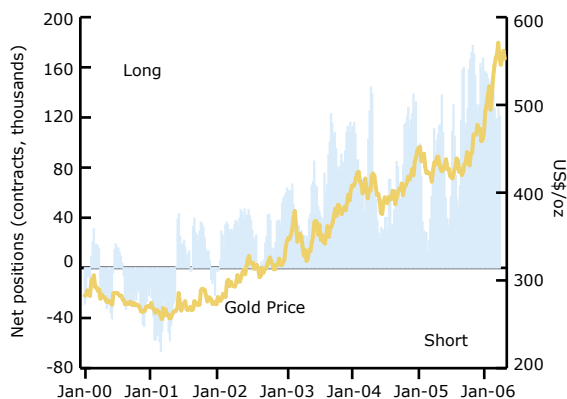
Gold investment demand was yet again one of the prime drivers of the price rally the metal enjoyed throughout the first quarter of 2006 and into the second quarter. The price performance of the yellow metal over the last few months of 2005 and the breach of the \$500-mark in December in particular, meant that investor sentiment at the beginning of 2006 was very positive. Expectations of a weakening US dollar, which to some extent has recently been proven correct, are also understood to have attracted investors to the metal. Furthermore, the continued strength of the wider commodities complex provided additional fuel to gold investment, particularly through the buying of commodity indices that contain a weighting in gold, for

Prices			
	05.Q4	06.Q1	% Change qoq
US\$/oz spot	484.20	554.07	14%
US\$ 12-mth	506.37	581.11	15%
Euro/kg	13,099	14,811	13%
Yen/g	1,827	2,082	14%
TL/g	21.15	23.73	12%
Rps/10g	7,209	8,002	11%
Rph/g	155,499	165,432	6%
Rand/kg	101,787	109,607	8%
A\$/oz	650.56	750.31	15%

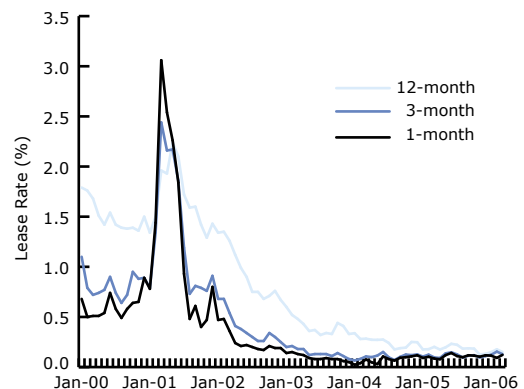
example, the GSCI and Dow Jones AIG. The impact of the apparently changing attitudes towards gold, of certain players within the official sector, is also believed to have somewhat added to the positive climate for the metal. Finally, the general economic and political backdrop, namely the persistence of high energy prices, the potential for economic slowdown in the medium future and the escalating diplomatic tensions between Iran and the international community added further appeal to investing in gold.

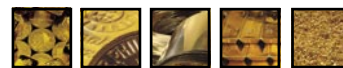
A supporting role was played by the official sector. In the March quarter, substantially reduced central bank net sales were noted, which are understood to have fallen by more than 50% year-on-year. The majority of the reduction was linked to European banks associated with the central bank gold agreement (CBGA), with the most substantial CBGA signatory net sellers being France and the Netherlands. While on an absolute basis the majority of significant activity occurred within the CBGA, activities by non-CBGA members interestingly underwent a swing from net sales to net purchases of gold in Q1. As mentioned above, activity from the official sector has in recent months been interpreted

### Comex: Non-commercial Net Positions      Leasing Rates (monthly average)



Source: CFTC





and reflected by parts of the investment community as a bullish outlook for gold. Central bank lending reduced again in the first quarter, and arguably linked to this, longer-term lease rates increased fractionally, albeit from what remain historically very low levels.

Additional price support was provided through the highest volume of net producer de-hedging measured since late-2002.

