

PLATINUM GROUP METALS

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Impala Platinum

The platinum group metals were the stars of the first metals market of the new millennium. Strong demand, coupled with the now familiar concerns regarding supply, combined to send the prices of the three major metals soaring. The average yearly price for platinum increased by 45% to US\$545/oz, that of palladium by 90% to US\$681/oz and for rhodium by 115% to US\$1,889/oz.

The platinum market remained in deficit last year notwithstanding a surge in Russian sales. Platinum jewellery demand remained resilient despite the sharply higher prices. Whilst the gradual return to platinum by automakers aided by an increase in diesel sales boosted automotive demand. The palladium market also stayed in deficit primarily as a result of another year of record usage by the automotive industry coupled with a decline in supply. Liquidity in the rhodium market remained tight despite a steep rise in Russian sales due to the fact that most of the metal remained off-market.

DEMAND Automobile

The use of platinum group metals by the automotive industry continues to benefit from the introduction of tighter emission legislation. In the US, increasing numbers of vehicles met the Low Emission Vehicle standards which require full compliance by 2001. In Europe, January saw the introduction of Euro Stage III rules. This legislation was effective for all new models from the start of the year and will apply to all new vehicles from the beginning of 2001. In Japan, new regulations were introduced for gasoline vehicles from October. In keeping with the global quest to reduce air pollution, stricter controls were introduced in China, India, Malaysia, Philippines, Singapore, South Korea and Taiwan.

Light vehicle sales in the three major markets of the US, Europe and Japan, were marginally higher at 36.4 million units. In the US, light vehicle sales ended half a decade of virtually unbroken growth culminating in best ever sales of 17.41 million units. In Western Europe car sales fell by 2.2% to 14.72 million units. The move to diesel cars continued unabated in Europe with one in every three cars now sold being an oil-burner. In Japan, car sales increased by 2.5% to 4.26 million units, the second successive yearly increase. The combined effect of the tighter and widening legislation, and buoyant light vehicle sales was that platinum demand for autocatalysts increased by 4.3% to 1.93 Moz, palladium (excluding stockbuilding) by 11% to 5.38 Moz and rhodium by 18% to 580,000 oz.

A concern raised in this review in recent years has been the soaring usage of palladium by the automotive industry, where it proved the most effective metal to meet the tighter hydrocarbon emission standards. With the phase-in of these standards all but completed and the next set of standards only set to take effect from 2004 onwards, automakers are now looking at reducing their dependence on palladium. Although palladium will remain a key ingredient in future catalyst formulations, usage can be cut by thrifting programmes and by moving to platinum/rhodium systems. During the course of the year automakers made their first moves in this direction. The thrifting programmes are primarily directed at the close-coupled, highly loaded palladium, catalyst. This is being achieved by advances in technology. These include amongst others, improvements in catalyst substrate and wash-coat technologies, better engine control and management systems, and cleaner fuels. The move to platinum/rhodium systems is at the expense of the palladium-only or palladium/rhodium system in the under floor

position. Palladium usage by the auto industry can be expected to be cut by around 30% due to these moves over the next five years.

Jewellery

Despite the high and often volatile price, platinum jewellery demand remained resilient at 2.88 Moz, the same level as the previous year. Higher sales in both China and the US compensated for a decline in Japan.

The high price had its greatest impact in Japan where weak economic conditions continued to undermine consumer confidence. Although purchaser preference remains highest for platinum, manufacturers were reluctant to increase production in an environment of fluctuating prices. Sales in the low price brackets were worst affected as buyers, mainly the younger, switched to more affordable white gold pieces. Despite strong bridal demand overall consumption declined by 17% to 1.09 Moz. Many manufacturers have used this period to reduce metal stocks and recycle old stocks, a move which will benefit fabrication when demand recovers. In China, the high price, coupled with the higher taxes levied on platinum compared to other precious metals and diamonds, resulted in a shortage of product as manufacturers cut back production as their margins were eroded. This did little to dampen consumer enthusiasm for platinum and demand increased by 15% to 1.1 Moz bringing China on a par with Japan.

In the US, price was less of an issue as the market is dominated by the bridal sector. Aided by increasing media coverage and a rapidly expanding retail range, platinum demand increased by 15% to 380,000 oz. In Europe, the UK fared strongest. Figures from the UK Assay Office showed that the number of pieces of platinum jewellery hallmarked increased by 29% to 177,800 pieces. In Germany, the higher price took its toll on the more price sensitive lower end of the market whilst in Italy it was the export market, particularly for chains, that was most affected.

