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The cover of GFMS Platinum & Palladium Survey 2015 features the wide range of Tanaka and Valcambi minted and cast bars. Monuments and buildings referring to the most important physical trading places of Platinum and Palladium.

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GFMS PLATINUM & PALLADIUM SURVEY 2015

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• WORLD SILVER SURVEY 2015	6th May 2015
• GFMS PLATINUM & PALLADIUM SURVEY 2015	14th May 2015
• GFMS GOLD SURVEY 2015: Q2 UPDATE AND OUTLOOK	July 2015
• GFMS COPPER SURVEY 2015 - UPDATE	October 2015
• GFMS GOLD SURVEY 2015: Q3 UPDATE AND OUTLOOK	October 2015
• GFMS GOLD SURVEY 2015: Q4 UPDATE AND OUTLOOK	January 2016

ACKNOWLEDGEMENTS

The estimates shown in *GFMS Platinum & Palladium Survey* for the main components of mine production, scrap, fabrication, investment and stock movements are calculated on the basis of a detailed supply/demand analysis for each of the markets listed in the main tables. In the vast majority of cases, the information used in these analyses has been derived from visits to the countries concerned and discussions with local traders, producers, refiners, fabricators and central bankers. Although we also make use of public domain data where this is relevant, it is the information provided by our contacts that ultimately makes *GFMS Platinum & Palladium Survey* unique. We are grateful to all of them.

NOTES

UNITS USED:

troy ounce (oz) =	31.1035 grammes
tonne =	1 metric tonne, 32,151 troy ounces

- Unless otherwise stated, all statistics on supply and demand are expressed in terms of fine metal content.
- All references in this publication to “ounces” refer to troy ounces.
- Unless otherwise stated, US dollar prices and their equivalents are for the p.m. fixes of the London Platinum and Palladium Fixing Company Limited for prices prior to 1st December 2014 and the p.m. LBMA Platinum Price and LBMA Palladium Price from 1st December onwards.
- Throughout the tables, totals may not add due to independent rounding.

TERMINOLOGY:

“-”	Not available or not applicable.
“0.0”	Zero or less than 0.05.
“dollar”, “\$”	US dollar unless otherwise stated.
“4E”	Four elements: platinum, palladium, rhodium and gold (3PGE+Au).
“6E”	Six elements: 4E plus iridium and ruthenium (5PGE+Au).

Estimates of **supply** include mine production and the recycling both of scrapped autocatalysts and old jewellery, but exclude contributions from above-ground stocks, such as supplies from stocks controlled by state institutions in Russia.

Demand estimates are net of recycling with the exception of autocatalyst and jewellery, where gross demand is shown - i.e. the total amount of metal absorbed to these two sectors. Estimates of recycling from scrapped autocatalysts and jewellery are shown separately as part of supply given their scale and potential for change. Estimates of demand exclude the movements of any above-ground stocks held within the specified industries, for example any changes in stocks held by the automotive industry.

By simple arithmetic, this leaves either a **“Physical Surplus or Deficit”** (in previous publications “Gross Surplus or Deficit”) before any movements in above-ground stocks are considered. This is a critical measure of the underlying fundamentals of platinum and palladium and indicates the extent to which fabrication demand may have depended on the release of above-ground stocks, or otherwise. At the same time, this also indicates the change in global above-ground stocks.

Unless otherwise stated, all references to **“above-ground stocks”** of platinum and palladium refer to stocks of refined metal, of a form and quality accepted as good delivery in the London and Zurich market and the world’s principal commodity exchanges. Our supply/demand tables also show **“Estimated Movements in Stocks”**. These specific movements relate only to above-ground stock holdings for which reasonable estimates of movement can be made and attributed. A listing and breakdown of these appears in the more detailed tables in the Appendices section of this Survey.

Having allowed for the Estimated Movements in Stocks as defined above, the **“Net Balance”** (previously “Residual Surplus or Deficit”) is arrived at by deduction. A negative Net Balance implies the extent to which other **above-ground stocks**, including those held by financial institutions and/or investors, were released to meet fabrication demand. Conversely, positive Net Balance implies the extent to which these other **above-ground stock** holdings were augmented. However, this should not be construed as indicating the change in global above-ground stocks. For this, please refer to the reported Physical Surplus or Deficit.

1. SUMMARY AND OUTLOOK

INTRODUCTION

After eight years of broad oversupply of platinum, by the second quarter of 2014 it was clear that the mining strike in South Africa would drive a supply-constrained market into deep deficits for both platinum and palladium. The collective loss over the stoppage and then shortfalls during ramp-up amounted to 1.36 Moz (42.1 t) of platinum with the concomitant palladium losses that the GFMS team at Thomson Reuters estimate at 0.64 Moz (20.0 t). This industrial action, the longest wage strike in South Africa's history, was by far the most damaging supply-side event for years. However it did not come without precedent; the previous seven years have chalked up the strikes of 2012, spates of heightened safety-related mine suspension, political posturing around mine nationalisation and constrained growth through electricity supply limitations. Over this period sharp cost escalation has also prevailed. Some might argue this has collectively built a case against the long-term reliability of the world's largest platinum producing country.

These concerns have gradually led to a demand side that has sought to mitigate supplier risk. Consumer strategies were put in place to diversify sourcing to other regions and to secondary suppliers, coupled with a progressive move to gradually purchase forward greater proportions of their metals requirements over longer tenures. In preceding years this led to an effective build of stock, that in 2014 major consumers were able to draw against this through the lengthy phase of constrained primary supply. Aiding this, mining companies had succeeded in building inventory, predominantly within their refining 'pipelines' in previous years that were run down in 2014 by almost 0.46 Moz (14 t). The upshot of this was that through the strike the platinum price failed to perform strongly in spite of growing speculative length on NYMEX, to reach record long exposure in early July.

A number of factors that included investor fatigue and disillusionment to the lack of a strong rally through the strike, and the strong dollar that weighed on much of the commodities complex led to the speculative overhang

WORLD PLATINUM SUPPLY AND DEMAND

(000 ounces)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Supply										
Mine Production										
South Africa	5,054	5,447	5,075	4,676	4,603	4,750	4,736	4,188	4,285	3,062
Russia	960	948	917	830	793	785	818	804	765	717
North America	358	366	324	342	294	238	389	338	337	366
Others	251	262	267	309	359	411	458	473	565	553
Total Mine Production	6,624	7,024	6,584	6,156	6,049	6,184	6,401	5,803	5,952	4,697
Autocatalyst Scrap	806	832	909	1,006	785	902	995	925	1,047	1,055
Old Jewellery Scrap	370	365	560	966	496	522	606	512	491	516
Total Supply	7,799	8,221	8,053	8,128	7,330	7,608	8,001	7,239	7,490	6,269
Demand										
Autocatalysts	3,713	3,897	4,036	3,520	2,509	2,937	3,051	2,914	2,898	3,003
Jewellery	2,337	2,210	2,061	1,847	2,678	2,201	2,388	2,597	2,659	2,569
Chemical	335	322	370	341	284	483	487	401	431	587
Electronics	366	404	397	292	253	251	224	195	169	162
Glass	503	449	431	507	91	505	338	323	84	(34)
Petroleum	148	167	150	191	163	168	144	140	122	158
Other Industrial	466	486	502	497	457	532	556	606	650	700
Retail Investment	22	(22)	23	452	313	95	312	282	141	138
Total Demand	7,889	7,914	7,969	7,648	6,750	7,172	7,501	7,458	7,153	7,284
Physical Surplus/(Deficit)	(90)	308	84	481	580	436	500	(219)	337	(1,016)
Sub Total - Stock Movements	13	0	(394)	(402)	281	(574)	(245)	(537)	(1,892)	1,082
Net Balance	(77)	308	(310)	78	861	(138)	255	(756)	(1,555)	66
LBMA PM Price (US\$/oz)	896.57	1,142.55	1,302.81	1,577.53	1,203.50	1,608.98	1,721.87	1,551.48	1,486.72	1,385.70

Source: GFMS, Thomson Reuters; LBMA

to unwind in the wake of supply side fears. Platinum prices traded in step with gold but in the second half of 2014 this selling pressure was influential in setting up the atypical relationship of platinum trading at a discount to the yellow metal.

The palladium market remained tight in spite of the metal's large above-ground bullion inventories, in part due to the carried over effect of the South African mining strike. As a consequence, palladium's annual average price reached a record high last year in nominal terms. Robust industrial demand, combined with temporary dislocations in the PGM refining market led to spikes in the pricing of metal in sponge form, for palladium in particular which reached a peak in the second quarter of the year but has since settled back to almost balanced pricing between ingot and sponge. Two rand-denominated ETFs, which were launched last March enjoyed exceptional uptake, with holdings collectively surpassing 1.21 Moz (37.9 t), albeit partially offset by redemptions taking place in sterling and dollar products.

Tensions in Russia remained high for much of the year, propagating concern that sanctions against Russia could in one form or another inhibit supply of palladium from

the world's largest producer of the metal. Such fears proved unfounded and indeed late in the year news broke that Norilsk Nickel's CEO was interested in structuring a deal to buy palladium from the Bank of Russia, introducing fresh questions around the existence and scale of any such stocks.

PLATINUM IN 2014

Supply-side shortfalls pushed the platinum market into a 1.02 Moz (31.6 t) deficit in 2014.

Platinum **mine production** fell sharply in 2014, by 21%, to at least a 15-year low of 4.70 Moz (146.1 t). The decline was almost entirely due to significant strike action in South Africa, championed by the Association of Mineworkers and Construction Union (AMCU), which led to the idling of a majority of the South African industry for a period of 22 weeks. We estimate that losses over that period, including the ramp up of operations, totalled 1.36 Moz (42.1 t). While this was a disastrous year for South Africa in terms of platinum output levels, it could have been worse at the level of corporate profitability, given the knock on effect of the strike on producer costs and continuing strong labour cost inflation. Some

WORLD PALLADIUM SUPPLY AND DEMAND

(000 ounces)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Supply										
Mine Production										
South Africa	2,591	2,857	2,677	2,365	2,481	2,646	2,685	2,397	2,371	1,892
Russia	3,133	3,164	3,049	2,701	2,677	2,722	2,704	2,627	2,580	2,660
North America	930	1,024	995	908	688	726	959	953	934	920
Others	300	310	329	407	476	518	513	528	575	567
Total Mine Production	6,953	7,355	7,050	6,381	6,322	6,612	6,861	6,504	6,460	6,039
Autocatalyst Scrap	629	749	957	1,200	1,077	1,308	1,515	1,473	1,590	1,718
Old Jewellery Scrap	103	234	185	192	116	179	248	223	230	248
Total Supply	7,685	8,338	8,192	7,772	7,515	8,099	8,624	8,200	8,280	8,005
Demand										
Autocatalysts	3,990	4,433	4,793	4,488	4,026	5,279	5,539	6,073	6,282	6,605
Jewellery	1,363	1,281	1,281	1,295	1,110	797	672	593	521	474
Dental	598	585	615	620	602	590	567	546	511	462
Chemical	316	411	383	367	310	359	378	364	391	385
Electronics	1,121	1,219	1,275	1,347	1,240	1,451	1,497	1,512	1,505	1,493
Other Industrial	78	86	92	89	80	100	104	111	115	118
Retail Investment	255	135	45	94	170	80	61	37	38	45
Total Demand	7,722	8,150	8,483	8,299	7,539	8,656	8,818	9,236	9,364	9,583
Physical Surplus/(Deficit)	(37)	188	(291)	(527)	(23)	(558)	(194)	(1,036)	(1,083)	(1,577)
Identifiable Stock Movements	1,858	1,613	620	899	593	(289)	1,282	(148)	(300)	(599)
Net Balance	1,821	1,802	329	372	570	(847)	1,088	(1,184)	(1,383)	(2,176)
LBMA PM Price (US\$/oz)	201.08	320.00	354.78	352.25	263.22	525.24	733.63	643.19	725.06	803.22

Source: GFMS, Thomson Reuters; LBMA

benefit did come, however, from the 13% depreciation of the rand against the dollar. Nevertheless, costs in South Africa grew by 5% last year.

Jewellery scrap return rose by 5% in 2014 to 0.52 Moz (16.1 t) despite the near \$100 drop in the platinum price. A 7% rise in China coupled with a 4% increase in Japan accounted for the bulk of the gain. In the latter, a weaker yen drove domestic prices higher which encouraged profit taking, while in China, supply chain destocking and an increase in recycling facilities accounted for the rise. North American jewellery scrap retreated by 8% as consumers held out for higher prices.

Autocatalyst scrap grew by 1% in 2014 to its highest recorded level, at 1.06 Moz (32.8 t). Solid growth was reported in all areas barring North America, where a 16% fall negated the majority of the gains seen elsewhere. We ascribe this to the US market being particularly sensitive to lower prices, with some stockpiling of material.

Turning to demand, global vehicle production rose by 2% to reach 90.5M units in 2014, with modest growth reported in most regions. The key factor behind this was improving market sentiment in Europe with correspondingly higher vehicle production levels. This was coupled with a continued tightening of emissions legislation in many countries, particularly in emerging markets, as air pollution becomes a more political issue in Asia, leading to a rise in metal use on a per unit basis. These factors pushed demand for platinum in **autocatalyst applications** up by 4% to 3.00 Moz (93.4 t), the fastest rate of growth since 2011. However, total consumption remained 26% below 2007's all-time high.

Jewellery fabrication retreated for the first time in three years, slipping by 3% to an estimated 2.57 Moz (79.9 t). The decline came mainly from the two largest markets,

China and Japan, where offtake contracted by 5% and 2% respectively. Both fell in concert with a weaker domestic economy, which curtailed consumer sentiment and discretionary spending. Similarly, in Europe, demand dropped by 3% as a weak economy and limited marketing for platinum jewellery impacted sales. In contrast, platinum jewellery demand in North America increased by 3%, benefiting from a more robust economy and lower prices that saw domestic consumption enjoy a healthy rise.

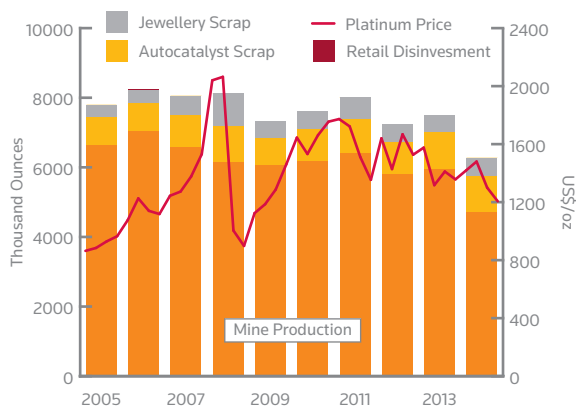
Despite the glass sector becoming a net supplier of platinum to the market due to closures in Japan, platinum demand across the **other major industrial segments** was up strongly in 2014. We estimate that platinum consumed in the chemical sector expanded by 36% last year to a record high of 0.59 Moz (18.3 t). This impressive gain was boosted by increased paraxylene capacity, predominantly in Japan and China. Petroleum demand returned to growth, increasing 30% last year.

PALLADIUM IN 2014

The palladium market experienced its deepest deficit for more than a decade last year, at 1.58 Moz (49.1 t).

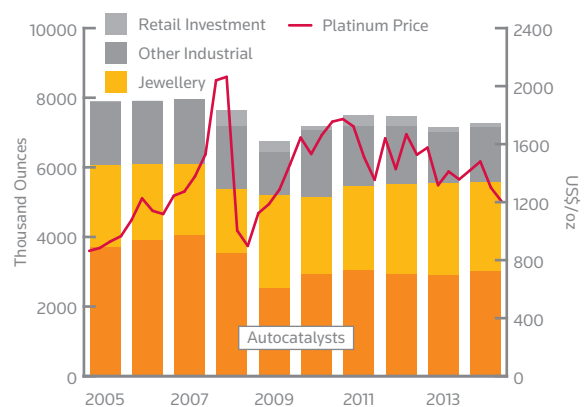
Mine production of palladium posted a more robust outcome than platinum, yet nevertheless fell by 7%, to total 6.04 Moz (187.8 t), a 12-year low. Again the main driver was heavy strike-related losses in South Africa, although the decline there was dampened somewhat by pipeline timing effects and from a shift in mined ore mineralogy to more palladium rich sources at the expense of platinum. Russian production provided a partial offset, growing by 3% due to the release of in-process palladium inventory, while production in Zimbabwe also grew by 3%.

WORLD PLATINUM SUPPLY



Source: GFMS, Thomson Reuters

WORLD PLATINUM DEMAND



Source: GFMS, Thomson Reuters

Autocatalyst scrap supply increased by 8% in 2014 to set a third consecutive annual record at 1.72 Moz (55.2 t) as higher loadings levels continue to filter through into higher scrap yields. Growth was seen in all regions, barring Japan, with Europe responsible for over 55% of global growth of 0.13 Moz (4.1 t). North America remained the prime source of supply with a 59% market share; however this was the continent's lowest share of supply since our series began in 1999.

Jewellery scrap supply rose by 8% to 0.25 Moz (7.7 t) in 2014, falling just short of the 2011 record. China continued to dominate (at almost 80% of the total) and registered a 9% rise, with higher prices and supply chain de-stocking accounting for the bulk of the rise.

Palladium demand in **autocatalysts** grew by 5% to 6.61 Moz (205.4 t) with growth in China leading the way in percentage terms and bringing the country's market share to 23%, up from 11% six years ago. Positive vehicle sales and continuing after treatment installations in emerging markets played a key role, as emissions regulations tightened around the globe. While substitution of platinum to palladium remained a feature of the sector in autocatalysts, the rate slowed.

Palladium demand in **industrial applications** exhibited a mixed performance in 2014, with demand slipping by 3% to an estimated 2.46 Moz (76.5 t). Electronics, as the largest category in this bloc, fell by 1% to a four-year low as the industry continues to deal with ongoing miniaturisation losses and a shift to mobile devices away from traditional PCs. Dental offtake declined by 10% in 2014 due to the continued slide in Japanese demand and further substitution losses in North America, while usage in the chemical industry also marginally declined, with a deceleration of purified terephthalic acid (PTA) capacity growth a key factor. Elsewhere, demand for palladium in

the petroleum sector rose by 23% last year, aided by an uptick in North America for fresh catalysts.