In contrast to the considerable inflow of money from investment, the price sensitive physical markets in particular saw demand collapse in the first quarter. Indian and Turkish bullion imports took two of the hardest blows, with the slump in the former largely due to the rupee gold price having reached record highs. As a direct result, imports during the marriage season were accordingly weaker. Falls in demand were not as dramatic in the less price sensitive regions, but nevertheless, declines were noted in, for example, North America and Italy.

Gold mine production in the first quarter is thought to have registered a modest increase year-on-year having benefited from new output at a handful of recent start-ups. Latin America made a good contribution to the growth in global output in the first quarter with improvements noted, in particular, in Peru, Mexico and Argentina. Provisional statistics suggest an impressive rise in first quarter output in Mexico which amounted to nearly 20%. Peru and Argentina, meanwhile, respectively benefited from the start-up of the Lagunas Norte and Veladero mines during June and September of 2005. Partly offsetting the production gains at new mines, Grasberg in Indonesia reported a 38% drop in gold output year-on-year.

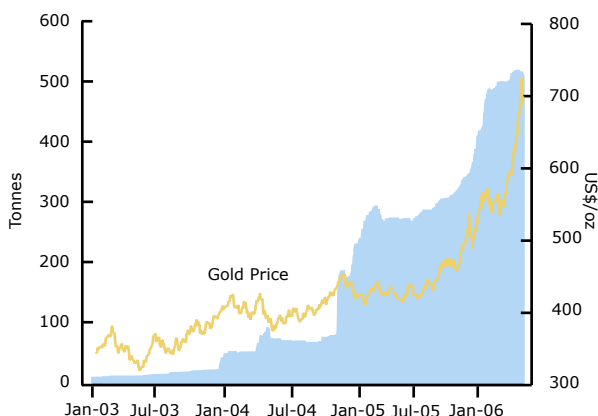
## Composition and Sensitivity of the Global Hedge Book

A significant wave of de-hedging was noted in the first quarter: 4.6 Moz (142 t) was cleared from the delta-adjusted book, to leave it at 50.3 Moz (1,563 t). This represented the most substantial net reduction to the global hedge book since Q4 2002, when 4.7 Moz (147 t) of de-hedging was recorded. Last quarter's reduction was almost entirely driven by a 4.4 Moz (136 t) net decline to the global forwards and loans position and bolstered by a 0.4 Moz (14 t) cut to the non-vanilla options portion of the book. In contrast, the simple vanilla options segment actually registered a 2% increase in delta-adjusted terms, to 12.1 Moz (379 t).

Most instrumental in the considerable first quarter reduction to the global forwards position was a 4.7 Moz (147 t) cut by Barrick Gold (discussed in greater detail in the *Company Activity* section), following their acquisition of the Placer Dome book. It was this transaction and the subsequent restructure of the legacy Placer Dome book that was also the main factor in the decline seen for the non-vanilla book. Added to this, Buenaventura's actions to simplify their hedge portfolio compounded the decline.

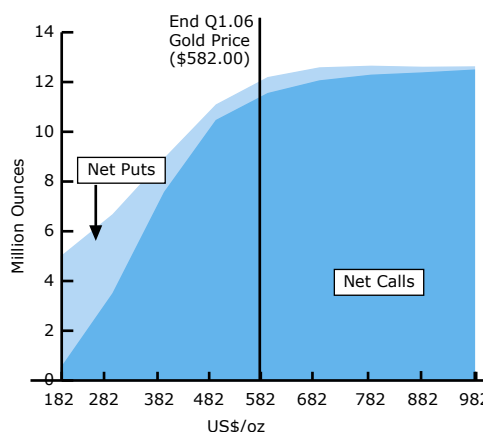
While on a volume basis the reduction witnessed to the non-vanilla options was less important than that of the forwards, the remaining contracts in that segment were cut by a dramatic 85% quarter-on-quarter in delta-adjusted terms. It is worth mentioning that a large part of the non-vanilla options were removed in the first half of 2004.