In late September, Platinum Guild International, the promotional arm of the platinum industry, launched platinum jewellery in India. The launch was initially limited to a small number of authorised retailers in Mumbai and Delhi. Because of problems with gold caratage each platinum piece is sold with a quality assurance certificate. Given that India is the world's largest gold market, it has the potential to be another significant market for platinum. The country already has a sophisticated manufacturing industry whose product is currently exported.

Other Demand

Industrial demand for platinum rose by 9% to 1.45 Moz in line with the strong economic conditions. The electronics industry, and in particular the computer industry, where platinum is used in hard disks to enhance storage capacity has been the main driver of demand. The electronics industry now accounts for approximately one-third of industrial usage. Demand in the glass industry continues to benefit from the strong demand for liquid crystal displays which are used in personal computers and televisions. Investment demand turned negative last year, the first time since 1986, as Japanese investors took advantage of the strong prices to sell large bars back onto the market. In the coin market, which is now virtually the domain of the American Eagle, sales of the US coin declined by 62% to 27,050 oz. Combined industrial and investment demand declined by 8% to 1.4 Moz.

Demand for palladium in industrial applications declined by 5% to 3.5 Moz, its lowest level in 10 years, as users moved to cheaper alternatives. The strong move away from palladium to nickel-based multi-layer ceramic capacitors in the electronics industry continues to be masked by the very strong growth in the number of electronic devices. This is despite the fact that less than 50% of the capacitors produced were palladium-based compared to around 60% the previous year. With the technical problems in

producing nickel capacitors having been overcome, and the investment in new plant required to effect such a change having been undertaken, the transfer to nickel is in most cases irreversible. In the dental industry, European and North American alloy makers' response to the high price has been to move away from palladium alloys to silver and gold alloys. In Japan, the Ministry of Welfare decided to continue to cover the cost of palladium alloys, thereby minimising the switch to alternatives.

Supply

Platinum supply increased by almost 5% in 2000 to 5.86 Moz mainly as a result of a surge in Russian sales.

South African platinum production declined by 150,000 oz to 3.78 Moz due to a combination of abnormally heavy rainfall and strike action. Production at Anglo Platinum fell by 151,000 oz to 1.87 Moz. Of this 67,000 oz was attributed to extensive flooding and 55,000 oz due to strike action. Impala's production was also impacted by the severe rains. Although mining was unaffected the collapse of a conveyor belt disrupted mineral processing and was the main reason for a 75,000 oz drop in output to 1.0 Moz. Lonmin, which is situated further to the east and was less affected by the inclement weather, increased production by 4% to 650,000 oz. Northam's output was virtually unchanged at 190,000 oz while Kroondal, which completed its first year of full production produced 65,000 oz of platinum.

In North America, output was unchanged at 285,000 oz. Production at Stillwater increased by 6% to 100,000 oz. During the year focus at the mine was on development, reserve generation and de-bottlenecking initiatives. However, the expansion to 3,000 st/d appears to have fallen further behind with last quarter tonnage only averaging 2,100 st/d. At the East Boulder project the majority of the surface infrastructure was completed. Emphasis this year will be on underground

development with the aim of bringing the mine to production in 2002. In Zimbabwe, only the Mimosa mine continues to operate. Output was in the region of 15,000 oz with plans in the pipeline to triple this production over the next few years.

Russian sales of platinum rose by almost 150% to 1.15 Moz. The surge in sales was due to the amending of the legislation which barred the sales of platinum and rhodium for most of the previous year. Sales by the US Defense Logistic Agency (DLA) were 5,000 oz compared with 215,000 oz the previous year. This was mainly due to the fact that 115,000 oz of fiscal year 2000's allotment of 120,000 oz were brought forward into 1999. Platinum recovered from spent autocatalysts, the majority of which is sourced from North America, increased by 30,000 oz to 540,000 oz.

As mentioned last year, the positive outlook for the market resulted in a number of expansion plans being announced by the South African producers. During the course of this year a further series of expansions have been announced. These together with the status of those already announced in 2000 are outlined below.