Jewellery demand fell for the sixth consecutive year, by 9%, to 0.47 Moz (14.7 t), the lowest level since 2004. This was mostly due to China, where offtake last year dropped by 16%, although this was the smallest fall since 2009.

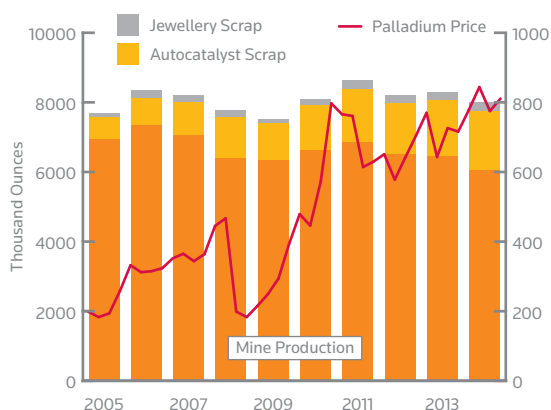
OUTLOOK FOR 2015

More detailed outlooks are produced by the GFMS team at Thomson Reuters, which presents its supply and demand forecast data, commentary, price forecasts and Mine Economics data to customers via Thomson Reuters Eikon subscriptions.

Global supplies of platinum and palladium are expected to rise this year as South Africa's suppressed output level pushes back up towards a 'level of neutral buoyancy' for its installed capacity and staffing levels. This, together with a moderate rise expected for recycling, will drive an increase in total supply by around 13% and 5% year-on-year for platinum and palladium respectively. Demand growth however is also expected for both metals. Whilst anti-diesel rhetoric in Paris and London pose some risk to sentiment for this fuel variant and implicitly therefore to platinum, vehicle sales on the whole appear to have been picking up in Europe as well as North America. New capacity installations are expected to drive platinum demand for glass, but project setbacks relating to lower oil prices will hit demand in chemical and petroleum.

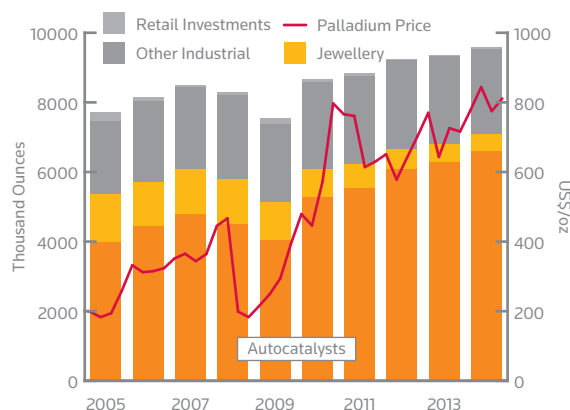
Our base case assumption is for a rate rise by the Fed in September this year in response to the strengthening US economy. Investor positioning ahead of this event suggests the market has been pricing monetary tightening into metals and therefore the event itself may not be as bearish as conventional wisdom might suggest.

WORLD PALLADIUM SUPPLY



Source: GFMS, Thomson Reuters

WORLD PALLADIUM DEMAND



Source: GFMS, Thomson Reuters

2. PLATINUM & PALLADIUM PRICES

- *Platinum prices started 2014 positively, influenced by the strike action in South Africa and the tensions between Russia and the West. Both factors were considered critical enough to shift the notional market surplus in 2013 to a deficit in 2014.*
- *The South African strike action disrupted an estimated 60% of supply at various mines in the country, leading to an annual mine supply decline of 28.5%.*
- *Once both supply risk factors were largely resolved, the platinum price started to descend, eroding the majority of its risk premium.*
- *This development was reflected in the speculative net-longs of managed money positions on NYMEX, which surged during the first half of the year to 2.2 Moz, but followed the platinum price when it started to retreat.*
- *Palladium prices averaged \$803/oz last year, a 10.7% increase compared to 2013. Contrary to platinum, intra-year, the price reached a high of \$911/oz on the pm fix, a level not recorded since 2001.*
- *The palladium market was influenced by a continued market deficit, supply disruption in South Africa and the tensions in between Russia and the West.*
- *Rumours that Norilsk Nickel in collaboration with various investors wanted to buy \$2bn worth of palladium stock from the Russian state hinted towards larger stocks present in the supply chain, which dampened the price.*
- *For this year, our technical indicators point to further weakness in the platinum price with various hurdles to overcome before we expect sentiment to turn again.*
- *Palladium on the other hand, looks more optimistic, despite its broadly sideways action during the start of the year. The \$800/oz is clearly a level to be taken out before we expect another test of the previous high at year-end.*

PLATINUM

The platinum price averaged \$1,388/oz in 2014, the lowest annual average in seven years. Intra-year, however, the drivers of price development in both halves were considerably different. While the rally in the first half was driven by severe supply shortfalls, during the second half of the year the platinum price fell due to a surging dollar and platinum's strong positive correlation with gold.

Platinum prices started 2014 constructively, influenced by the impending (and then actual) strike action in South Africa and the increasing tensions between Russia and the West. Both developments were considered as critical factors that could disrupt supply of PGM's to the market and with that have a material impact on the price.

In addition, both were also critical elements that could shift the marginal surplus in 2013 to a deficit market in 2014. More important were the supply disruptions from the following mines in South Africa- Amandelbult Tumela, Amandelbult Dishaba, Marikana, Impala Lease, Rustenburg Thembelani, Rustenburg Siphumelele, Rustenburg Bathopele, and Union, which began from 23rd January and ended on 24th June. The impact was estimated to cut 60% of the supply from the region; however, as it fell short of this estimate the market started re-pricing platinum's value after the strike. In effect the total production from South Africa declined by 28.5%, the highest year-on-year fall recorded in our series dating back to 1999 and output had also fallen to the lowest volume. In absolute terms it took away 1.2 Moz of the production from the region, thereby contributing to almost an equal amount of loss noted in global production. In other words, the share of global production which is South African declined from a ten year average of 76% to 65% in 2014. The events between Russia and Ukraine did provide additional concerns around supply, as people expected that Russia would react to sanctions by imposing an embargo on Russian

PLATINUM VOLATILITY* & TRADING RANGES

(p.m. fix)	2012	2013	2014
Volatility	16.6%	15.5%	13.0%
High (US\$/oz)	1,729	1,736	1,512
Low (US\$/oz)	1,390	1,317	1,178
Trading Range	21.9%	28.2%	24.1%

*20-day rolling average

Source: GFMS, Thomson Reuters; LBMA

PALLADIUM VOLATILITY* & TRADING RANGES

(p.m. fix)	2012	2013	2014
Volatility	18.1%	15.3%	14.1%
High (US\$/oz)	722	774	911
Low (US\$/oz)	565	643	702
Trading Range	24.4%	18.1%	26.0%

*20-day rolling average

Source: GFMS, Thomson Reuters; LBMA

shipments of PGMs, including platinum. Also with its contribution to global production at about 14%, the risk premium was factoring in the possibility of supply curbs from that area. However, clearly the South African strike was a bigger influence and following that unrest and early signs of steps to recover output more quickly than had been feared, the platinum price reversed from the second week of July.

The supply risks helped the price rise by 11% from the beginning of the year to 10th July when the price peaked at \$1,512, the highest level since 3rd September 2013. The price gains were exacerbated by the rise in the net long for managed money on NYMEX rising from just under 0.64 Moz (20 t) as of end December 2013 to 2.2 Moz (68 t) on 13th July. From then on it is clear that investors got increasingly cold feet about their involvement in the market, which was compounded by the price falling by 20%. As a consequence, on 23rd November 2014 the net long positions for managed money fell back to almost the exact same level at which they had started the year. The trend saw platinum slump to a new low of \$1,178 on 14th November, the lowest since 29th July 2009, which was 37.8% lower than September's 2008 high.

In a similar vein, as strikes started to persist ETF holdings started to rise, increasing their total holdings by 17% in a span of six months to 2.9 Moz, the highest recorded since the launch of platinum ETFs. But just as was the case for investors on NYMEX the settlement of strike action, and the resultant switch to a surplus market sparked liquidations in ETF holdings as well, falling by 6% to 2.7 Moz on 6th October 2014. Since then activity has been lukewarm, as investors appear to be (understandably) apprehensive to settle for negative returns.

PALLADIUM

Palladium prices last year averaged \$803/oz, 10.7% higher than the 2013 average. This stemmed from the large physical deficits that characterised the palladium market in 2012 and 2013. The deficit deepened further last year to 2.17 Moz (47.1 t) from 1.38 Moz (33.7 t) in 2013. The five-month-long strike at South African mines was the key reason behind this increase. To put this in perspective, supply from South Africa declined by 20% to 1.89 Moz (58.8 t) to the lowest recorded since 2000. Over a decade, South Africa contributed almost 38% of global mine output, which dropped to 31% last year. Russia, the largest producer, with a mine output share of 44% in 2014, failed to offset weaker South African supply, as its output increased by only 3%. However, the region managed to post nominal gains after three consecutive years of decline. In addition, autocatalyst and jewellery scrap helped reduce the decline in total supply to just 3% year-on-year.

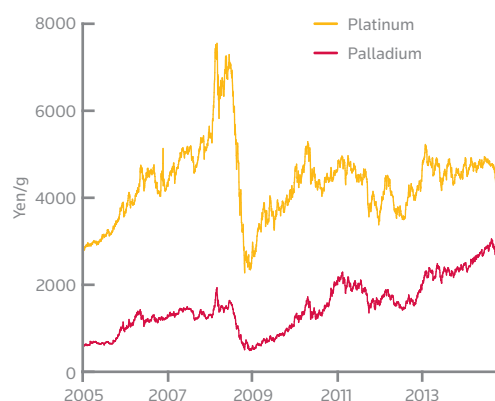
Reflecting the labour unrest at South African mines, palladium prices rose 23%, rising from \$702 on 4th February, to \$866 on 4th July. Even as the strikes were resolved, palladium prices continued to track higher, as opposed to platinum, which by then had started to fall. Palladium, on the other hand, held strong amid supportive macroeconomic data releases from the United States and the expectation that Chinese authorities will approve legislation to reduce the pollution levels. This stimulated demand during a time of tight supply in the market. As a result, the price rose to \$911/oz on 1st September 2014, the highest p.m. fix posted since 21st February 2001. On a full year basis, for 2014 the price registered a 13% gain, closing at \$811/oz. The sell-off was triggered by rumours that Norilsk Nickel, led by various investors, was discussing with the Central Bank of Russia to purchase \$2 billion worth of palladium.

PGM PRICES: SOUTH AFRICAN RAND



Source: Thomson Reuters

PGM PRICES: JAPANESE YEN



Source: Thomson Reuters

PLATINUM PRICES IN VARIOUS CURRENCIES

	US\$/oz	Rand/kg	Yen/g	Euro/kg	Yuan/kg
2013	1,486.72	458,205	4,653	36,009	294,016
2014	1,385.70	481,674	4,695	33,482	274,470
Change (yoy)	-6.8%	5.1%	0.9%	-7.0%	-6.6%

Source: GFMS, Thomson Reuters; LBMA

Based on a spot price of \$775/oz, \$2 bn worth of metal would add up to 2.6 Moz, which is approximately equivalent to Russians total annual mine supply and almost a third of the global mine supply. Markets interpreted this news as a sign that Russia was probably holding higher stock levels than some had previously estimated.

Demand-led factors, particularly from the perspective of autocatalyst, were a key driver last year, both with respect to changes in economic activity as well as regulatory. Car sales in Europe last year increased by 4.7% to 12.1 M units. Growth was particularly strong in the UK, where car registrations grew an impressive 9.3%, reaching 2.48 M units. In this sense, palladium growth was mainly caused by strong vehicle sales in China, which was responsible for almost half of the increase in demand for the metal last year. Demand for catalytic converters rose in 2014, driven by rising global car sales and stricter legislation.

PRICE DEVELOPMENTS FOR THE MINOR PGMS

Rhodium enjoyed its first annual increase in price since 2010, gaining 10% year-on-year to \$1,171.96/oz. Last year started with the price at \$1,000, before it rose gradually to early July and then surged to a peak of \$1,475 in mid August. This was due to increased purchases from industrial players and tightness in supply, due to the South African strike earlier in 2014. Demand is reliant on the automotive sector (which makes up 85% of the market), and in recent years has shifted to China, where we have seen increased buying of this metal.

In addition to industrial applications there is also a small market for rhodium investment bars, mostly in the U.S. and Germany. Coinciding with a fall in platinum and palladium prices, rhodium prices declined gradually until the end of the year, falling to \$1,245.

Ruthenium traded within its narrowest range since 2003, with only a \$15 difference between the annual high and low. From starting the year at \$57, ruthenium rose to an annual high of \$72 at the start of April. From the start of June and through into the first quarter of 2015 prices gradually declined, reaching a twelve year low of \$50 at the start of April 2015. Last year was the fifth consecutive annual decline for

PALLADIUM PRICES IN VARIOUS CURRENCIES

	US\$/oz	Rand/kg	Yen/g	Euro/kg	Yuan/kg
2013	725.06	224,103	2,274	17,556	143,327
2014	803.22	279,495	2,730	19,460	159,121
Change (yoy)	10.8%	24.7%	20.1%	10.8%	11.0%

Source: GFMS, Thomson Reuters; LBMA

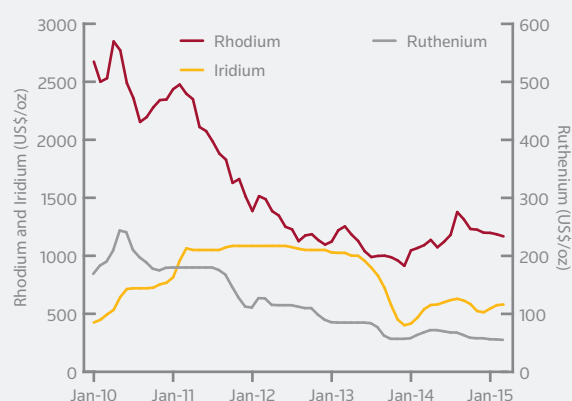
Investment activity meanwhile was supportive to the price over the first half of the year, although given the strike action it is noticeable that the increase in the net long managed money position for palladium, rising from 15,660 contracts (49 tonnes) on 5th January 2014 to a strike related peak of 22,054 contracts (69 tonnes) on 15th June 2014, was more muted than that for platinum.

Interestingly though, and in sharp contrast to platinum, they recovered to reach a 2014 peak of 23,763 contracts (74 tonnes) in mid-September. ETF holdings, meanwhile posted a rise from 2.17 Moz from the beginning of the year to 3.07 Moz as of 31st December; a 41% intra-year rise. The surge can largely be attributed to the introduction of the two South African palladium ETFs (the first in that country), which now make up 40% of the total palladium ETF holdings.

ruthenium as electronic devices are increasingly using flash drives instead of traditional ruthenium-bearing hard disks.

After starting the year at \$400/oz, **Iridium** prices rose to \$630 by mid August. This was only a partial recovery from the losses of 2013 as the market remains well supplied. From September the price began to drop off, reaching a low of \$500. The rest of the year saw a minor recovery. Iridium is used in high performance spark plugs, reflecting its high melting point and resistance to corrosion.

MINOR PGM PRICES



Source: Thomson Reuters

PRICE OUTLOOK

Platinum is expected to average \$1,170 in 2015 which will be 16% lower than the average for 2014. That said, the price trajectory from current levels is upwards, towards \$1,290; however the upside potential will be limited and we would not be surprised if platinum tested \$1,000 this year. The bearish view is based on the increase in supply, more specifically the estimated 22% rise in South Africa's mine production and 10% rise in autocatalyst scrap can increase total supply to 7.05 Moz (219 t) this year, 13% higher than in 2014.

On the other hand demand is estimated to rise by 6%, taking it to an eight year high of 7.72 Moz (240 t), supported by gains from autocatalyst and glass industries as the latter returns to the market. In essence, the market will run a deficit of just 0.67 Moz (21 t) as against 1.02 Moz (32 t) in 2014. That said, the price should bottom out this year supported by shrinking above ground stocks, which are estimated to fall by 12% this year from last year to 5.77 Moz (179 t), the lowest in eight years, thereby providing demand cover of just nine months as against near 11 months in 2014.

Demand growth from industrial segments, more specifically the autocatalyst and glass industries together, is seen to absorb an additional 0.32 Moz (10 t) this year. Autocatalysts, which comprise 41% of the total demand, are estimated to rise toward the highest level in seven years, although will still be below the pre-recession levels, suggesting that growth is just recouping losses. Sales of light vehicles in Europe, one of the largest platinum consuming regions, are likely to rise markedly this year due to increasing production and further rollout of tighter emissions legislation. In addition, higher car sales from the United States and legislative changes in China and India should help add to usage volumes. While jewellery demand is set to grow at a modest pace of 4%, retail investment demand is projected to surge by 20% on bargain hunting as price falls towards \$1,000.

Platinum's price trend from a technical perspective is currently in a short term bearish trend that is projected to end at \$1,000. Last year the price rallied through the first half, touching \$1,511 on 2nd July 2014; the rise was deceptively bullish with higher highs and higher lows, while the momentum was waning on the other hand leading to a bearish "rising wedge" pattern. As a result the price scythed through some of the trend-reversing

PLATINUM



Source: Thomson Reuters

support levels, taking it lower than the 61.8% of the Fibonacci level of \$1,183 illustrated in the chart. At the time of writing in late April, the 26 week Relative Strength Index shows growing divergence between momentum and prices; this suggests a brief upside action, with potential to test near \$1,290 levels, the higher end of the flag pattern. Also we expect the price to reverse to the 200-day moving average before weakness resumes.

Movement in the gold price has been a key influence on platinum with correlation ranging between 80 to 95% through most of the period. This year for instance the correlation varied from 80 to 98% and we believe in the short term gold will play a key role in taking platinum prices lower as monetary policy tightening takes effect and the US dollar rallies.