**Gold ETFs & Other Similar Products**



Source: GBS; CFC; CGT; Absa; State Street; BGI

**Q1 Options Delta Adjusted Position**





The sensitivity of the Q1 barrier options delta hedge to changes in the spot price is illustrated in the chart below right. In order to demonstrate the significant reduction seen over the last quarter, profiles of the non-vanilla positions for Q1 2006 and the Q4 2005 can be compared in the two adjacent charts below.

Turning to the net vanilla options book, the Q1 delta-adjusted position increased by a measured 0.2 Moz (8 t), or by 2% quarter-on-quarter. The rise was explained by an increase in the nominal volume of net calls, which saw the delta hedge position expand by 0.4 Moz (12 t) - this was in spite of the fact that the implied delta against the net call contracts declined by 2% quarter-on-quarter. The increase in the delta hedge net call position was partly offset, however, by a modest decline in the delta hedge net put position which registered an 18% fall from the calculated position at end Q4-2005, from 0.78 Moz (24 t) to 0.64 Moz (20 t).

Based on the end-Q1 price of \$582/oz used to value the contracts, and as alluded to above, the net delta options position stood at 12.2 Moz (379 t). As illustrated in the chart on page 5, the delta hedge options profile shows relative stability at prices above the end-Q1 gold price, partly due to the overriding majority of sold calls that make up the book, but also due to the elevated valuation price: because the contracts are so deeply in-the-money, additional price increases would have little impact on the delta. At progressively lower prices, the size of the book contracts markedly through a combination of a sharp reduction to the sold call position, partly offset by an increased volume of bought put options.

Sensitivity of Q1 Options Book					
Move in Volatility (%)	Move in Gold Price (\$/oz)				
	-200	-100	0	+100	+200
4	-8.9	-10.9	-12.0	-12.4	-12.6
2	-8.9	-11.0	-12.1	-12.5	-12.6
1	-8.9	-11.0	-12.1	-12.5	-12.6
0	-8.9	-11.1	<b>-12.2</b>	-12.6	-12.6
-1	-8.9	-11.1	-12.2	-12.6	-12.6
-2	-9.0	-11.2	-12.3	-12.6	-12.7
-4	-9.1	-11.3	-12.3	-12.7	-12.7

Source: GFMS

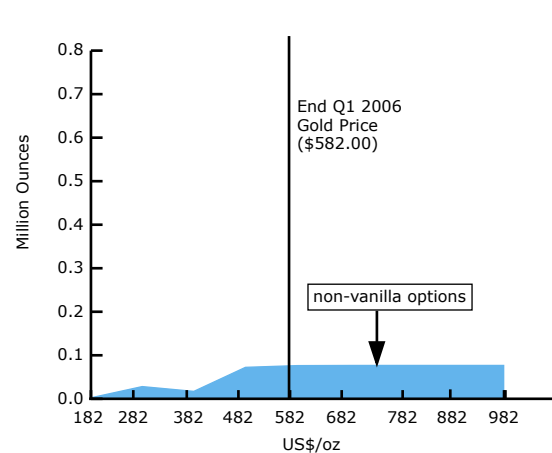
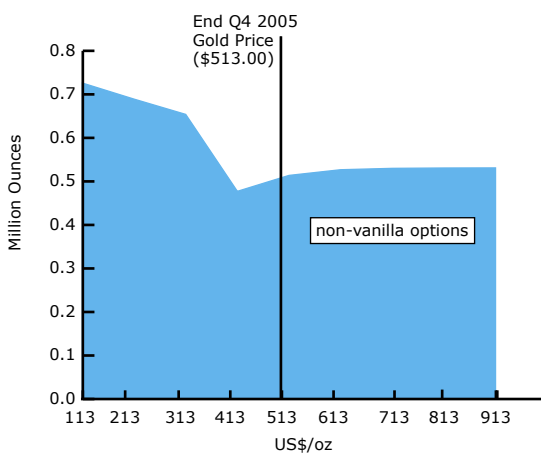
**Note:** the delta-adjusted options book at end-Q1 was calculated at 12.2 Moz. The matrix above shows changes in the delta-adjusted volume under different gold prices and volatilities.