In May 2000, Anglo Platinum announced that it would expand output from some 2 Moz to

Platinum Supply and Demand ('000 oz)			
DEMAND	1998	1999	2000^e
Automobile	1,780	1,850	1,930
Jewellery	2,430	2,880	2,880
Other	1,530	1,520	1,400
Total	5,740	6,250	6,210
SUPPLY			
South Africa	3,730	3,925	3,775
Rest of Western World	405	700	395
Russian Sales	1,200	450	1,150
Secondary Metal	490	510	540
Total	5,825	5,585	5,860
Implied change in stock	85	(665)	(350)

e = estimate

3.5 Moz of refined platinum per annum by 2006. Of the expansions already announced, those at Amandelbult and Lebowa with combined output of 107,000 oz were completed. Development of the new Bafokeng-Rasimone mine has fallen behind schedule and full production of 250,000 oz of platinum is now scheduled for 2002. Work has commenced on the Maandagshoek project on the Eastern limb of the Bushveld and full production of 162,000 oz of platinum is expected to be achieved during 2002. Two expansion projects at Rustenburg and Union Sections, were announced during the year. They are both scheduled for completion during 2002 and are planned to produce 395,000 and 94,000 oz/y of platinum, respectively.

Implats announced the re-opening of the Crocodile River Mine early in the year. Opencast mining commenced in December with milling scheduled for the following month. At full production the mine output will be 50,000 oz of platinum a year. In March, Implats completed the sale of its 54% shareholding in Messina Ltd to Southern Era Resources Ltd. Mining is expected to commence during 2002 building up to full production of 60,000 oz of platinum a year later. Like Kroondal, Impala will smelt, refine and market the metal. In December, the company announced its purchase of 100% of Platexco Inc, the Canadian-listed company that owns the Winnaarshoek property situated on the Eastern limb of the Bushveld. Mining will commence in 2002 and full production of 200,000 oz/y of platinum is planned for the end of 2003.

The feasibility study of Aquarius Platinum's Marikana project was completed during the year and the 85,000 oz/y platinum project is expected to receive the go-ahead during 2001. Implats has a life-of-mine concentrate off-take agreement with this project similar to the arrangements with Kroondal. Lonmin intends to expand its platinum production to a level of 750,000 oz by 2002 and to over 800,000 oz by 2007 from its existing

operations. The expansion will be achieved by the sinking of three new shafts and the construction of a new smelter and concentrator. In January, Northam approved an expansion project to mine the UG2 reef. Full production of 100,000 oz/y of PGMs is scheduled for early 2001.

Palladium supplies, declined by 6% to 8.24 Moz. Russian sales of 5.2 Moz were once again heavily reliant on inventory draw-down. South Africa production declined by 70,000 oz to 1.84 Moz. DLA sales fell from 345,000 to 185,000 oz as a result of the pulling forward of sales. Supply from spent autocatalysts increased by around 25% to 265,000 oz. This "mine on wheels" will become a significant source of metal by the middle of the decade as an increasing number of vehicles with heavily loaded palladium catalysts are scrapped.

Terminal Markets

While platinum is the major metal traded on TOCOM, it was palladium that stole the headlines with the suspension of futures trading and the freezing of prices in late February. This was done in order to protect Japanese investors, who had built up short positions of around 650,000 oz, from financial ruin as the price soared to record highs. Despite the lifting of trading restrictions in April, turnover in May fell below 10,000 lots,

Palladium Supply and Demand ('000 oz)			
DEMAND	1998	1999	2000^e
Automobile	3,925	5,850*	5,380
Industrial	3,900	3,700	3,500
Total	7,825	9,550	8,880
SUPPLY			
South Africa	1,840	1,910	1,840
Rest of Western World	790	1,130	935
Russian Sales	5,400	5,500	5,200
Secondary Metal	155	210	265
Total	8,185	8,750	8,240
Implied change in stock	360	(800)	(640)

^e = estimate

* = includes consumer stocking of 1 Moz

compared with over half a million in January, and stayed there for the balance of the year. The consequence of this was that turnover for the year plummeted by 83% to just over one million contracts. Open interest mirrored the performance of trading volumes declining from 93,383 lots in January to just 2,099 at year-end. Warehouse stocks declined to 530 oz compared with 18,519 oz the previous year. While the action taken in February had the desired effect it has seriously dented confidence in the exchange. Platinum fared better than its sister metal palladium with trading volumes up 2% to 13.58 million contracts. In February a record 2.4 million contracts were traded as price volatility reached a peak with over US\$100/oz separating the monthly high and low fixes. Having seen the year's monthly high of 397,946 lots traded in January, open interest dwindled throughout the year before rebounding at year-end to 262,130 lots on the back of positive market sentiment. A rise in deliveries to the warehouse in December lifted stocks to 19,998 oz at year-end.