The outlook for **palladium** remains bullish as stricter emission standards and rising autocatalyst demand from Europe and China keep the market in a deficit. The bullish sentiment is in line with our technical view after prices failed to break below the apex of the symmetrical triangle at \$730/oz. Between October 2014 and March 2015 this level was tested three times, and has given form to a triple bottom formation that will be the base of

the upward trajectory in the coming weeks. We do not believe the effect of Norilsk's interest to buy up to \$2 billion of palladium stock from Russia's central bank is priced-in, but even if it does transpire we do not expect palladium to drop below \$730/oz.

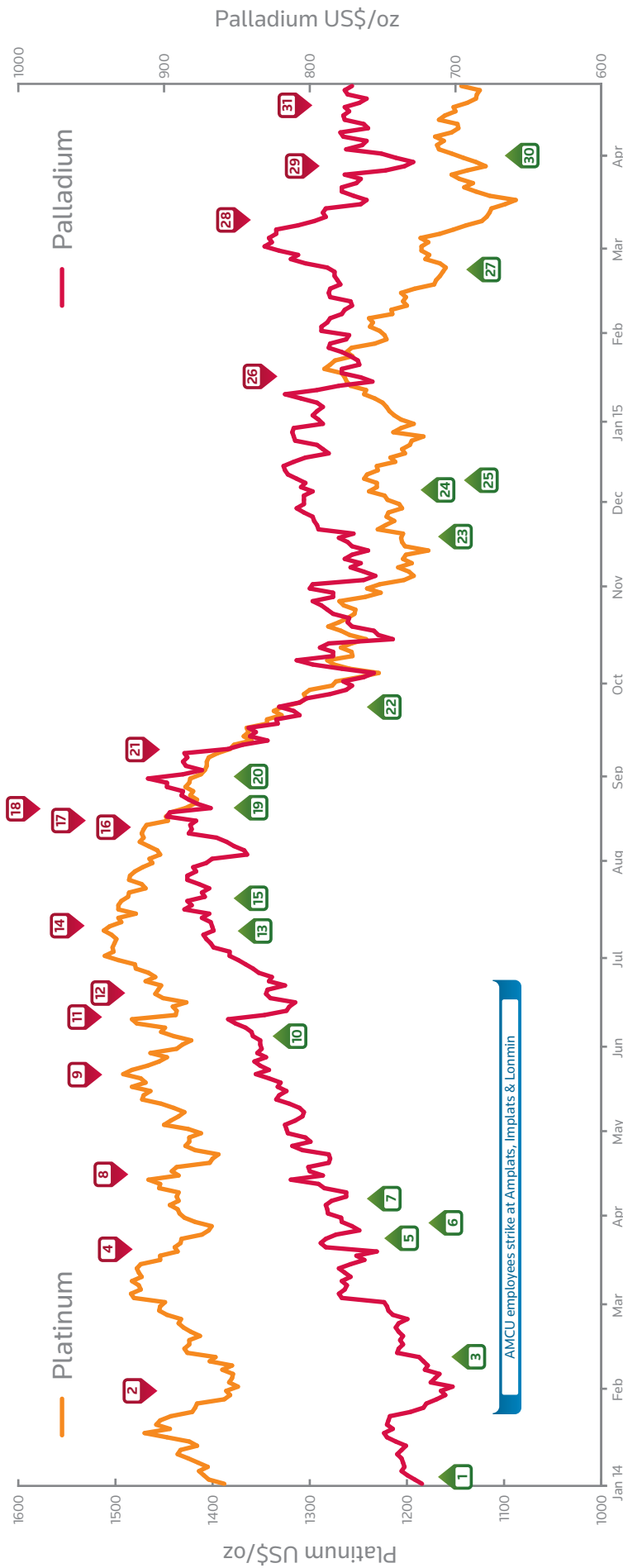
we expect a break \$805/oz level as stipulated by the piercing pattern in the monthly chart. The bullish candlestick pattern talks to the upward bias at \$730/oz and a reversal of the 7-month downward trend that took prices from \$910/oz to \$730/oz. Under this time frame, the divergence relative to prices serves as an indication that the momentum of the prevailing downtrend is waning and a reversal is imminent. In recent months, the resistance level found at \$805/oz has been reinforced by the 12-month moving average, which will pose an additional obstacle for palladium to signal an impending recovery.

Beyond \$805/oz, the price dynamic will be governed by the upward trending channel that dictated much of the activity witnessed over the last three years. Though further resistance lies at \$860/oz and \$910/oz, we expect to see palladium reach \$940/oz before year-end.

PALLADIUM



PLATINUM AND PALLADIUM PRICES



1	(03/01/14): ISIS occupies Fallujah city near Baghdad, tension escalates in the region. Ukraine crisis adds to geopolitical risk premium	17	(14/08/14): Russian President Putin plays down crisis in Ukraine at a speech in Crimea	23	(24/09/14): Norilsk CEO unveils proposal to purchase up to \$2bn worth of palladium from CBR	28	(10/03/15): Platinum and Palladium drop as DXY nears 12-year high
2	(29/01/14): A further \$10bn taper is announced	18	(18/08/14): Tensions in Ukraine ease; equities and US dollar rallies	23	(17/11/14): Japan slips back into recession	29	(27/03/15): Palladium breaks below support level at \$750/oz; sell-off triggered
3	(11/02/14): US debt ceiling raised through to March 2015, technical default averted	19	(19/08/14): Palladium managed money net long position on NYMEX reach 1½ year high	24	(05/12/14): Eskom initiates fresh load-shedding on diesel shortages	30	(01/04/15): Short-covering rally triggered by weak U.S. employment data. Palladium finds support at \$725/oz
4	(19/03/14): Additional taper takes stimulus down to \$55bn per month	20	(10/07/14): Speculative net-longs on NYMEX at all time high	25	(08/12/14): Shutdown at Lonmin's #1 smelter for 3 months following a matte leak	31	(20/04/15): Expectations build on a rate increase; U.S. home sales hit highest level in 18 months
5	(24-27/03/14): The first two South African palladium ETFs are launched on the JSE by Standard Bank and Absa	21	(17/07/14): Malaysian commercial airliner crashes in Ukraine. Geopolitical tensions increase	26	(14/01/15): Palladium fails to break above \$820/oz for a third time in 2 months; sell-off begins following Fed comments on a possible delay in raising interest rates		
		16	(11/08/14): Platinum drops as DXY near 7-month high; palladium's rally extends	27	(25/02/15): Precious metals jump following Fed comments on a possible delay in raising interest rates		
		12	(18/06/14): Fed reduces further bond purchases to \$15bn of MBS and \$20bn per month of long dated treasuries				
		13	(08/07/14): Palladium ETF holdings reach an all time high of 3.1Moz. Platinum managed money net long position in NYMEX reach 1½ year high				
		14	(10/07/14): Speculative net-longs on NYMEX at all time high				
		15	(17/07/14): Malaysian commercial airliner crashes in Ukraine. Geopolitical tensions increase				
		16	(11/08/14): Platinum drops as DXY near 7-month high; palladium's rally extends				
		6	(28/03/14): Short-covering rally triggered by weak U.S. employment growth. Miners strike in South Africa provides further support				
		7	(07/04/14): Standard Bank launches platinum ETF on JSE				
		8	(15/04/14): Firmer dollar offsets safe-haven buying. Drop below technical levels lead to heavy sales on profit taking; DXY near 2 month high				
		9	(23/05/14): Precious metals drop on profit taking; DXY near 2 month high				
		10	(04/06/14): South Africa's AMCU president says wage demand is non-negotiable				
		11	(12/06/14): South African producers strike deal with union. Investors unwind long positions				

Source: GFMS, Thomson Reuters



THOMSON REUTERS

PLATINUM AND PALLADIUM PRICE CORRELATIONS

The GFMS team at Thomson Reuters believes the study of correlation coefficients to be highly useful, not only as an indication of underlying themes that may influence the market, but also to confirm economic theory with empirical evidence. It must be noted, however, that the existence of either a positive or inverse correlation between two assets is not sufficient in itself to establish direct causality.

The close relationship between platinum and palladium is borne out of their chemical characteristics. They are in the same group of the Periodic Table and share similar industrial uses, especially in catalysts. The automotive sector dominates platinum and palladium usage in autocatalysts, representing 41% and 69% of gross platinum and palladium global usage respectively in 2014. Contrary to demand, the supply of both metals is more diverse and so are the underlying fundamentals.

Various market events during the year affected both prices for palladium and platinum ranging from supply side related strike action in South Africa, increased tensions between Russia and the West, the rumour about Norilsk's willingness to buy a large amount of palladium from the Russian State stockpiles and rising auto production. In addition, the sharp contraction across the various commodity markets in metals, energy and agriculture affected the sentiment for palladium and platinum too throughout 2014. On the other hand, while almost all these factors would affect both metals, the differing importance of auto production and mine output for each of the metals respectively caused the relationship between both metals to loosen slightly. Even so, the daily correlations remained the strongest of the various assets under consideration.

Platinum typically has a closer correlation with gold than palladium, stemming in part from platinum's proportionately higher jewellery demand. This lies in the markets' history; jewellery was traditionally the largest demand area for platinum (especially in Japan) until the blossoming of PGMs in the auto sector finally propelled that use into the top spot. Over the 1992-2002 period (the final year before autocatalysts emerged as the dominant use), jewellery demand averaged 43% of total platinum offtake, considerably higher than the 35% share last year. Palladium's role in jewellery, which flourished in the late 1990s and early 2000s, has retreated substantially, accounting for less than 5% of gross global demand in 2014; a drop for the sixth consecutive year. The markets' perception of palladium as a jewellery medium continued to contract, contrasting with a sharp increase in usage in industrial applications. In addition, the correlation between platinum and palladium as well as both metals with gold plunged in Q1 2015, driven by a stronger dollar and a general flight out of commodities. This created short-

QUARTERLY CORRELATION COEFFICIENTS

(on log-returns in daily prices)

	2013	2014	2014	2014	2014	2015
	Q4	Q1	Q2	Q3	Q4	Q1
Platinum-Palladium	0.66	0.57	0.71	0.62	0.59	0.48

Platinum

Gold	0.53	0.37	0.40	0.36	0.17	0.44
US\$/Euro Rate	0.25	0.10	0.18	-0.11	0.06	-0.07
CRB Index	0.10	-0.01	0.10	0.08	0.05	0.29
Oil (WTI)	0.12	-0.26	-0.04	0.13	-0.04	0.10
Thomson Reuters Base Metals Index	0.33	0.26	0.17	0.09	0.33	0.27

Palladium

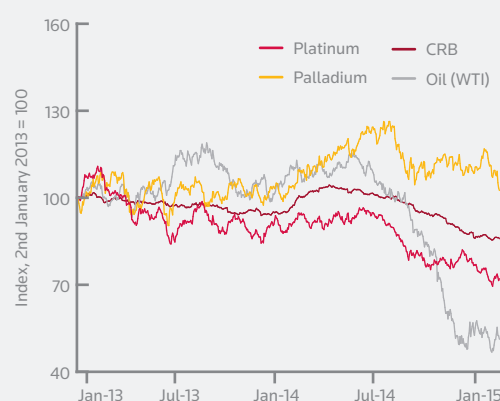
Gold	0.20	0.16	0.19	0.15	0.09	0.05
US\$/Euro Rate	0.34	0.12	0.02	-0.15	0.03	0.09
CRB Index	0.01	0.03	0.05	0.09	0.19	0.23
Oil (WTI)	0.00	-0.10	-0.16	0.03	-0.22	0.11
Thomson Reuters Base Metals Index	0.34	0.21	0.14	0.28	0.46	0.24

Source: GFMS, Thomson Reuters

term turbulence and distortion within the sector. The acute fall in the oil price during the second half of 2014 was the main topic of discussion within and outside the commodities sector and the wider investment community. While palladium was one of the few metals that managed to post a positive result last year due to tightness in the underlying fundamentals, it is obvious that the commodities sector in general suffered as a result of a slowing demand environment coupled by an increase in supply. This development resulted in investors re-allocating capital to more attractive asset classes supported by the absence of any significant official global inflation pressures.

The correlations of both platinum and palladium with oil have reversed into negative territory. This could reflect the inference that a lower oil price could have a positive bearing on vehicle sales, reflecting lower running costs of using the vehicle, which could be beneficial for the demand of all PGMs in autocatalysts.

PLATINUM, PALLADIUM AND OTHER COMMODITIES



Source: Thomson Reuters

3. INVESTMENT

- **Platinum Total Identifiable Investment, which includes retail investment and ETF inventory build, dropped by 66% to 356,000 ounces (11.1 t). In indicative value terms, investment demand amounted to \$493 million.**
- **The decline in our identifiable investment figure was largely due to a slowdown in demand from ETF investors, but we understand that outside ETFs there was some fresh buying interest in the OTC and futures markets.**
- **By contrast, a surge in buy-side interest in ETFs saw palladium identifiable investment jump to 944,000 ounces (29.4 t) in 2014, the highest since 2010. In value terms, this was equivalent to \$758 million.**
- **Outside ETFs, last year saw heavy selling in the OTC market, although some of it was offset by a rise in speculative interest in futures.**

OVERVIEW

After two consecutive years of strong gains, platinum identifiable investment slowed considerably last year. By contrast, investor interest in palladium soared in 2014. Before discussing in detail the trends in platinum and palladium investment in 2014, it is worth making some general observations that apply to both metals. First, it is worth highlighting the impact of gold investment on activity in PGMs. It is clear that both platinum and, to a lesser extent, palladium suffered from weak investor sentiment towards gold, which was, in turn, formed by improving economic conditions in the United States, a shift in US monetary policy and a strong dollar appreciation, particularly in the second half of the year.

Meanwhile, supply/demand fundamentals also played an important role in investor sentiment, providing some support for both metals. For instance, concerns over South Africa's prolonged platinum miners strike and fears

that rising tensions between Russia and the West over Ukraine would hit supply of palladium were believed to have encouraged some speculative buying.

As shown in the table below, identifiable investment in **platinum**, which is the sum of retail investment and the net change in exchange traded funds (ETFs), fell to 356,000 ounces (11.1 tonnes) in 2014, representing a decline of 66% from a year earlier. A close analysis of individual investment components indicates that last year's outcome was mainly driven by a 76% decline in demand from ETF investors. That said, our supply/demand analysis suggests that the platinum market shifted towards a small surplus, of some 66,000 ounces (2.1 t), last year, a good part of which was absorbed by investors in the OTC and futures markets.

Starting with the futures markets, net investor long positions on NYMEX and TOCOM collectively rose by 341,000 ounces (10.6 t) or 20% during 2014. Although it is difficult to assess what the precise physical impact of this increase would have been, the offset physical purchases are usually reasonably close to a 1-to-1 ratio against the futures. It is worth emphasising that the increase was largely attributable to a surge in buy-side interest on NYMEX, particularly in the first half of the year, fuelled by major supply disruptions in South Africa. Meanwhile, investor interest on TOCOM registered a modest 2% increase during the year, with the bulk of inflows taking place in the period between early July and late September, as a sharp decline in the platinum price in yen terms triggered some bargain hunting. Our analysis also suggests that the OTC market experienced modest net buying in 2014, particularly in the latter part of the year, mainly driven by a steep fall in the price and platinum's discount to gold in the final quarter.

Turning to other components of our investment figure, total ETF holdings rose by 218,000 ounces (6.8 t) during

IDENTIFIABLE INVESTMENT*

(000 ounces)	Platinum				Palladium			
	2011	2012	2013	2014	2011	2012	2013	2014
Retail Investment	312	282	141	138	61	37	38	45
Exchange Traded Funds	145	237	892	218	(532)	448	0.1	899
Total Identifiable Investment	457	519	1,033	356	(471)	485	38	944
Indicative Value US\$ (Mn)**	786	806	1,536	494	(346)	312	28	758

*Excludes investment activity in the futures and OTC markets.

**Indicative value calculated using annual average volume and prices.

Source: GFMS, Thomson Reuters

2014. The bulk of buying was concentrated in the period between February and mid-July and seemed to have been related to the protracted five-month strike in South Africa, which led to major supply disruptions, taking total ETF volumes to a fresh high of 2.91 Moz (90.5 t) in late July. While last year's increase in platinum ETF holdings may appear muted compared to the previous year, it should be noted that demand in 2013 was exceptionally high, boosted by the launch of the South African NewPlat fund in April that year, which soon attracted strong interest from South African investors and became the largest platinum ETF.

Meanwhile, retail investment in physical platinum bullion registered a muted 2% fall in 2014, as opposed to a sharp double-digit decline a year earlier. This was primarily attributable to strength in Japanese demand, particularly in the first few months of the year, which saw a surge in demand for platinum bars ahead of the sales tax hike in April. In addition, marked weakness of the yen later in the year and a steep decline in the local price in mid-October below ¥4,250/g, the level last visited more than a year ago, spurred some fresh interest in the metal. This was, however, outweighed by losses in North America, subdued investment demand in Europe as a result of the VAT burden and a lack of interest elsewhere.

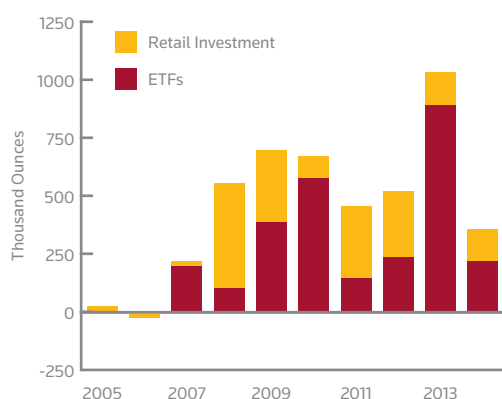
Looking at **palladium**, identifiable investment rebounded strongly in 2014, thanks to strong demand for ETFs. It is worth stressing, though, that the investor community as a whole remained net sellers for the third consecutive year. Key to this was the growing deficit in the palladium market, which reached 2.18 Moz (67.7 t) in 2014, a record level since our series began in 1999. This was entirely met by heavy liquidation in the OTC market, with the bulk of selling happening in the latter part of the year, after the palladium price hit \$911/oz in September, the highest since February 2001, which triggered a bout of aggressive

profit taking in the final few months. While 2014 marked another year of significant outflows from palladium, it is worth stressing that the total was 8% lower than the 2013 level. This was largely due to strong buying interest from ETF investors last year. Total holdings increased by 899,000 ounces (28.0 t) in 2014 as a whole, marking the highest increase since 2010. Looking at the intra-year developments, last year's growth was heavily skewed to the period between end-March and mid-August, which was also one of the key drivers behind the steady price increase during that period. It is also worth noting that the jump in investment demand was largely thanks to inflows into the new Absa and Standard Bank palladium ETFs that were launched in South Africa in March, more than offsetting outflows in some other funds.