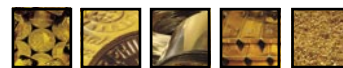
### Company Activity

Barrick's closure of roughly two-thirds of the Placer Dome hedge book, which the major inherited as a consequence of its acquisition of the world's fifth largest producer, accounted for a remarkable 80% of gross de-hedging in Q1. The gold miner gained control of Place Dome in January 2006 when it acquired 81% of the outstanding common shares. Barrick's first announcement, concerning the legacy Placer Dome gold hedge programme, was made in February 2006, with a statement confirming that since end-year it had reduced the book by 1.5 Moz (47 t), the bulk of the cut realised by the elimination of all outstanding sold call options.

In addition to this reduction, Barrick later revealed that it had slashed the combined forward book by a further

### Q4.05 Non-Vanilla (Delta-Adjusted)      Q1.06 Non-Vanilla (Delta-Adjusted)





3.0 Moz (93 t), a total cut during the three months to March of 4.7 Moz (146 t). At end-Q1, Barrick's consolidated hedge position consisted of 15.8 Moz (476 t) of "fixed-price hedge contracts" and a further 0.7 Moz (22 t) of "floating-price gold sales contracts". Within the former category, allocated forward sales against future production at development projects included some 6.5 Moz (202 t) at Pascua-Lama and 3.0 Moz (93 t) at the recently acquired Pueblo Viejo.

Newcrest continued to deliver production into scheduled commitments and, in so doing, reduced its forward sales by 329,500 ounces (10 t) and its gold loan by 34,193 ounces (1 t). Further support to de-hedging was provided by Kinross, who closed out 155,000 ounces (4.8 t) of nominal written call options during the quarter. The buy back left the balance of the book at a modest 100,000 ounces (3 t) of contracts with expiry dates in the second quarter of 2006.

One of the striking features of de-hedging in Q1, and as discussed in more detail in the preceding section, was the sharp contraction in the non-vanilla option book, which in nominal terms declined by 90% quarter-on-quarter. Along with the elimination of Placer Dome's barrier option contracts described above, Compañía de Minas Buenaventura also contributed to the fall, with the conversion of its derivative instruments to physical delivery commitments. In detail, the company converted a total of 340,000 ounces (10.6 t) of options contracts (which included both vanilla and barrier positions) into simple forward sales. The conversion, however, had the effect of actually increasing the group's outstanding delta-adjusted hedge, which at end-Q1 stood at 2.2 Moz (69 t) compared to the calculated position at end-Q4 2005 of 2.0 Moz (64 t).

### Top De-hedgers in Q1

(delta-adjusted, spot basis)

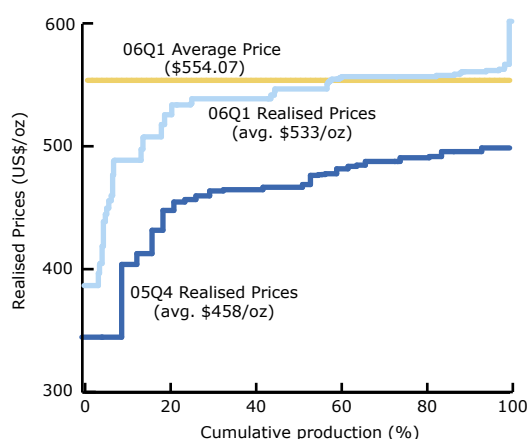
Company	% of gross decline	decline in Moz
Barrick Gold	80%	-4.74
Newcrest	6%	-0.36
Kinross	2%	-0.13
Xstrata	1%	-0.07
Kingsgate Consolidated	1%	-0.06
OceanaGold	1%	-0.04
Cambior	1%	-0.03
St Barbara Mines	1%	-0.03
Lihir Gold	0%	-0.03

Note: Delta-adjusted volumes are calculated on the basis of published company data. As such disclosures are not exhaustive, the GFMS calculated position may not exactly correspond to the delta position reported by the company. In addition, GFMS values the contracts on a spot delta basis, whereas some companies report positions on a forward delta basis. This can lead to minor discrepancies between the calculated and reported delta-adjusted volumes. Where published data was unavailable, an estimate based on the expiry of contracts has been made.