It was a dismal year for both metals on NYMEX. Platinum trading volumes declined by 44% to 317,942 lots while open interest was down 30% at year-end to 8,429 lots. Warehouse stocks were virtually unchanged at 33,500 oz. It was a similar picture for palladium with trading volumes and open interest down 32 and 35% to 50,712 and 1,848 contracts respectively. The lack of liquidity in the market was reflected in stocks which declined by just over 50% to 15,900 oz.

Prices

The rally in the platinum price which commenced in September 1999 carried on virtually unabated throughout 2000 as the market continued to be driven by a combination of strong consumer demand and concerns regarding the availability of Russian supplies. Having opened the year at US\$442/oz platinum broke through the psychological US\$500/oz barrier for the first time in 10 years in early February, aided by rallies in both the palladium and gold, to fix at

a 12-year high of US\$573/oz on February 17. The price then succumbed to profit taking before consolidating at around US\$480/oz in March. In the ensuing months platinum began to make a series of steady gains culminating with it breaching the US\$600/oz level in both early August and September. In each instance the rally was capped by the inevitable profit taking. In late November platinum once again climbed above US\$600/oz as concerns began to mount about the possible lack of Russian supplies in 2001. Platinum climbed quickly in early December reaching the year's high of US\$625/oz on the 13th. For the balance of the month platinum traded in a narrow US\$600 – 620/oz band. The year's final fixing of US\$611/oz represented a 38% or US\$169/oz increase over the year's opening fix.

The palladium market is far more sensitive to the level and pattern of Russian supplies due to the fact that more than half of the sales come from inventory, the size of which is unknown. Starting the year at US\$444/oz palladium began to move steadily upwards on the back of strong demand and a shortage of Russian metal. The rally took on meteoric proportions in February culminating in a record fixing of US\$800/oz on the 21st. The surge in price resulted from a rush by Japanese investors trying to close-out their short positions but being unable to do so as the soaring price resulted in TOCOM opening limit-up. To save investors the exchange suspended free market trading on the 23rd. The price plunged US\$100/oz the following day as traders liquidated their long positions. Having consolidated at this level the price fell below US\$600/oz at the end of March on heavy selling rumoured to be linked to the closing of Tiger Management's palladium hedge fund. Palladium commenced a strong recovery in June culminating in a new record fix of US\$855/oz on August 2. The price remained volatile over the next few months before starting a rally in early October. The rally continued through to year-end, as strong demand combined with fears over Russian

supplies, culminating in a record fix of US\$972/oz on December 27th. The year's final fixing of US\$954/oz represented a US\$510/oz gain over the year.

Rhodium started the year at around US\$1,000/oz and quickly climbed above US\$2,000/oz in early February. With demand remaining strong, Russian market activity was the major influence on the price which ebbed and flowed on either side of US\$2,000/oz for the balance of the year. At year-end the price was US\$2,025/oz, virtually double the previous year's closing price.

Market Outlook

While the world economy appears to be heading for a slowdown in 2001 the fundamentals for the PGMs remain firm. Though prices are expected to retreat from their year-end highs, the level and pattern of Russian supplies will yet again play a significant role in price levels and volatility. Platinum is the best placed of the three metals in the medium term. An expanding jewellery market, increased usage by

automakers and the as of yet untapped fuel-cell industry combined with the depletion of Russian stocks will underpin the market. Despite thrifting by automakers and substitution by nickel in the electronics industry the palladium market will continue to be heavily reliant on Russian stockpile sales for the next few years. Strong automotive demand will support the rhodium price.

Price Movements 2000 US\$/oz			
	Platinum	Palladium	Rhodium
January	441	452	1,122
February	516	636	2,300
March	480	666	1,900
April	499	573	1,690
May	526	571	1,695
June	559	647	2,150
July	560	703	2,403
August	578	760	1,969
September	592	728	1,969
October	579	740	1,590
November	593	784	1,888
December	610	914	1,991
Average	545	681	1,889

Monthly average price for platinum and palladium is the London pm fix.