In addition, total investment outflows in 2014 were somewhat mitigated by an increase in speculative investor interest in the futures market. Indeed, combined net long positions on NYMEX and TOCOM rose by 429,000 ounces (13.3 t) or 24% over the course of the year. It should be noted, however, that the growth was primarily down to a surge in investment activity on NYMEX, which saw net long positions rising by 448,000 ounces (13.9 t) or 25% during the year. Similar to ETFs, the peak in activity was concentrated in the March-August period, taking the net long towards an all-time high in early September. This was in sharp contrast to investment activity on TOCOM, where investors in aggregate shifted to become net sellers.

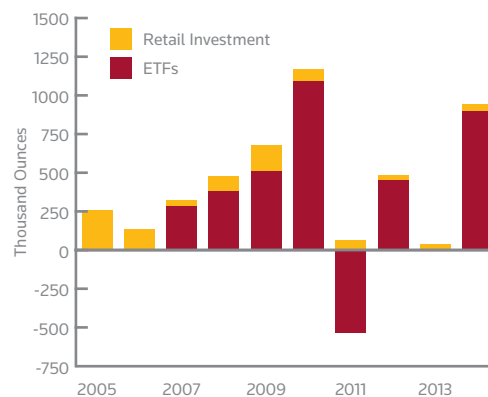
Meanwhile, retail purchases of palladium bullion recorded an 18% growth last year, although it is important to emphasise that the level of this type of investment in absolute terms remained insignificant. Last year's growth was in large part driven by the continuation of the positive trend in North America, slightly offset by losses in some other regions.

PLATINUM IDENTIFIABLE INVESTMENT



Source: GFMS, Thomson Reuters

PALLADIUM IDENTIFIABLE INVESTMENT



Source: GFMS, Thomson Reuters

PLATINUM AND PALLADIUM EXCHANGE TRADED FUNDS

Platinum ETF holdings grew by 9% or nearly 218,000 ounces (6.8 t) in 2014 to reach 2.75 Moz by year-end. Meanwhile, palladium ETF holdings grew by a stunning 41% to end the year at 3.07 Moz, once again overtaking platinum ETF holdings in volume terms. Both platinum and palladium ETFs achieved record-high holdings at one point in 2014 (2.91 Moz for platinum and 3.09 Moz for palladium holdings) on the back of concerns over supply from Russia and South Africa and hopes of stronger industrial demand from stricter European emissions standards.

Starting with palladium ETFs, the marked rise in ETF holdings last year was attributable to the launch of two new palladium ETFs in South Africa; ABSA's NewPalladium fund and Standard Bank's AfricaPalladium ETF fund in March. Both funds have proved to be very popular with investors, with inflows exceeding 500,000 ounces and 700,000 ounces respectively by year end. The other palladium ETFs fell by 15% or approximately 320,200 ounces (9.9 t) last year, indicating that the two new funds have cannibalised palladium ETF holdings elsewhere in addition to drawing in fresh investors.

After a stellar first half, palladium ETFs fell by more than 118,000 ounces (3.7 t) in August alone, just when the palladium price was about to reach its intra-year high of \$911/oz. The price failed to hold above \$900/oz and started to collapse in September and October to reach \$743/oz, reversing gains it had built earlier in the year. Prices traded sideways within the \$750-\$800/oz range for the rest of the year, while ETF holdings steadily eased, ending the year at 3.07 Moz (95.5 t).

After enjoying 55% growth in 2013 thanks to the NewPlat fund launched in South Africa, platinum ETF holdings continued the momentum of 2013 into the first half of 2014, with net inflows of 352,492 ounces over the first six months of the year. This was despite a muted price reaction in response to the labour

NET INFLOWS INTO PLATINUM & PALLADIUM ETFs

(000 ounces)		
Platinum	2014	Jan-Apr 2015*
Absa NewPlat	195	-33
ETFS USA	-23	-6
ETFS London and Australia	13	-8
Zürcher Kantonalbank	-44	-8
Others**	76	17
Total	218	-38
Palladium		
Standard Bank AfricaPalladium	703	33
Absa NewPalladium	516	-26
ETFS London and Australia	43	-47
ETFS USA	-203	-54
Zürcher Kantonalbank	-49	-8
Others**	1,152	-89
Total	899	-152

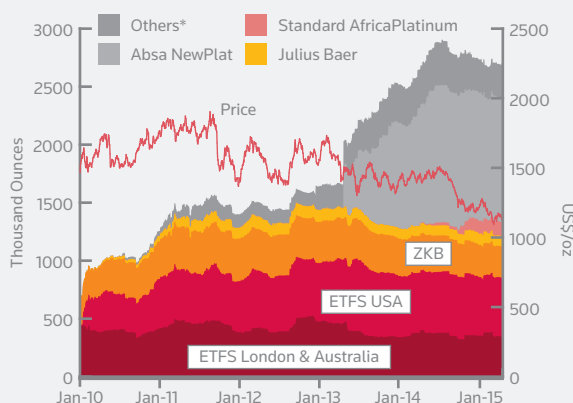
*until 27th April;

**ETF Securities Glitter, WITE, Mitsubishi, Deutsche Bank, iShares ETC, Source, Sprott, Julius Bär, Standard Bank Africa ETFs; Source: Respective issuers

strike that persisted over the same period. Inflows, however, slackened in the second half of the year as the platinum price tumbled from an intra-year high of \$1,512/oz to \$1,178/oz, a five-year low.

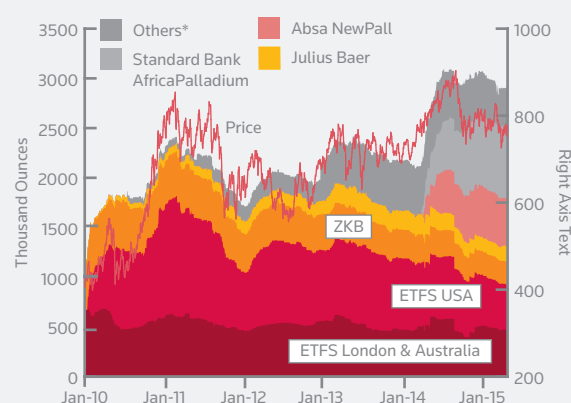
Mirroring palladium ETF holdings, albeit at a smaller magnitude, platinum ETFs saw healthy inflows during the first half of the year while the platinum price was trading in a range of \$1,350-\$1,500/oz. Platinum ETF holdings grew from 2.50 Moz in the beginning of the year to a record high of 2.91 Moz in July, representing a 16% gain. However, some of these holdings were liquidated over the latter half of the year in conjunction with the steep price decline to a five-year-low of \$1,178/oz. Entering 2015, the platinum price continued to trend lower, at times hitting levels below \$1,100/oz. While net ETF liquidations continued, ETF holdings were attempting to stabilise around the 2.7 Moz level, as speculative investors have presumably left the market.

PLATINUM ETF HOLDINGS



Source: GFMS, Thomson Reuters; collated from respective ETF issuers' data
*ETF Securities GLTR, WITE, Mitsubishi, DB Physical Platinum, iShares Physical Platinum ETC, Sprott Physical Platinum Trust

PALLADIUM ETF HOLDINGS



Source: GFMS, Thomson Reuters; collated from respective ETF issuers' data
*ETF Securities GLTR, WITE, Mitsubishi, DB Physical Palladium, iShares Physical Palladium ETC, Absa NewPalladium, Standard Bank AfricaPalladium

COMMODITY EXCHANGES

- *Investor interest in platinum futures on TOCOM grew by just 2% during 2014, as a strong rebound in demand in the third quarter was offset by liquidations in the final months.*
- *In stark contrast to platinum, investors in palladium futures traded on TOCOM in aggregate shifted to become net sellers.*
- *Both metals saw a rebound in investor activity on NYMEX in 2014, with the managed money net long (futures and options) rising by 22% and 28% for platinum and palladium respectively during the year.*
- *Trading volumes on the Shanghai Gold Exchange dropped 28% in 2014, with the average premia slipping slightly to \$74/oz.*

TOCOM

Net investor positions on TOCOM futures are used to analyse investment activity on the exchange. Starting with **platinum**, the net investor long rose by a modest 2% over the course of the year. While this may at first look like an indication of a lack of investor interest, the analysis of intra-year developments reveals that the period between early July and late September saw a rapid increase in investment demand. Net long positions soared by nearly 553,000 ounces (17.2 t) or 216% during that period, to hit a fresh high of over 800,000 ounces (25.2 t) on the 26th September. This was largely driven by bargain-hunting purchases on the dramatic decline in the yen denominated platinum price. Indeed, the local platinum price plunged below ¥4,250/g by mid-October, to the lowest since June 2013, representing a 14% drop since the beginning of July.

This spike in investment demand, however, came to an end as the price rebounded as it recouped a good

portion of the earlier losses towards the end of the year. This triggered a bout of long liquidation in the fourth quarter, which saw net investor positions contract by approximately 325,000 ounces (10.1 t) or 41% within this three-month period. It is worth mentioning that a rapid price recovery was, in turn, driven by a marked depreciation of the yen in the final months of the year as the economy returned to recession, registering negative GDP growth for two consecutive quarters. Moreover, the Bank of Japan's announcement at the end of October of an expansion of its monetary stimulus policy in an attempt to boost economic recovery put further pressure on the Japanese currency.

Turning to **palladium**, investor activity was characterised by heightened volatility over the course of the year. While investors as a whole were net sellers in 2014, there were several bouts of dramatic buy-side interest in the metal, in particular at times when palladium prices in yen terms registered steep declines. For instance, speculative long positions jumped by 70% in the final three weeks of June, after the price dropped by some ¥150/g. Similarly, price declines in early August and September stimulated more waves of bargain purchases. In addition to the price factor, it is important to mention palladium's high sensitivity to changes in investor sentiment towards the global economic outlook. This is due to its innate heavy dependence on industrial demand, which also helps to explain dramatic shifts in investors' behaviour.

NYMEX

CFTC reports on total managed money positions, which include both futures and options, provide a good proxy for investor activity on the exchange. As illustrated on the chart on the next page, the bulk of investment activity in **platinum** was concentrated in the first seven months of the year. While this period was characterised by a

TOCOM PLATINUM FUTURES



Source: TOCOM

TOCOM PALLADIUM FUTURES



Source: TOCOM

NET INVESTOR POSITIONS ON THE TOCOM AND NYMEX

(end-period; positive represents net longs)	Platinum				Palladium			
	H1.13	H2.13	H1.14	H2.14	H1.13	H2.13	H1.14	H2.14
TOCOM Futures Contracts	17,374	28,993	28,374	29,607	648	669	746	-548
- equivalent in ounces (000s)	279	466	456	476	10	11	12	-9
NYMEX Futures Contracts	18,148	14,388	34,387	17,132	18,775	15,237	20,553	19,717
- equivalent in ounces (000s)	907	719	1,719	857	939	762	1,028	986

Source: TOCOM, CFTC

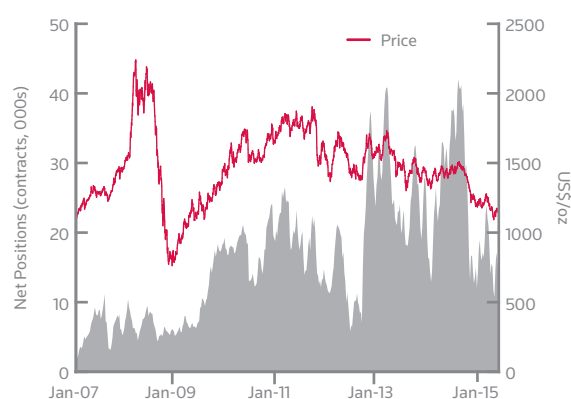
reasonable degree of volatility, there was a clear positive trend, which took net investor long positions to a fresh high of 2.18 Moz (67.9 t) in early July, representing an increase of 1.22 Moz (37.9 t) or 126% since the beginning of the year. Central to this was growing buy-side interest on renewed concerns over supply disruptions in South Africa in light of the labour strike, which lasted for five months and affected all three of the country's major platinum producers. Long speculative positions jumped by 58% during that period, to hit an all-time high of 2.29 Moz (71.2 t).

Improving economic sentiment in the United States, a shift in US monetary policy towards tapering and a sharp dollar appreciation in the second half of the year brought about the end to the earlier upward trend. The net investor long plunged by 1.53 Moz (47.5 t) or 70% since early July to hit the lowest since August 2012 in early November. The move was driven by a sharp rise in speculative short positions, coupled with long liquidation. This was a key driver behind a steep decline in the platinum price, from the year's high of \$1,512/oz on 10th July towards the low for the year of \$1,178/oz on 14th November, which was also the lowest since July 2009. Having said that, additional stimulus measures from the world's other major central banks, along with platinum's discount to gold in the final months of the year, saw the net investor long recover afterwards, closing the year at 0.89 Moz (27.8 t), 22% higher than the end-2013 level.

Similar to platinum, albeit to a lower extent, fresh supply-side fears revolving around the South African mining industry spurred some speculative interest in **palladium** in the first eight months of 2014, particularly during the period between early March and August. Over that period, the managed money net long surged by 42% to hit the highest for the year of 2.38 Moz (73.9 t) at the start of September, the level last visited in November 2013. Moreover, the introduction of economic sanctions against Russia over the escalating Ukraine crisis spurred concerns about Russian supplies of palladium, further encouraging some speculative interest. The price strongly rebounded over that period, climbing from \$702/oz at the beginning of February towards \$911/oz in early September, the highest level in more than a decade.

However, as the price rally was largely driven by speculative activity, it is not surprising that profit taking took place after the rally ran out of steam, particularly in light of easing supply-side concerns, the announcement of the Fed's QE tapering and the news over the slowing economic activity in emerging markets. This prompted some long liquidation, with speculative long positions falling by 17% since the September high. It is worth emphasising, though, that despite year-end profit taking the net long at end-2014 was up 28% year-on-year. This was due to a steep 28% decline in speculative short positions over the September-December period, which helped to offset the impact of long selling.

NYMEX: PLATINUM TOTAL MANAGED MONEY NET POSITIONS



Source: CFTC, Thomson Reuters

NYMEX: PALLADIUM TOTAL MANAGED MONEY NET POSITIONS



Source: CFTC, Thomson Reuters

SHANGHAI GOLD EXCHANGE

The Shanghai Gold Exchange (SGE) remained the only official source of VAT-free platinum in China in 2014. Information received from members of the SGE that are involved in platinum trading, along with our own field research, confirms that the overwhelming majority of the trading on the SGE is related to the sourcing of metal for industrial and jewellery fabrication.

Total volume on the SGE declined by 28% to 1.04 Moz (32.4 t) last year. The decrease was mostly driven by weaker demand from the jewellery, glass and petroleum sectors as the softer domestic economy weighed heavily on offtake. The closed nature of the Chinese platinum bullion market generally leads to a differential between the SGE and the international price. Using this benchmark, the SGE premium declined slightly to an annual average of \$74/oz in 2014, compared to \$78/oz in the previous year.

RETAIL INVESTMENT

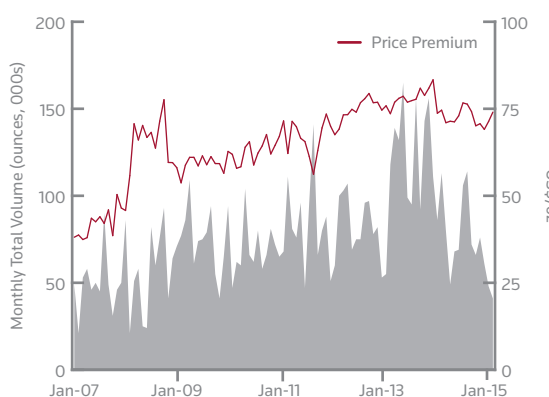
The vast majority of investment in physical platinum and palladium bullion products has historically been concentrated in two countries, namely Japan and the United States. Looking at Japan first, physical investment for platinum is estimated at 55,000 ounces (1.7 t) in 2014, a 31% increase on the previous year's figure. Japan is currently the world's largest retail market for platinum investment, accounting for nearly 40% of the total. Investment demand held firm as the platinum price denominated in yen terms managed to stay around the ¥4,500/g level despite having slumped to a five-year-low in dollar terms, providing a compelling case for investors to invest. Furthermore, the VAT hike in April encouraged some investors to front load their purchases.

In North America, platinum retail investment declined by 14% year-on-year to an estimated 47,000 ounces (1.5 t). Investment demand for platinum has waned considerably since 2012 as the price has not performed well, leading to disenfranchisement amongst speculators. Some investors have in fact switched their exposure from platinum to palladium, as evident in an increase in palladium retail investment by 16% year-on-year in 2014, fuelled by the metal's attractive supply/demand fundamentals and higher price expectations. The platinum price premium over palladium narrowed considerably from over \$700/oz to under \$400/oz over 2014. While the US Mint had re-introduced the platinum bullion coin programme last year, sales dwindled towards the year-end in response to platinum's dismal price performance.

Physical investment in Europe remained subdued in 2014. This is largely because purchases of platinum and palladium bullion continue to be impeded by Value Added Tax (VAT) being levied on sales of bars and coins; investment in the region is therefore mainly in the form of VAT-exempt metal accounts. In China, purchases of PGM bullion products remained limited last year, due to still low awareness among the general public of PGMs as alternative investment vehicles, coupled with these bullion products' high premia at the retail level.