Elsewhere, and partly offsetting the impact of the buy backs outlined above, fresh hedging was concentrated in the vanilla options book. Positions put in place during the first quarter included hedges by AngloGold Ashanti, Aurizon Mines, Avocet and Bema Gold.

AngloGold Ashanti reported a 393,943 ounce (12 t) increase in its delta-adjusted hedge book in Q1. The rise was explained by a 513,644 ounce (16 t) hike in the delta hedge vanilla options book being partly offset by a 119,698 ounce (4 t) drop in its forward contracts. The increase in the net options delta hedge was the result of a 239,000 ounce (7 t) increase in the nominal volume coupled with the impact of the higher gold price used to value the contracts.

### Received Prices in Q1



Aurizon's hedge was connected to conditions of a loan facility related to the development of its Casa Berardi project in Quebec. The hedge totalled 287,431 ounces (9 t) of purchased puts, which the company paid for by selling an equal volume of call options over the same period (2007-2010). Casa Berardi is currently on schedule to start operations in Q4 2006, and based on current reserves should produce 1.1 Moz (34 t) of gold over an initial 6.2-year mine life. The put options secure roughly 40% of the first four years' annual production at \$500/oz. The company also entered into currency forward contracts totalling C\$60 million at an exchange rate to the US dollar of 1.12 (the rate at end-Q1 was 1.17).



AIM-listed Avocet Mining announced that it had, “taken advantage of the recent high price volatility” and reduced its existing sales commitments, while adding some option contracts to protect sales prices below \$450. The new option contracts (a zero cost collar structure), affects 57% of Avocet’s current annual gold production of approximately 210,000 ounces (6.5 t). Lastly, Bema Gold added positions to their longer-dated options contracts (2009-2012) related to the project financing requirements of Kupol, which is due to commence production in mid-2008. In total, the company purchased an additional 116,265 ounces (3.6 t) of put contracts and sold 77,530 ounces (2.4 t) of call contracts.

### Outlook

As in previous editions of *Global Hedge Book Analysis* the delivery profile of the delta-adjusted global hedge book, based on reported contract maturity dates, is illustrated in the chart below. This profile does not take into account the impact of buy backs, book restructures, new hedging or the effect of changes in the gold price used to value the option book, and as such can only offer a guide to expected levels of de-hedging.

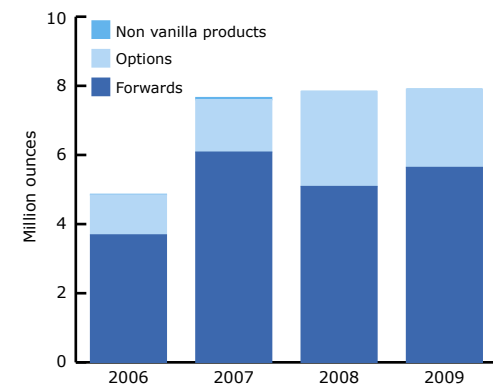
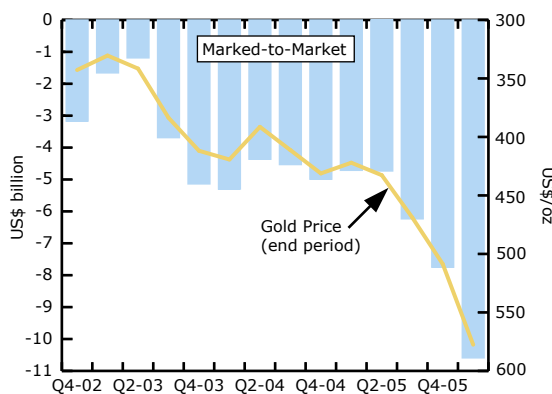
The delivery profile as at end-Q1 suggests a further 4.9 Moz (151 t) of de-hedging in the remaining nine months of the 2006 which, combined with the offset provided by estimated additions to the hedge book, gives a total of 7.4 Moz (230 t) of de-hedging in 2006. However, in the light of Barrick’s announcement that it