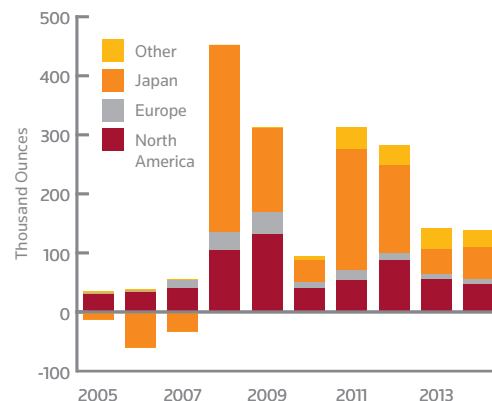
In the coin sector, platinum coin sales grew by 34% year-on-year to 29,480 ounces (0.9 t) in 2014; much of this growth was on the back of the US Mint's relaunch of the platinum Eagle programme. The US Mint resumed selling its American Eagle Platinum bullion coins in March after a four year hiatus in the market, in response to renewed interest from investors. A total of 16,700 ounces (0.5 t) of Eagle Platinum coins were sold in 2014. Excluding the US Mint, sales of platinum coins from other bullion mints declined by 42%.

SGE PLATINUM MONTHLY VOLUME & PRICE PREMIUM



Source: GFMS, Thomson Reuters; SGE

PLATINUM RETAIL INVESTMENT



Source: GFMS, Thomson Reuters

4. SUPPLY

- **Global refined platinum mine production was driven to a greater than 15-year low of 4.70 Moz (146.1 t) in 2014, overwhelmingly due to precipitous drop in strike-affected South African production.**
- **Palladium output was also pulled down to a 12-year low of 6.04 Moz (187.8 t) due to the events in South Africa, with more modest drops in Canada and Botswana.**
- **Total Cash Costs expressed in dollars increased by 3% in 2014, to \$1,209/platinum equivalent ounce (PtEqoz), while All-in Costs rose by 2% year-on-year, to reach \$1,661/PtEqoz.**
- **A sharply weaker South African rand and higher palladium prices helped offset sharp cost escalation in South Africa when denominated in dollars.**

MINE PRODUCTION

SOUTH AFRICA

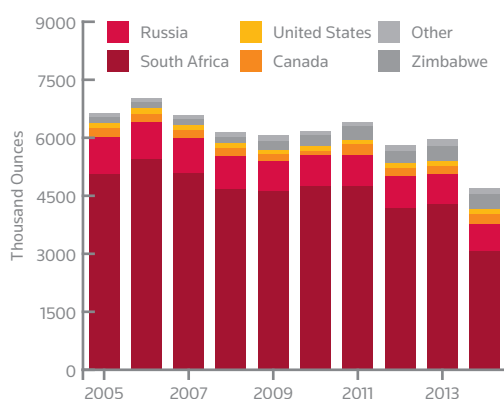
South Africa was overwhelmingly responsible for the global contraction of supply for platinum and palladium, with local output falling by 1.22 Moz (38.1 t) in the case of platinum and 0.48 Moz (14.9 t) for palladium in 2014, respective drops of 29% and 20%. The less severe decline for palladium resulted from two main factors; firstly from a temporary shift in the origins of mined ore last year (increased tonnage with relatively higher palladium content) but also from refining pipeline effects, with the refining lead time of each PGM being different. The stand-out theme that dwarfed other dynamics in the mining sector for PGMs last year was the strike championed by the Association of Mineworkers and

Construction Union (AMCU), which hit Amplats', Implats' and Lonmin's mines on the Western Bushveld. The mines impacted by this industrial action were the conventionally stoped (in some cases hybrid) mines including two of Amplats' three Rustenburg units, Union Section and the two Amandelbult mines, Impala's Lease Area mines and Lonmin's Marikana, all of which, as is to be expected, recorded substantial decreases in production last year.

Settlement was reached on 24th June 2014 and then began the procedure to safely re-start production. This entailed ensuring that staff (many of whom are migrant workers) were back in Rustenburg, and extensive checks to evaluate stopes and ensure that working areas were safe for production to be re-started. Another issue was malnourishment and the general health of the workforce, following the extended strike period during which time the 'no work, no pay' principle was enforced. It is worth pointing out that relative to the strike events of 2012, production after this strike actually ramped up relatively quickly. This was made possible thanks to a number of factors. Firstly, with the impending strike well telegraphed, the mines were able to ensure a robust support regime in the stopes. Secondly, although AMCU has become the dominant union, the remainder of the workforce were not on strike; although production activities were not taking place staff were deployed to undertake underground maintenance and development activities. Thirdly, following the strike and five months without pay, the workforce was amenable to overtime where offered by some mines.

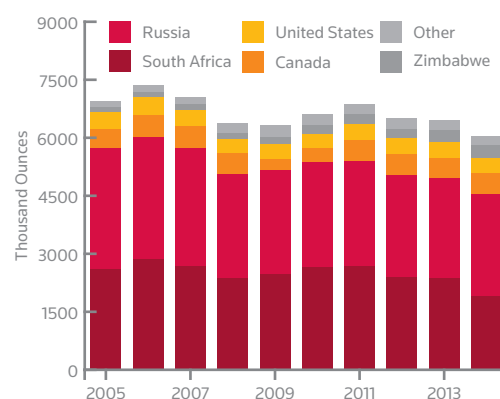
The GFMS team estimates that the cumulative impact on platinum production over the period of the strike amounted to 1.36 Moz (42.1 t), of which 1.05 Moz (32.6 t)

WORLD PLATINUM MINE PRODUCTION



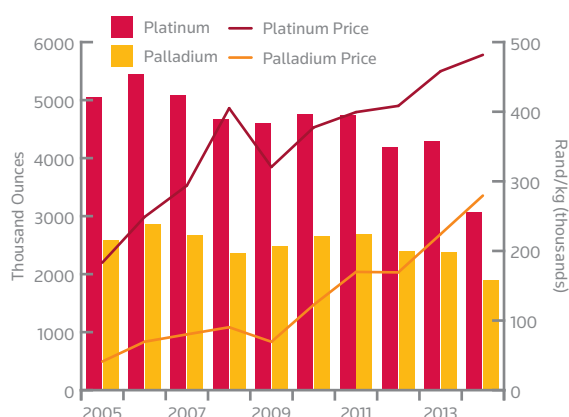
Source: GFMS, Thomson Reuters

WORLD PALLADIUM MINE PRODUCTION



Source: GFMS, Thomson Reuters

SOUTH AFRICAN MINE PRODUCTION



Source: GFMS, Thomson Reuters

arose from direct losses and 0.31 Moz (9.5 t) from shortfalls as the mines ramped back up to normal production rates. Stripping out this exceptional occurrence, production from the remaining portion of the South African industry actually recorded a modest increase last year.

At the corporate level, Amplats reported group refined production of platinum of 1.89 Moz (58.8 t) and palladium of 1.23 Moz (38.1 t). Excepting the strike affected mines, Mogalakwena was the stand-out change last year, as production continued to increase. Including ore trucked to a third party concentrator, the mine's platinum production increased 10% to 0.37 Moz (11.5 t). During the year the company announced a decision to cease production from its unprofitable south declines at Union. Amplats reported that stripping out the impact of the AMCU strike at its Western Limb operations, and adjusting for the shafts that were placed on care and maintenance, the shafts collectively performed more strongly in 2014. One factor that will have influenced this was a conscious strategy to allow labour attrition at the Amandelbult shafts in 2013 that was implemented to compensate planned headcount reductions arising from the restructuring at Rustenburg.

Lonmin, meanwhile, recorded a production drop of 39% and 35% for platinum and palladium respectively, with sharp drops closely tied to the performance of Marikana, which although strike impacted, performed well in its rate of production re-start. At Implats' South African operations, the Impala Lease Area reported platinum and palladium production to have fallen more severely, by 63% for both metals. Here the post-strike ramp-up was more drawn out, and the mine's output further suffered from a Section 54 closure during that phase. Elsewhere, Implats' Marula mine incurred a marginal drop last year.

Looking at the mid-tier producers, Northam posted strong gains, thanks to a full year of operations at its Eastern Bushveld project, Booyssendal. Having commenced concentrate production in the second half of 2013, the mine continues to ramp up and is expected to hit steady state operations in 2015. At the established Zondereinde operation, production gained modestly from the depressed (strike impacted) levels in 2013, though with intermittent industrial action, output still remained below the mine's 2011-12 levels.

Atlatsa's Bokoni, meanwhile, also delivered gains with reported metal-in-concentrate 14% higher, in large part thanks to the addition of Merensky ore from the Klipfontein open pit to its underground feeds. Royal Bafokeng Platinum's BRPM and Aquarius' Kroondal also delivered fractionally improved volumes.

Tailings retreatment and by-product operations provided a meaningful boost to production in 2014, notably chrome producer Tharisa Minerals which ramped up throughput from its Voyager plant. PGM recoveries also benefited from the commissioning of a high energy flotation circuit. Sylvania Platinum's dumps operations, SDO, also recorded gains, courtesy of higher grades of PGMs in the plant feeds at Millsell and Lannex plants. Some offset came from Amplats' WLTR facility, where output of platinum in concentrate production dropped by 15% on the back of both lower grades and throughput.

WORLD PLATINUM MINE PRODUCTION

(000 ounces)	2012	2013	2014	Change
South Africa	4,188	4,285	3,062	-29%
Russia	804	765	717	-6%
Zimbabwe	335	409	398	-3%
Canada	220	217	247	14%
United States	118	120	119	-1%
Others	138	156	155	-1%
World Total	5,803	5,952	4,697	-21%

Source: GFMS, Thomson Reuters

WORLD PALLADIUM MINE PRODUCTION

(000 ounces)	2012	2013	2014	Change
Russia	2,627	2,580	2,660	3%
South Africa	2,397	2,371	1,892	-20%
Canada	557	530	520	-2%
United States	396	404	400	-1%
Zimbabwe	256	314	325	3%
Others	271	260	243	-7%
World Total	6,504	6,460	6,039	-7%

Source: GFMS, Thomson Reuters

RESTRUCTURING IN THE PGM MINING SECTOR

After months of depressed dollar pricing, coupled with persistent cost escalation, the platinum sector as a whole remains in an unhealthy state. Completed transactions to-date have been sparse, but a number of large potential deals are in the pipeline.

Strategic reviews have led to a number of major replacement projects being mothballed and have propagated ongoing speculation around possible asset sales or closures. The pool of potential sellers is plentiful, would-be buyers less so. Producers have been looking to rationalise portfolios featuring assets that are either in decline, having struggled to justify large-scale capital injections to the Board, or projects whose ramp-ups have been challenged by lower than expected labour productivity.

Impairments, a major feature of the gold sector over the past 18 months, have been fewer in number in platinum both on absolute and relative bases, in part thanks to less transactional activity taking place towards the top of the market, as was the case in the gold sector, which then necessitated large-scale carrying value write-downs.

Last year experienced very limited M&A and so far in 2015 completed transactions have been limited, but appear to be showing signs of picking up: activity includes Aquarius Platinum's recent sale of its mothballed Everest Mine and its surface infrastructure (including a UG2 concentrator plant with nominal 250ktpm capacity) to Northam for R400 million (approximately USD 33 million) and the associated new order mining right for a further R50 million (USD 4 million). With Aquarius in need of cash and Northam seeking long term options for its adjacent Booyseendal mine, this outcome appears entirely logical for both parties. This followed on from a landmark BEE transaction orchestrated by Northam through the issuance of 22% of new share capital to a special purpose vehicle named Zambezi Platinum, representing a consortium of historically disadvantaged South African groups, underwritten by the Public Investment Corporation and Coronation.

Glencore plc announced in February that pending a shareholder vote on 7th May it planned to divest its minority 24% holding in Lonmin plc, which would take place by way of a distribution in specie to Glencore shareholders. Adjoining Lonmin's Marikana to the east, Crocodile River Mine's (CRM's) owner, Toronto-listed

Eastplats announced the planned sale of its entire South African business to Hebei Zhongbo Platinum Co. Limited in November for a gross consideration of US\$225 million, which in addition to CRM, currently on care & maintenance, includes a suite of exploration and development assets on the Eastern Limb.

Many possible transactions opportunities are still in the process of being scoped. One of the likely major deals for which the market has been watching for over a year now, but whose details have yet to be announced, relates to Amplats' Rustenburg and Union Sections. The company has guided that a decision will be reached by mid-2015 on whether these units are to be spun out to a newly listed entity, or as an asset sale. Meanwhile Implats announced that following a strategic review it would be amenable to sell its majority-owned Marula mine.

On the other side of the Atlantic, in mid-April 2015 North American Palladium (NAP) announced that it is in discussions with its senior lender, Brookfield Capital Partners, regarding a potential recapitalisation transaction that would see Brookfield's debt (initially arranged as a US\$130 million refinancing in 2013 carrying a coupon of 15%) converted to equity, amounting to 92% of issued share capital. NAP has until the end of Q2-2015 to identify a superior proposal for its shareholders. It is worth noting that we would not expect this possible corporate restructuring to impact production volumes from Lac des Iles.

A quandary facing the producers that look to offload mines is the extent to which the platinum market that they have sought to cultivate would adversely respond in the event that sold assets could be aggressively ramped-up by a new, leaner owner, to deliver substantial production increases in the short- to medium-term. This was achieved with some success over the past two years in the South African gold industry by Sibanye. The dilemma remains as to whether vendors will be better off releasing non-core assets for cash if they have the potential to deliver growth under new management, thereby potentially undermining the market's fundamentals and by implication, therefore, other parts of a vendor's portfolio. Our perception at this stage is that a new listing may be the preferred route for major asset sales at this stage in the market cycle. Either way, it seems likely that after several years of relatively static asset ownership the next twelve months will see meaningful change in an industry that is ripe for restructuring.

2014 INDUSTRIAL ACTION IN SOUTH AFRICA: LONG TERM IMPLICATIONS?

The platinum mining strike initiated by the Association of Mineworkers & Construction Union (AMCU) on 23rd January 2014 lasted 22 weeks, ceasing ore production from what could be considered the 'engine room' of the platinum industry; the Western Limb of the Bushveld Complex. Resolution was reached with three-year wage agreements (part of which being retrospective) signed on 24th June; workers began to return from 25th June. Amplats and Lonmin succeeded in ramping production up through the third quarter, while at Impala the process was more drawn out.

Based on producer estimates the inactivity led to a loss of R35 billion from the South African economy, in the form of foregone wages and lost mining revenue. The team at GFMS puts the estimate of platinum production lost from a combination of direct strike action and then shortfalls during protracted ramp-ups at 1.36 Moz (42.1 t), with palladium output loss of 0.64 Moz (20.0 t). The chart below expresses the percentage of South African platinum production capacity offline over the strike period, relative to previous strike action.

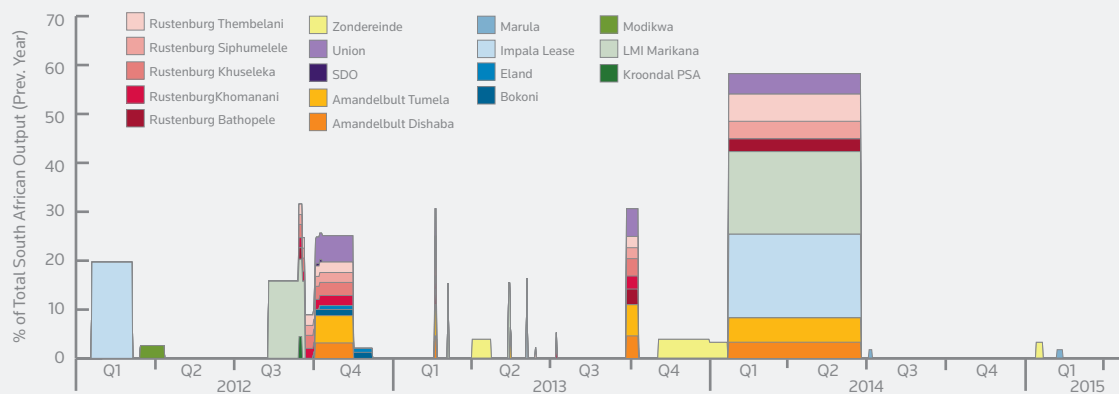
One of the most regrettable aspects of this unrest is that it will in our opinion serve to accelerate what now seems an inevitable reduction of employment across the sector over time. It is perverse that the trade union mandated to improve the working conditions of its members has become the architect of a situation that may well see tens of thousands of its current member base retrenched in the coming years: the final wage settlements will continue to drive aggressive rand-based cost escalation and necessitate either higher metal prices and/or a retirement of loss-making mining assets. We expect that the costly salary agreements and increased labour militancy will ultimately contribute to stifle the approval of new mines whose design and extraction depends on 'conventional' labour-intensive mining configurations using handheld equipment.

These are common on the narrow, sometimes 'rolling' reef deposits on the Western Limb, whose ore production has been the mainstay of global platinum through much of the 20th century.

Ultimately, it seems likely that over time underground platinum ore will increasingly be mined using trackless equipment in bord & pillar configurations or bulk methods. It is hard to envisage conventionally configured projects gaining Board approval in future; new projects not amenable to mechanisation from the outset stand a much higher likelihood of being passed over. Mechanisation is the norm on the wider Great Dyke reef in Zimbabwe and for much of the UG2 mining on the Eastern Limb. This more technically demanding work requires extensive training and commands considerably higher salaries than is the case for entry-level conventional mineworkers. As such it would render the much-vaunted R12,500 per month basic salary a moot demand and indeed this may partly explain the AMCU's lower representation rate at many mechanised mines. It should be noted that mining productivity at these operations is commonly 3-4 times higher and staffing levels concomitantly lower.

As the economy continues to mature, this trend of productivity improvement and up-skilling of the workforce is clearly a positive direction in which to move. But progress in this area alone will not be without much broader challenges. A lack of existing skills could mean that some of these jobs may need to be filled by expatriate labour; an initiative that proved a challenge and attracted some media attention at Booyssendal last year. New investments may therefore be welcomed by the government, but this will ultimately represent replacement, rather than expansion of capacity, and associated mine closures will certainly face challenges. Platinum mining currently employs close to 200,000 people in South Africa, where the official unemployment rate stands at around 25%; other aspects of the economy will need to be well positioned to take up the slack as this evolution plays out over the coming decade.

SOUTH AFRICAN STRIKE ACTIVITY 2012-2015



TOP 10 PLATINUM PRODUCING COMPANIES

Rank	2013	2014	Company	Output (000 ounces)	
				2013	2014
1	1		Anglo American Platinum Ltd. ¹	1,773	1,324
2	2		Impala Platinum Holdings Ltd. ²	1,122	660
4	3		OJSC MMC Norilsk Nickel	651	657
3	4		Lonmin plc. ³	722	454
8	5		Northam Platinum Ltd. ⁴	167	195
5	6		Aquarius Platinum Ltd.	187	188
6	7		Royal Bafokeng Platinum Ltd. ⁵	179	183
9	8		Vale S.A. ⁶	145	182
7	9		ARM Platinum	177	162
10	10		Glencore plc. ⁷	145	140

¹ Refined production from mining operations² Attributable mine production including Zimplats³ Calendar year refined sales ⁴ Estimated saleable metal in concentrate⁵ Estimated metal in concentrate ⁶ Including custom feeds ⁷ Estimate

TOP 10 PALLADIUM PRODUCING COMPANIES

Rank	2013	2014	Company	Output (000 ounces)	
				2013	2014
1	1		OJSC MMC Norilsk Nickel	2,661	2,749
2	2		Anglo American Platinum Ltd. ¹	1,056	921
3	3		Impala Platinum Holdings Ltd. ²	656	441
4	4		Stillwater Mining Co.	404	400
5	5		Vale S.A. ⁷	352	398
6	6		Lonmin plc. ³	317	232
9	7		North American Palladium Ltd.	135	174
7	8		ARM Platinum	161	148
10	9		Aquarius Platinum Ltd.	111	113
11	10		Northam Platinum Ltd. ⁴	87	102

Source: GFMS, Thomson Reuters

RUSSIA

Russian platinum output fell by 48,000 ounces (1.5 t) or 6% last year, falling to 0.72 Moz (22.3 t). This represented a third consecutive year of decline for the number two global producer. Russian production of platinum and palladium is mainly as a co product of Norilsk Nickel's base metals mining operations on the Taimyr and Kola Peninsulas and, as such, the Russian trend usually reflects Norilsk's PGM production. In 2014, however, with platinum production from Norilsk's Russian operations effectively flat (only falling by 6,000 ounces), the decline was primarily attributable to the alluvial sector. Russian Platinum, the largest player, which produces from the Kondyor operation in Khabarovsk, registered a contraction in alluvial production of 43,000 ounces (1.3 t). The company encountered delays with mining equipment delivery, which led to production disruptions. The company is expecting to restore platinum production to normal levels in 2015. We estimate that the relatively modest Koryakgeoldobycha alluvial operations in Kamchatka also recorded a slight drop last year.

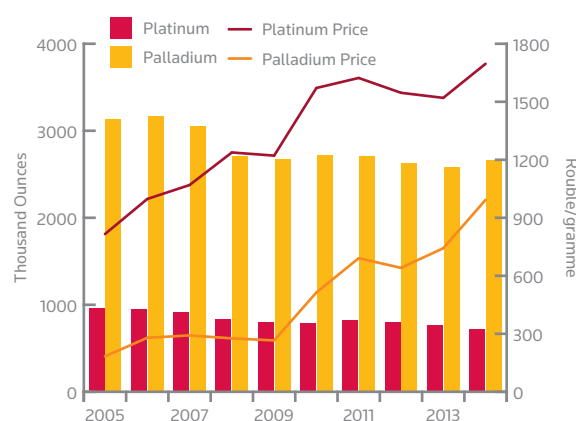
Turning to palladium, Russian output grew by 3% in 2014, to 2.66 Moz (82.7 t). Having previously issued guidance of a decrease in palladium output, Norilsk Nickel reported an increase in production of 60,000 ounces (1.9 t), exceeding guidance, primarily due to the release of in-process inventory as the company continues a long-term modernisation of its process facilities. The rebound in palladium output is expected to be temporary, however, with company guidance for 2015 indicating slight falls in both platinum and palladium production.

In December 2014 Norilsk was granted an extension of the exploration license for the Maslovskoye platinum-copper-nickel deposit in Krasnoyarsk. C1+C2 Russian classification reserves are estimated at 32.26 Moz (1,003 t) of palladium and 12.48 Moz (388 t) of platinum.

CANADA

Canadian output of PGMs showed a divergent trend last year, with platinum output rising by 30,000 ounces (0.9 t) while palladium dropped marginally. Vale reported an increase to total PGM production, including custom feeds, of 37,000 ounces (1.2 t) of platinum and 46,000 ounces (1.4 t) of palladium. Excluding toll refining, we calculate that attributable mined production of platinum grew by a more modest 32,000 ounces (1.0 t) of platinum, while palladium production fell, by 26,000 ounces (0.8 t). We ascribe much of the gain in platinum production to the continued ramp up of operations at the comparatively PGM-rich Totten shaft,

RUSSIAN MINE PRODUCTION



Source: GFMS, Thomson Reuters

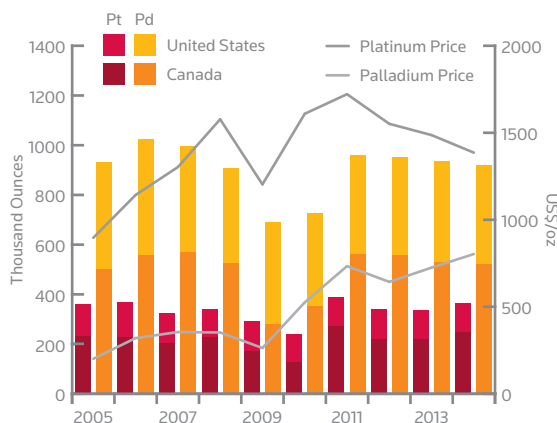
re-opened late in 2012, despite planned and unplanned mill downtime in Sudbury throughout the year. We estimate that platinum and palladium output from Glencore's assets in Sudbury, Ontario and Raglan, Quebec, contracted modestly in 2014, while PGM output at KGHM International's Morrison mine fell marginally due to increased seismic activity restricting access to some mining areas.

Looking at Canada's sole primary palladium mine, Lac des Iles, production showed a robust 29% increase in payable palladium production, thanks to a rise in mining and processing rates from the recently developed Offset Zone, where production transitioned to shaft-hoisting from previous ore transit via the decline. Furthermore, the plant, which has ample capacity relative to underground tonnage hoisted, processed lower grade surface stockpiles in addition to underground run-of-mine ore in the latter months of 2014.

UNITED STATES

Production in the **United States** was relatively steady last year, recording a decrease of 1% for both platinum and palladium. The overwhelming majority of output comes from Stillwater's two mining units in Montana, the Stillwater and East Boulder mines. A decision was made to cease production from some higher-cost stoping areas at Stillwater, leading to a drop of 7% for platinum and palladium. In addition, Stillwater's operations benefited from an inventory release in 2013 in the form of the processing of old furnace bricks (into which metals had become associated) following a smelter rebuild, which was not repeated in 2014. East Boulder recorded gains, particularly for palladium which increased by 12%, in part thanks to the onset of first production from the new Graham Creek workings, and improvements in underground productivity.

NORTH AMERICAN MINE PRODUCTION



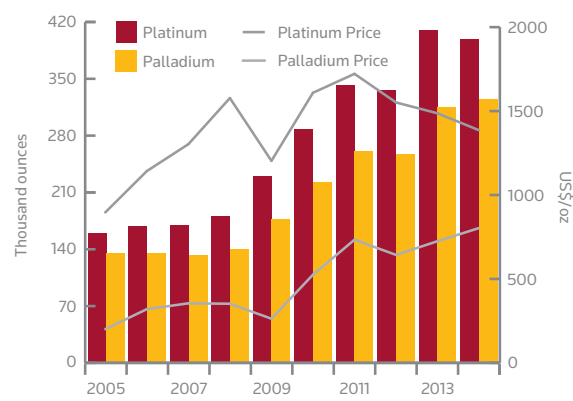
Source: GFMS, Thomson Reuters

Aside from Stillwater's operations, modest volumes of platinum and palladium came from the start-up of Lundin Mining's Eagle Ni-Cu mine in Michigan. We estimate that the mine, which was brought online in September 2014 having been largely developed by Rio Tinto and sold in July 2013, produced a couple of thousand ounces of combined PGM in its first partial year of operations.

ZIMBABWE

Platinum production in **Zimbabwe** fell by 3% last year, to total 0.40 Moz (12.4 t), while palladium output was more robust, growing by 10,000 ounces (0.3 t). A large proportion of the fall in platinum came from Ngezi. Mining rates early in the year were hit as efforts were focused on rehabilitating poor ground conditions at Bimha portal around the Mutambara shear zone, leading to a shortfall in run-of-mine feeds at a time when ore stocks were also low. While the ramp up of output from the Mupfuti portal began to mitigate mining shortfalls, Ngezi suffered a setback in the third quarter, where following a major fall of ground incident at the Mutambara shear, mining activities at Bimha were suspended, with knock on effects on mined and processed tonnage. In the fourth quarter concentrate stockpiled earlier in the year was called upon to replace smelter feed, with the result that for the full-year, ore mined rose by 7% and ore milled fell by 1%. With changes to the planned mining height enacted during 2014, which resulted in an overall reduction of 4E grades, platinum in matte output fell by 6% year-on-year. However, as the additional ore areas mined contained a higher concentration of palladium than platinum, the fall in overall grade was concentrated in platinum. Consequently, palladium production fell by a more modest 1%.

ZIMBABWEAN MINE PRODUCTION



Source: GFMS, Thomson Reuters

Elsewhere, Unki also saw a drop, with refined platinum output falling by 7,000 ounces (0.2 t) and palladium output flat. Partially limiting the losses, Mimosa saw a positive result for both platinum and palladium production, with production growth of 6,000 ounces (0.2 t) for both metals, and record PGM production in the fourth quarter of 2014 due to a 4% increase in throughput over calendar 2014.

Discussions continue between the Zimbabwean platinum producers and the government regarding indigenisation issues and new proposed production taxes. A finance bill published in early January this year proposed that a 15% tax on unrefined platinum exports be made effective as of 1st January 2015. Previously, in Zimbabwe's December 2014 Budget, the levy was proposed to be deferred until 2017.

OTHER COUNTRIES

Limited volumes of PGMs are recovered on a widespread basis from large-scale copper and nickel processing, but production remains concentrated in the five main countries of South Africa, Russia, Canada, the United States and Zimbabwe, which together amount to 97% of platinum and 96% of global palladium supply. Among the group of 'other countries', platinum production was flat year on year. Output at the Kevitsa open pit in **Finland** continued to grow, albeit having slowed from 2013, with an additional 3,687 ounces year on year, due to a 6% increase in throughput. Countering this growth, platinum production from Tati Nickel in **Botswana** fell by 3,000 ounces. In **Colombia**, a significant alluvial producer, we estimate that production was unchanged year on year.

For palladium, output at the country level followed the same trend, with a slight rise in palladium from Kevitsa in Finland overtaken by a 20,000 ounce drop in palladium output from Tati Nickel in Botswana. Among the other producers, we estimate production to have remained flat year on year in China.

PRODUCER HEDGING

Hedging of platinum and palladium by producers remained inconsequential last year, and the practice of hedging platinum and palladium over extended tenures by mining companies is limited. While quotational period price hedging is commonly used, this activity has little effect on the market when measured from one year to the next. Although we have raised our estimate of above ground stocks of platinum, we retain the opinion that

market liquidity is such that a major producer looking to use the forward market to hedge in quantity would be plain to see by dealers across the market, which would likely compromise access to attractive forward pricing. In an operational environment where PGM producers, primarily in South Africa, find their profitability still under severe pressure at prevailing prices, the platinum mining industry remains in a precarious position. In such circumstances, even if management and shareholders were more amenable to the practice of hedging, the prospect of locking in arrangements such as vanilla options or forwards (with pricing formulae derived from the current spot price) does not seem likely to us. It is worthy of note, however, that in January 2014 Norilsk Nickel announced a long term supply agreement with BASF to provide platinum and palladium, involving a pre-paid component.

PRODUCTION COSTS

- *Global average Total Cash Costs expressed in dollars increased by 3% in 2014, to \$1,209/platinum equivalent ounce (PtEqoz).*
- *Increasing costs in South Africa were the dominant effect on the global average, with labour cost inflation the most significant upward pressure on the Total Cash Cost.*
- *Depreciation of producers' currencies against the US dollar dramatically mitigated cost escalation.*
- *Global All-in Costs, which include all cash and non-cash costs, sustaining capital expenditures, indirect costs and overheads, increased by 2% year-on-year, to reach \$1,661/oz.*

Global Total Cash Costs expressed in US dollars increased by 3% in 2014, to \$1,209/oz. Average global costs are heavily influenced by the South African platinum industry, as in 2014 the country was responsible for 78% of costed mine production (on a platinum-equivalent basis). South African producers faced strong headwinds in 2014, from the detrimental effects of the five-month labour strike during the first half of the year, as well as the persistence of above-CPI wage inflation, and these were the dominant influences on the global Total Cash Cost last year. These factors combined to result in steepening of both the Total Cash Cost and the All-in Cost curves, which may be interpreted as indicating that, while the lower-cost operations succeeded in containing costs, those operations at the upper end of the cost curves (many of which were the strike-impacted mines) saw aggressive increases. This was despite fewer impairments being charged than in 2013, and the removal of Crocodile River and Rustenburg Khomanani,

both of which were at the upper end of the All-in Cost curve (and closed) in 2013.

As seen elsewhere in the mining industry, cost containment and disciplined capital spending were recurring themes. Furthermore, the ongoing restructuring of Amplats' operations is an example of the portfolio rationalisation that is currently prevalent in the precious metals mining sphere. Another important influence during 2014 was continued weakening of platinum producers' currencies against the dollar, to the general benefit of miners with operations in South Africa, Zimbabwe, Russia and Canada. However, these factors only partially mitigated the negative effects of events in the South African platinum industry.

With reduced volumes and lofty wage settlements in the range of 8-10%, South African producers saw Total Cash Costs increase by 5% to \$1,272/PtEqoz, which was only partially offset by the dramatic 13% year-on-year weakening of the rand against the dollar. Strike-impacted operations were amongst those to experience deteriorations in their production costs. Lonmin reported a 47% increase in its rand/oz cost of production at Marikana, where 391koz of output were lost due to the strike. Production from Amplats' strike-affected operations was collectively down by 48% year-on-year, with costs substantially higher as a result. Amplats reported year-on-year increases in the cash operating cost per refined Pt ounce of 54% for Thembelani, 43% for Siphumelele and 37% for Tumela.

Zimbabwe also saw cost inflation in 2014, with the Total Cash Cost on a platinum-equivalent basis increasing by

TOTAL CASH COSTS PER EQUIVALENT OUNCE (US\$)

	2013	2014	Change
North America	1,003	939	-6%
South Africa	1,212	1,272	5%
Zimbabwe	943	1,008	7%
World*	1,172	1,209	3%

*Excluding Norilsk Nickel

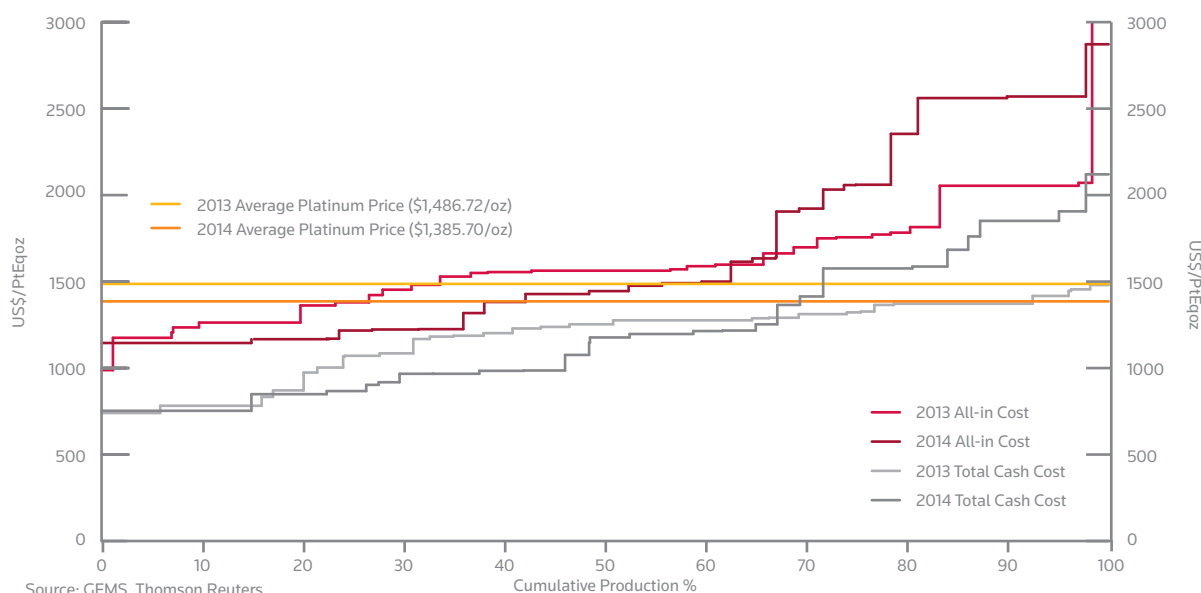
Source: GFMS, Thomson Reuters

7% year-on-year, to \$1,008/PtEqoz. This was largely driven by cost increases at Ngezi, where production was lost following the precautionary closure of the Bimha mine, as a consequence of an underground collapse in August 2014. Unit costs also rose year-on-year at Unki, where production was down on lower processed grade.

North American producers saw a reduction in their Total Cash Costs to \$939/PtEqoz, a 6% year-on-year decrease. However, as only 8% of global supply came from the North American region during 2014, this downtrend had little impact on the global average Total Cash Cost. Looking at Total Cash Costs plus sustaining capex, there was a 9% year-on-year fall in costs for North American producers. Despite revenue also decreasing, by 7% year-on-year, North American producers saw a 6% increase in their average margin, to \$253/PtEqoz in 2014.

This analysis excludes Norilsk Nickel, which produces large quantities of platinum and palladium as co-products of its nickel-copper mining activities in Russia. This exclusion is undertaken in order to avoid distortion to the cost statistics. Were Norilsk's Russian assets to be included in the analysis they would have the effect of dragging the global average lower by 26%.