Total Nominal Positions, Percentage Change qoq				
Region	Forwards & Gold Loans	Calls Sold	Puts Bought	Net Vanilla Options
North America	-3%	-12%	-13%	-12%
Australia	0%	47%	16%	26%
South Africa	-11%	5%	-5%	6%
Other	11%	-13%	-10%	-11%
<b>Total</b>	<b>-2%</b>	<b>2%</b>	<b>-5%</b>	<b>1%</b>

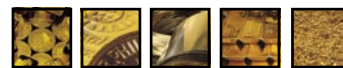
Source: GFMS

had removed a further 1.0 Moz (31 t) from the legacy Placer hedge book in April and that the remaining 2.0 Moz (62.2 t) of the position is planned to be eliminated before the end of the current year, expectations are now somewhat different: the revised forecast range for de-hedging in 2006 now stands at between 9.5 to 12 Moz (295 t to 373 t).

**Marked-to-Market Hedge Book** | **Delivery Profile End Q1\* (base case)**



\*potential de-hedging based on contract year of delivery/expiry



## Technical Annex

The GFMS analysis utilises the Brady Trinity™ Risk Management and Trading system. Each mining company's individual trades have been input into the Brady Trinity system.

The use of the Brady Trinity system is particularly relevant for the analysis of mining companies' options positions. We have entered each option trade by mid-year of expiry. Moreover, non-vanilla products such as convertible forwards have been broken down into their constituent options. This analysis enables us to accurately obtain key parameters and valuations for each instrument used by each company and subsequently for the global hedge book as a whole. This methodology also allows us to model the delivery profile of the hedge book.

All forward contracts, including spot deferred, floating rate forwards and fixed rate forwards, are input as forward sales. Options contracts, including cap and floor agreements, are entered as their constituent vanilla put and call contracts. Convertible and contingent options are unbundled into their constituent barrier options contracts. Trigger levels for barrier options are taken as the mid-point of published ranges, where available. Convertible forward contracts are modelled as a barrier call option combined with a vanilla put option.

In terms of the GFMS analysis, the key parameter of interest is the **delta-adjusted** position. As explained in the glossary, the delta of an option (or indeed of a forward) is the rate of change in the value of the derivative for a change in the price of the underlying. In the case of a gold forward sale (or purchase), the forward delta is 1, whilst in the case of an option, this delta is derived from the Black-Scholes option pricing formula.

The counterparties to mining companies' hedging activity (typically banks) will dynamically hedge their exposure through delta hedging. For example, suppose a mining company purchases a put option. The writer of the option (a bank) will be long the delta volume. In other words, if the delta of the option is +0.5 and the nominal volume of the trade is 100,000 ounces, the delta volume will be 50,000 ounces (of which the bank will be long). To hedge this exposure, the bank must therefore undertake a transaction that yields an equal and opposite position (i.e. short). This will typically be achieved by the bank borrowing gold (normally from a central bank) and selling this into the spot market. Through this mechanism, mining companies' hedging activities impact directly on the spot gold market.

It should be borne in mind that the value of an option, as well as the delta, will change in response to movements in key parameters, particularly the spot gold price, but also market volatility, interest rates and time to expiry. In response to this, banks will continuously or dynamically adjust their delta hedge position.



## Glossary

**Option** - An option contract gives the holder the right, but not the obligation, to buy or sell gold at a predetermined price on or by an agreed date.

**European Option** - An option that can only be exercised at the expiry date.

**American Option** - An option that can be exercised at any time prior to the expiry date.

**Put Option** - An option contract which gives the buyer the right, but not the obligation, to sell a specified amount of gold (or other asset) at a predetermined price (the strike price) on or before a specified date (expiry date).