WORLD PLATINUM EQUIVALENT TOTAL CASH COST AND ALL-IN COST CURVES



YEAR-ON-YEAR COST CHANGES

Based on detailed mine-by-mine analysis in Thomson Reuters' PGM Mine Economics Service, estimates of the main cost drivers of mine production can be isolated and quantified, in the form of a year-on-year variance analysis. These are presented here on a \$/PtEqoz basis, and reflect platinum equivalent production of recoverable metal in concentrate for our global population of primary PGM mines.

The first step in this process is to quantify and strip out the effects of **exchange rate** changes, by calculating the extent to which mine site costs would have changed from one year to the next in dollar terms, were exchange rates the only driving factor. As discussed earlier, local currencies continued to depreciate against the rand during 2014, and this effect contributed an average downward pressure on costs of \$135/oz. Exchange rates were the most significant factor driving the trend in costs during 2014, as they were in 2013. Given South Africa's dominance of global PGM platinum production, the global average Total Cash Cost is particularly sensitive to movements in the rand, which depreciated by 13% against the dollar year-on-year.

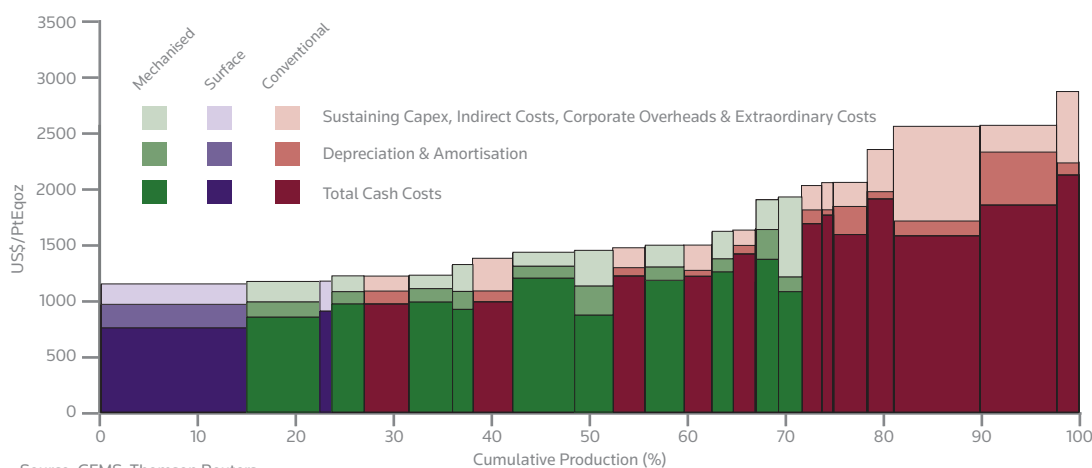
Once again, **labour** costs were the primary source of upward pressure on the year-on-year cost trend, increasing cash costs by an average of \$48/PtEqoz. Although labour costs in absolute terms were lower during 2014 due to the prolonged labour strike, which took place under "no work, no pay" principles, production was also significantly lower, thus leading to an increase in dollar per ounce terms. Furthermore, the eventual end of the strike came through Lonmin, Implats and Anglo American Platinum signing a three-year wage agreement with the AMCU. This agreement, backdated

to 1st July 2013, involves annual wage increases of 7.5-8% (and greater for those earning below R12,500/month). Inevitably, producers are making efforts to reduce headcount where possible, with Aquarius undertaking voluntary retrenchments at Mimosa during 2014, and Amplats continuing to cut employee numbers as part of the restructuring programme commenced in 2013.

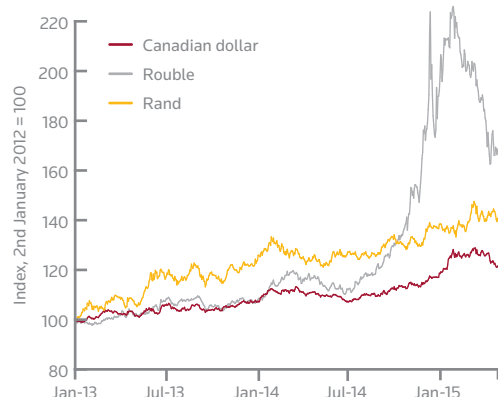
The **miscellaneous** category includes a number of factors that cannot be satisfactorily disaggregated through the variance analysis. These include metal production volumes and prices, as well as specific consumables and maintenance costs, including some of the costs associated with maintaining plant and equipment during strikes. Last year, this category amounted to \$48/PtEqoz of upward pressure on costs. Co-product price trends were varied in 2014, with palladium and rhodium seeing average year-on-year increases of 11% and 10% respectively, while the average price of ruthenium fell by 13%. There was also a mixed performance from the base metal co-products, with the copper price decreasing by 6%, whereas nickel and cobalt increased by 12% and 9% respectively. On balance, the increases in the average prices of palladium and nickel supported producer costs, given the relative importance of these co-product metals. to the producer baskets. However, countering this was the negative effect of lower production volumes as significant quantities of supply were lost from strike-affected operations.

As with other aspects of their operations, producers are attempting to reduce maintenance and consumables costs through improved efficiency. Amplats, for example, is now replacing steel waffle coolers with graphite equivalents during furnace rebuilds, which shortens the rebuild time, costs less and extends the life of use.

2014 PLATINUM EQUIVALENT ALL-IN COST CURVE



US\$ AGAINST PGM PRODUCERS' CURRENCIES



Source: Thomson Reuters

The costs of **smelting and refining** added an average of \$45/PtEqoz to producer cash costs during 2014, which in part reflects the relatively high fixed cost component of smelting and refining. For example, Lonmin continued to run its smelters through the strike in order to aid swift ramp-up to normal operation post-resolution. Consequently, unit costs were significantly higher in 2014. At Amplats' operations, higher output from Mogalakwena, which mines the Ni-Cu-rich Platreef, was cited as being influential in a 12% year-on-year increase in smelting, treatment and refining costs.

Fuel added \$16/PtEqoz to producer costs in 2014. The fuel component of producer costs is far more significant for open pit mines, with Mogalakwena particularly influential in 2014, singularly skewing the industry trend, as its production activities continued to increase, while lower fuel-consuming underground production was substantially lower. **Power** charges also continued to provide modest upward pressure on costs, of \$6/PtEqoz in 2014, largely due to the 8% annual tariff for South African miners under the NERSA Multi Year Price Determination 3, which commenced in 2013 and runs for five years. Together with employee costs, utilities

AVERAGE MARGINS (PRIMARY PGM MINES)

	2013	2014	Change
South Africa (annual averages in 000 rand/kg)			
TCC + Sustaining Capex	433	504	17%
Revenue Realised	449	466	4%
Margin	16	-38	-334%
US\$:Rand	9.61	10.84	13%

North America (annual averages in US\$/PtEqoz)

TCC + Sustaining Capex	1,251	1,139	-9%
Revenue Realised	1,489	1,392	-7%
Margin	238	253	6%

Zimbabwe (annual averages in US\$/PtEqoz)

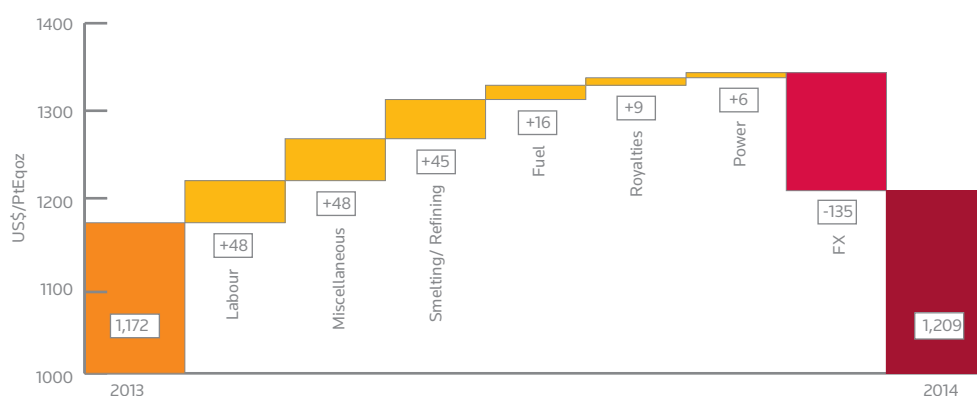
TCC + Sustaining Capex	1,087	1,135	4%
Revenue Realised	1,490	1,288	-14%
Margin	403	153	-62%

Source: GFMS, Thomson Reuters

were frequently cited by producers as a cost pressure during 2014. Years of above-CPI increases in electricity tariffs, together with increasing power requirements due to the demands of mining at ever-greater depths, have incentivised producers to reduce their power requirements wherever possible. This has been added to by the continued call by Eskom to intensive users and households alike to reduce usage.

The effect of trends in **royalty** payments was an overall increase to average cash costs of \$9/PtEqoz in 2014. Although a number of producers did see their royalty rates drop to the minimum level of 0.5% of gross revenues during 2014, falling royalty rates last year often accompanied dramatic falls in output. Consequently, on a weighted average basis, the 2014 royalty rate was skewed upwards by the smaller group of operations that reported higher royalty payments on increased output.

PLATINUM EQUIVALENT TOTAL CASH COST VARIANCE ANALYSIS



Source: GFMS, Thomson Reuters

SCRAP SUPPLY

- **Platinum output from autocatalyst and old jewellery scrap increased to 1.57 Moz (48.9 t) in 2014, 2% higher than 2013. This marginal increase came about despite the sharp price decline and was due to small rises in supply from both scrapped autocatalyst feedstock and jewellery.**
- **Palladium supply from autocatalyst and jewellery scrap recycling increased by 8% last year to 1.97 Moz (61.2 t). Both segments saw sharp increases in supply, autocatalysts mostly due to the rise in palladium content per-unit scrapped last year and for jewellery aided by the record (in nominal terms) annual average price.**

Platinum and palladium scrap supply includes sources of recycled material that are brought back to the market for use in newly fabricated products or sold to investors in refined form, often referred to as “open-loop” scrap. GFMS data details old jewellery sold back by consumers or liquidated by retailers and wholesalers and old autocatalysts from scrapped vehicles. Closed-loop recycled material refers to metal recycled from manufacturing scrap, which is returned directly to manufacturers for ongoing purposes.

Overall, and despite the price decline, open loop platinum scrap has risen to its highest ever share of global supply, as shown in the accompanying chart. Last year, the volume of autocatalyst scrap material rose, in part a function of stronger vehicle sales, which translated to an increase in scrapped vehicles. The composition of PGM loadings in spent autocatalysts being sold to recyclers has been shifting toward higher palladium and lower platinum concentrations over the last few years. The increase in palladium refined from spent autocatalyst has been more robust than the increase in platinum

autocatalyst scrap supply. Platinum autocatalyst scrap has been benefiting solely from increases in feedstock numbers, since the per-unit content has been trending lower over the past several years. Collectors de-stocked more autocatalyst scrap in 2014 relative to 2013.

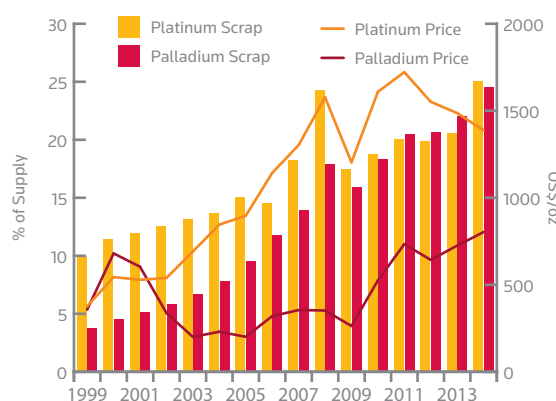
Platinum jewellery scrap rose 5% in 2014, perhaps surprisingly for some given the sharp drop in dollar denominated platinum prices. However, the two dominant markets, Japan and China, both saw marked increases. The rise in the former was boosted by the sharply weaker yen and the increase in the latter was due to a realisation by the supply chain there that they had overstocked in 2013. Palladium jewellery scrap rose even more rapidly, by 8% in 2014, with higher prices being key.

AUTOCATALYST RECYCLING

- **Global platinum autocatalyst recycling rose marginally by 1% to 1.06 Moz (32.9 t) in 2014. A strong decline recorded in North America offset healthy gains elsewhere.**
- **Palladium, on the other hand, continued to rise, gaining by 8% to 1.72 Moz (53.4 t) last year driven by solid increases in Europe, China and our Other regions.**

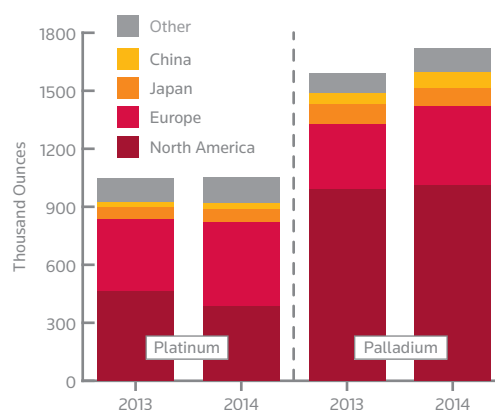
The typical autocat recycling value chain includes at least collectors, pre-processors and refiners. Physical recovery is limited to a few specialists worldwide, but at the beginning of the supply chain the number of small players is much larger. The recent drop in various precious metals prices has seen some consolidation in the industry, particularly at the collector level. Automotive catalyst applications on average have a recovery rate of around 50-60%. That tends to vary substantially by region where the United States, Europe and Japan in general have the best recycling facilities

TOTAL OPEN LOOP SCRAP SHARE OF TOTAL SUPPLY



Source: GFMS, Thomson Reuters

GLOBAL AUTOCATALYST RECYCLING



Source: GFMS, Thomson Reuters

and technology installed. In addition, autocatalyst recovery rates are susceptible to the underlying economic progress in a region.

The recycling process is composed of several stages. First, de-registered vehicles are, mostly, shipped to scrapyards. A percentage of de-registered vehicles are rendered lost due to export to developing regions for continued use, however. Also, some cars never make it to a scrapyard, as they may sit in backyards for extended periods of time, saved by the consumer for parts or simply due to neglect. Next, autocatalysts are collected, dismantled and de-canned. Some of this material gets lost due to damage and inefficient collection systems. Recycling rates of this “open-loop” system are usually much lower compared to “closed-loop” systems due to losses throughout the supply chain (and tend to vary widely by region based on the level of sophistication of the collection and recycling systems). In closed-loop systems, material management is only handled by the PGM user and the recycler, which is a much smaller supply chain and effectively more efficient. Last year, autocatalyst recycling continued to rise, driven by higher recycling levels across the various regions.

That said, for the first time, material differences have been recorded in platinum and palladium recycling levels. Indeed, palladium continued its strong growth in recovery, rising by 8% to 1.712Moz (53.4 t), whereas platinum only marginally increased by 1% to 1.06 Moz (32.9 t). The main market driving that development in both platinum and palladium autocatalyst scrap recycling has been Europe, followed by China and the Other regions.

In **China**, where recovery rates are still relatively small, growth in both PGM's was robust last year, driven by a combination of the strong rising pool of available

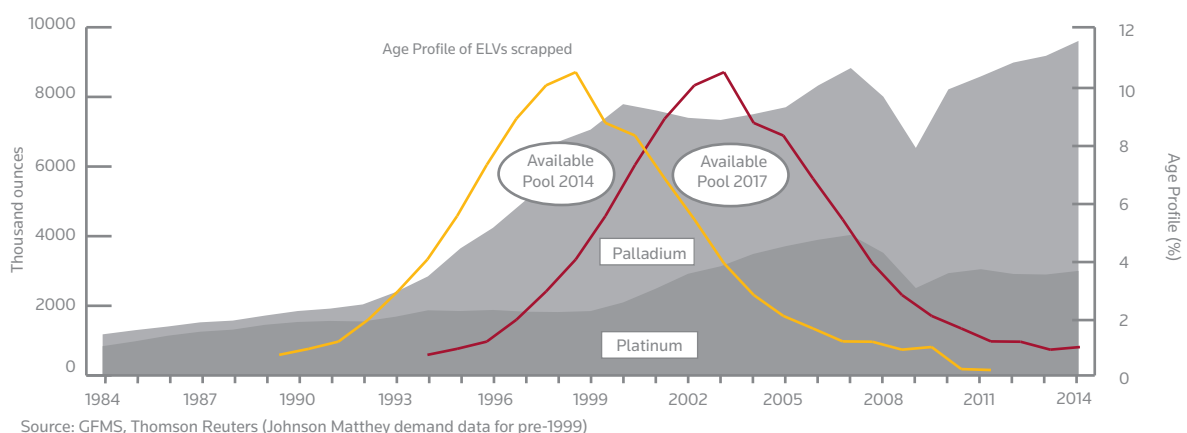
vehicles and a rising incentive to scrap older cars. We estimate that the recycling industry in China is still relatively undeveloped with previously scrapped autocats frequently finding their way back to European processing facilities.

But driven by the shift in the government-led ‘war on pollution’ various international players have expressed their interest in developing recycling capabilities, usually in the form of joint-ventures, in the country itself. Due to its strong reliance on gasoline-driven vehicles, palladium loaded catalysts tend to come back in larger quantities compared to their platinum counterparts. However, similar to some other regions, old vehicles discarded in the major cities do not always immediately find their way into the recycling supply-chain but are migrated inland, where the emissions legislation and compliance enforcement is less strict. We estimate that recycling volumes for palladium autocatalyst scrap are between 2-3 times higher than platinum and forecast this ratio to increase further.

Recovery of palladium-based autocatalyst scrap rose last year by 2% in the **North America** to 1.01 Moz (31.4 t), representing a market share of 59%. In the case of platinum though, where the United States only has one third of the market share, for the first time, recovery rates fell last year and by a significant 16% to 0.39 Moz (12.1 t). The main reason for this development lies in the fact that the US tends to get an increasing amount of richer palladium based autocatalyst scrap.

The material returning from the market is on average 15 years old, which was the time when the country started to focus its aftertreatment solutions based on mainly palladium and rhodium formulations, with some of the domestic major OEM's leading the way. We expect continued low volumes of platinum-based autocatalyst

AUTOCATALYST DEMAND AND AGE PROFILE



scrap going forward, also driven by lower loadings. This will further intensify the competition in the country, which is currently facing a saturated market.