**Call Option** - An option contract which gives the buyer the right but not the obligation to buy a specified amount of gold (or other asset) at a predetermined price on or before the expiry date.

**Barrier Option** - An option whose outcome depends on the performance of the price of the underlying during the life of the option and whether that price breaches a predetermined barrier.

**Forward** - A transaction in which two parties agree to the purchase and sale of gold at a future date.

**Gold Lease Rate** - The cost of borrowing or return from lending gold, the daily level of which reflects the supply and demand for metal in the lending market.

**Writer** - The writer or grantor is the party who sells the option and receives that premium income.

**Long** - A position in an asset (e.g. gold) for which the value will rise should the price of that asset rise.

**Short** - A position in an asset (e.g. gold) for which the value will fall should the price of that asset rise.

**Delta** - The rate of change of the price of a derivative with the price of the underlying asset.

**Gamma** - The rate of change of delta with respect to the asset price.

**Theta** - The rate of change of the price of a derivative with the passage of time.

**Vega** - The rate of change of the price of a derivative with volatility.

**Rho** - The rate of change of the price of a derivative with the interest rate.

**Greeks** - The basket term for the above hedge parameters (delta, theta, vega, gamma, rho).

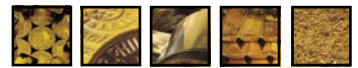
**Underlying** - Shortened term for the underlying commodity on which forwards and options are traded (i.e. in this case gold).

**Delta Hedging** - A hedging scheme that is designed to make the value of a derivatives portfolio insensitive to small changes in the price of the underlying.

**Black-Scholes Model** - A model for pricing European options. Developed by Fischer Black, Myron Scholes and Robert Merton. See F. Black and M. Scholes "The Pricing of Options and Corporate Liabilities" *Journal of Political Economy* 81, 1973 and R.C. Merton "Theory of Rational Pricing" *Bell Journal of Economics and Management Science* 4, 1973.

**Vanilla/Non-Vanilla** - Vanilla options are simple put and call options, whilst non-vanilla options are more complex, with pay-offs dependant on a variety of market factors, such as price paths or the price of alternative assets.

**Volatility** - A measure of the uncertainty or rate of change of an asset price.



## About GFMS

**[www.gfms.co.uk](http://www.gfms.co.uk)**

GFMS Ltd, the world's foremost precious metals consultancy, specialising in research into the global gold, silver, platinum and palladium markets. GFMS is based in London, UK, but has representation in Australia, India, Russia, Germany, Spain and China, and a vast range of contacts and associates across the world.

GFMS is credited with producing the most authoritative surveys of the gold and silver markets, the annual Gold Survey and World Silver Survey, and produces a range of other publications dealing with all aspects of the precious metals markets. GFMS also provides consultancy services in the form of tailor-made research into selected areas of the precious metals markets. GFMS' research team of fifteen full-time analysts comprise experienced economists and three geologists.

## About Brady plc

**[www.bradytrinity.com](http://www.bradytrinity.com)**

Brady is a Software Solution provider whose main product, Trinity, is targeted towards Corporate Treasury in the Metals and Mining Industry. Trinity specialises in Physical Material Management, Financial Transaction Management, Treasury, Risk & Contract Management. Brady is acknowledged as the leading provider of Trading and Risk Management Software for the global metals marketplace, installed with producers, fabricators, merchants, banks and brokers around the globe. Headquarters are based on Cambridge Science Park in the UK. Brady floated on AIM in 2004.



**GFMS Limited**

Hedges House

153-155 Regent Street

London, W1B 4JE

United Kingdom

Tel: +44 (0)20 7478 1777

Fax: +44 (0)20 7478 1779

E-mail: [gold@gfms.co.uk](mailto:gold@gfms.co.uk)

**[www.gfms.co.uk](http://www.gfms.co.uk)**