Softer PGM prices during the second half of last year have also resulted in a slowing of autocatalyst material offered towards year-end. This strategy also seemed to be prevalent, particularly in North America in 2013, when precious metals prices experienced their violent correction. Although in general the major recyclers do not speculate on price action, some smaller parties are believed to be more active in trying to manage the most profitable timing in regards to when they bring their material back to the market.

North America in general tends to have on average more catalysts installed per vehicle than any other region, largely because the average vehicle and engine sizes exceed those anywhere else. Indeed, the average engine size of vehicle production in the US last year was 3.4 litres and in Canada 3.3 litre. In Mexico, engine sizes tend to be much smaller, around 2.7 litres on average last year, whereas in Europe, the bulk of the vehicle fleet, accounting for approximately 70%, will have an engine displacement in the range of 1.4-2.0 litres.

In **Europe**, autocatalyst recycling increased by 16% and 21% for platinum and palladium-based autocatalysts to 0.43 (13.4 t) and 0.41 Moz (12.6 t) respectively. In the first instance this might seem to exceed the prevailing market sentiment in the last year, but the rising pool of available cars continues to increase and scrappage schemes, particularly in Spain continue to bring a decent amount of cars back to the market.

In fact, at those levels of supply coming back to the market, recovery levels are actually still relatively low around 40-45% for both platinum and palladium, which, despite all the leakage in the system, remains a pretty conservative estimate. What is more, autocatalysts with higher loadings returned from the market last year due to the previously increased emissions legislation on the continent, which required higher vehicle autocatalyst loadings to combat more stringent legislation. In addition, as already mentioned, Europe has a few major recyclers that operate with local collectors, but who process their material centrally, usually in their home base. Looking ahead, we expect growth in recycling of both palladium and platinum-based autocatalysts to slow in Europe.

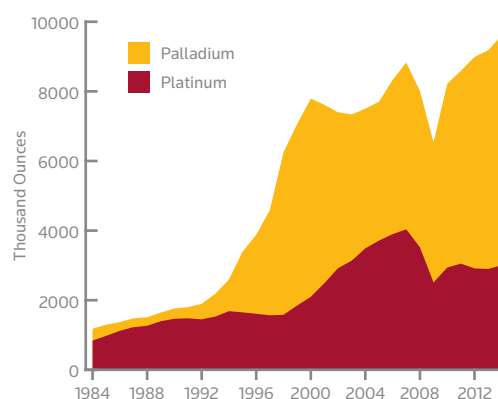
This is particularly driven by the fact that the majority of material that entered the supply chain between 2008-

2010 will have been processed by now. During that period, various recyclers on the continent saw a spike in vehicle scrappage due to the generous cash for clunkers government-led scrappage scheme. A similar variant was also implemented in the United States, but in Europe the tax break or subsidy could add up to €2,500. In some cases, that easily doubled the return value of the car. Many diesel vehicles returned from the market, which benefited platinum recycling rates and were exchanged for smaller petrol driven cars generally more often loaded with palladium-based autocatalysts.

In **Japan**, autocatalyst recycling sketched a mixed picture depending on the metal under consideration. We estimate that platinum autocatalysts returning from the market rose last year by around 14% to 0.07 Moz (2.1 t). Palladium, however, saw volumes decline by 6% to 0.1 Moz (3.0 t) last year. This was mainly a function of the disappointing vehicle sales market which in turn generated lower replacement demand and lower levels of scrapped vehicles. Import volumes from the United States and Europe remained stable.

In a similar vein, growth in autocatalyst recycling from our **Other regions** increased last year by 7% reaching 0.12 Moz (3.7 t) in the case of palladium and 0.13 Moz (4.0 t) in case of platinum. Many of the global players stretch their reach for material well beyond the local borders into markets with a large vehicle pool. Despite emissions legislation lagging the most modern standards implemented in the United States, Japan and Europe, in many cases standards are catching up. This means in the first instance more PGM is needed on new vehicles but also increasingly vehicles with slightly higher PGM loadings tend to return from the market. Loadings are on average much lower compared to Europe, but economies of scale add up. At present, in many of these markets the gravity seems to be focused on the first

HISTORICAL AUTOCATALYST PGM DEMAND



Source: GFMS, Thomson Reuters; Johnson Matthey

stages of the supply chain process, such as collecting and pre-processing and less so on refining as this requires significant capital outlays in modern technology. However, comparable to China, these markets tend to develop and we believe the potential to be pretty significant going forward, with some markets more attractive than others.

JEWELLERY SCRAP SUPPLY

- **Last year's 5% increase in global platinum jewellery scrap was mainly driven by China, while a rebound in Japanese scrap supply further bolstered supply.**
- **Palladium jewellery scrap increased 8% last year, to 0.25 Moz (7.7 t), a level last reached in 2011. This gain can largely be attributed to growth in Chinese scrap, where a higher palladium price supported the supply chain.**

Global platinum jewellery scrap increased 5% last year to reach 0.52 Moz (16.2 t), while the supply of palladium jewellery scrap rose by 8% to 0.25 Moz (7.7 t). In our view, the main driver behind the recovery in platinum scrap supply was China, in which an increase of 16,000 ounces (0.5 t) of supply was recorded year-on-year, a stark difference to a year ago when supply only increased by a fraction of this level. Meanwhile, Japan, the second largest source of supply in this category after China, provided further support, increasing scrap flow by 4% in 2014. Interestingly, North America was the only region to record a contraction in supply over the year, falling by 8%.

Looking at the key regions in more detail, platinum jewellery scrap from China increased 7%, to reach an estimated 0.25 Moz (7.8 t) in 2014. The strong increase in scrap flow in China saw it overtake Japan for the first time as the largest jewellery scrap contributor taking

49% of the global market share, after sharing the position with Japan in 2013 (at 48% each). A contraction in domestic demand resulted in an increase in destocking from the supply chain, where retailers who over stocked in 2013 sold back slow moving stock to upgrade to newer designs. Furthermore, China's poorer economy encouraged people to sell their hoardings, releasing more supplies into the market, while there was a rise in collection points and refineries capable of treating platinum scrap. This assisted in a more seamless collection system and encouraged scrapping.

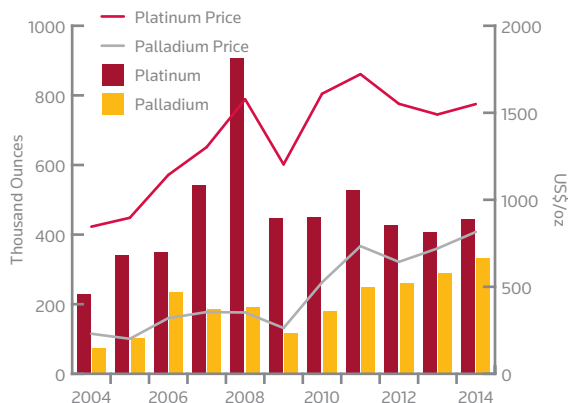
Platinum jewellery scrap from Japan increased 4% in 2014 to an estimated 0.25 Moz (7.6 t), rebounding from negative growth recorded in 2013 of 0.02 Moz (0.7 t). Japan's destabilized economic environment, (as the country fell back into recession), sparked a increase in distress selling, while the weakened yen increased the domestic platinum price, rising 2% year-on-year, further encouraging sales.

North America was the only region to record a decline in scrap supply over the year. This was attributable to an improving US economy, in which fewer people felt the need to liquidate as unemployment levels fell and disposable incomes rose. However, looking to Europe, scrap flows remained unchanged over the year, where platinum's discount to gold in the second half of the year discouraged selling in the market.

The 8% increase in palladium scrap flow over 2014 saw the metal regain its historical high of 0.25 Moz (7.7 t), which was last attained three years ago. Similarly to platinum, the growth in palladium scrap sales were mainly driven by increases recorded in China, in which supply rose by 9% to reach 0.20 Moz (6.1 t) over the year. Indeed, palladium jewellery scrap supply is dominated by scrap sales in China. Last year scrap supply from China made up just under 80% of total global jewellery scrap sales and grew 9% year-on-year to 0.20 Moz (6.2 t). We believe that the 11% annual average increase in the price encouraged a wave of selling of redundant jewellery stocks in addition to old unwanted consumer jewellery.

Meanwhile, Japan recorded a steady increase in supply of 9% year-on-year. In North America and our 'Other regions' category, scrap flows were relatively unchanged from 2013, while Europe was the only region to post a decline in 2014. This was a consequence of falling gold scrap flows, including white gold, in which palladium is used largely as an alloy.

PLATINUM & PALLADIUM JEWELLERY SCRAP



Source: GFMS, Thomson Reuters

ABOVE-GROUND BULLION STOCKS

- *A return to a significant physical deficit in 2014 caused above-ground bullion stocks of platinum to fall to approximately 6.5 Moz (203 t) at end-year.*
- *The drawdown of above-ground bullion stocks of palladium not only continued but accelerated last year, slumping by 16% to 8.1 Moz (253 t).*

Our supply/demand balances for platinum and palladium are designed to separate any distorting effect of flows from pre-existing above-ground stocks. Where we are able to identify such flows with reasonable confidence, these are shown separately as “below the line” items. Consequently, the arithmetical difference between our estimates of new supply (from mining and recycling) and fabrication demand, i.e. the physical surplus or deficit, represents our view of the underlying fundamentals of these metals. Where a physical surplus is reported, this indicates an excess of new supply over fabrication demand, implying a consequent increase in above-ground stocks. Conversely, a physical deficit indicates a shortfall of new supply relative to fabrication demand. This implies an equivalent decline in above-ground stocks as this metal is called upon to redress that shortfall and satisfy fabrication needs.

In conjunction with our supply/demand balances, we also attempt to quantify the broad scale of above-ground platinum and palladium bullion stocks. This includes stocks in the terminal markets (implied in part from historical trade data), allocations to physically-backed ETFs and declared stock holdings on futures exchanges. In addition, we also include an estimate for Russian government stocks of palladium. Although this remains a grey area, we believe there is sufficient anecdotal evidence to enable us to make estimates. However, we are not able adequately to define stocks of refined metal

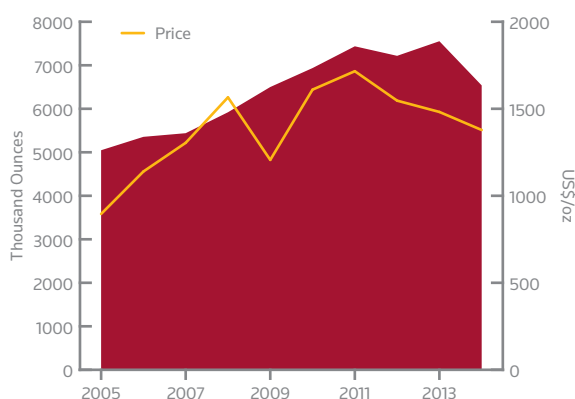
that may be held by industrial consumers and producers (industry stocks), although from time to time we are able to infer flows relating to such holdings, insofar as these can be detected or deduced in our analysis.

PLATINUM

Last year saw a return to physical deficit for the platinum market. Indeed, the deficit in 2014 at over 1 Moz (32 t) was the largest in our records and caused a marked drop in above-ground platinum bullion stocks last year. Crucial to this, unsurprisingly, was the sharp decline in South African production caused by the protracted strike action in that country, although an increase in demand from industrial customers also played a role. As a result, above-ground stocks of platinum have now fallen to the lowest level in five years.

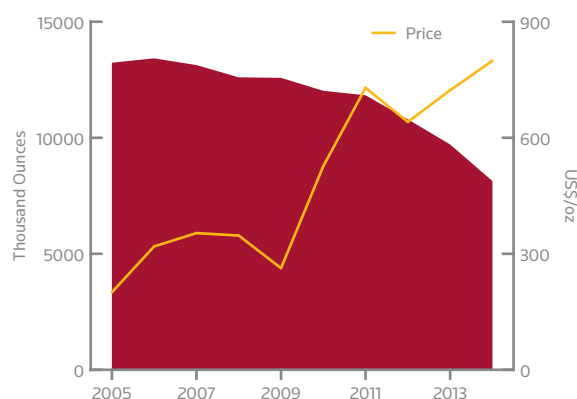
Our estimate of above-ground stocks at end-2014, are in the region of 6.5 Moz or 200 tonnes, of which more than 2.7 Moz (84 t) are ETF holdings, and is equivalent to eleven months’ fabrication demand. Indeed, there would have been substantially different market conditions were it not for a decrease of industry stockpiles of approximately 1.3 Moz (40 t). We believe that this largely occurred in the first half of 2014 with a significant portion from South African miners who ran down stockpiles that they had built in anticipation of the widespread strike. The high stock levels also indicate why this had little discernible impact at the time on physical liquidity or lease rates. All of this, combined with extensive field research, and the knowledge of stock levels being held to meet hedging needs for the automotive industry have led us to upwardly revise our stocks levels for platinum to the level given at the beginning of this paragraph.

ESTIMATED ABOVE-GROUND PLATINUM STOCKS



Source: GFMS, Thomson Reuters

ESTIMATED ABOVE-GROUND PALLADIUM STOCKS



Source: GFMS, Thomson Reuters

ESTIMATED MOVEMENTS IN STOCKS

(000 ounces)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
PLATINUM										
Physical Surplus/(Deficit)	(90)	308	84	481	580	436	500	(219)	337	(1,016)
Identifiable Stock Movements										
Russia	0	0	0	0	0	0	0	0	0	0
US National Defense Stockpile	13	0	0	0	0	0	0	0	0	0
Industry Stocks	0	0	(200)	(300)	665	0	(100)	(300)	(1,000)	1,300
Exchange Traded Funds	0	0	(194)	(102)	(384)	(574)	(145)	(237)	(892)	(218)
Sub total - stock movements	13	0	(394)	(402)	281	(574)	(245)	(537)	(1,892)	1,082
Net Balance	(77)	308	(310)	78	861	(138)	255	(756)	(1,555)	66
PALLADIUM										
Physical Surplus/(Deficit)	(37)	188	(291)	(527)	(23)	(558)	(194)	(1,036)	(1,083)	(1,577)
Identifiable stock movements										
Russia	1,400	1,550	900	1,280	1,100	800	800	400	200	0
Stillwater	439	63	0	0	0	0	0	0	0	0
US National Defense Stockpile	19	0	0	0	0	0	0	0	0	0
Industry Stocks	0	0	0	0	0	0	(50)	(100)	(500)	300
Exchange Traded Funds	0	0	(280)	(381)	(507)	(1,089)	532	(448)	(0)	(899)
Sub total - stock movements	1,858	1,613	620	899	593	(289)	1,282	(148)	(300)	(599)
Net Balance	1,821	1,802	329	372	570	(847)	1,088	(1,184)	(1,383)	(2,176)
Source: GFMS, Thomson Reuters										

PALLADIUM

For the eighth year in a row, the palladium market recorded a physical deficit in 2014, reaching 1.6 Moz (49 t). This was the largest deficit since 2000 and more than 50% higher than in 2013. Just as with platinum, albeit to a lesser extent, this was due to lower South African mine output, although higher autocatalyst demand was also significant. As a result, there has been a continued fall in above-ground palladium stocks, which are estimated to have dropped to 8.1 Moz (253 t) by end-2014, equal to roughly 10 months' fabrication demand. In a similar vein to platinum, however, this was coloured by a decrease in industry stocks, due to the inventories that had been built in anticipation of the South African strike in early 2014, of around 300,000 ounces (9.3 t).

Above-ground palladium stocks are still undeniably substantial but they are trending downward. This is the result of a string of physical deficits that have underlain the palladium market almost continuously so far this century, although this was obscured by unrelated releases from stocks long held off-market, the most prominent being those from Russian government stocks. Below the surface, however, it is evident that while off-market holdings of palladium have been declining for much of this century this trend has reversed in the last few years with implied stocks of palladium in the terminal market falling as a result.

TERMINAL MARKET

Since 2010, the assessment of above-ground bullion stocks in the terminal market has been complicated by transfers of metals from Zurich to London, when clearing and settlement of platinum and palladium trades (previously carried out almost entirely in Switzerland) started to gather momentum in London as London took over as the primary central clearer for the market. This has been compounded by the effects of uncleared, bonded holdings adjacent to both locations, which are not necessarily reflected in national trade data and consumer hedging which we would argue is occurring against terminal market stock.

Starting with platinum, holdings in the terminal market (Zurich and London together) are estimated to have totalled 3.8 Moz (118.0 t) at end-2014, accounting for 58% of global above-ground bullion stocks (Note: the terminal market here excludes ETF holdings, which are dealt with separately). Unsurprisingly given the substantial physical deficit, the level is markedly lower than a year earlier, by roughly 0.77 Moz (24.0 t). The drawdown in terminal market stock last year reflected the aforementioned deficit and a rise in platinum ETF holdings, partly ameliorated by mining company inventory releases supplementing refined outturn to meet fabrication demand.

Turning to palladium, our estimate shows that stocks in the terminal market dropped by approximately 1.9 Moz (58 t) to a ten-year low of 4.1 Moz (127.2 t) by end-2014. This was equivalent to just under 70% of global above-ground bullion stocks. It is of note that the fall in the terminal market was a little smaller than that in above-ground stocks (the amount of the physical deficit), as the decrease in industrial stocks was more than offset by a strong bout of ETF purchases.

RUSSIA

As we understand it, Russian mine production of both platinum and palladium was again sold in its entirety in 2014. Furthermore, sales from mine production are understood to have been transacted independently and therefore had no bearing on the level of stocks controlled by the Russian government. As is well known, stocks owned by the Russian government remain classified as an official state secret. Therefore, all estimates relating to these holdings are derived from anecdotal information, together with the analysis of available trade data.

During 2014, and unlike in all prior years this century, we have not included sales of palladium as a “below the line” item from Russia’s state-owned inventories. This was due to the much-reduced level of government-owned stocks after protracted heavy sales in previous years. While we believe 2013 was the end of sales by the Gokhran, this does not necessarily mean that the government’s palladium stocks are entirely eradicated. Indeed, it appears increasingly likely that the Central Bank of Russia may sell up to \$2 billion of palladium to Norilsk Nickel.

EXCHANGE TRADED FUNDS (ETFs)

Our chapter on investment covers the subject of physically-backed ETFs in detail. Their relevance to the issue of above-ground stocks is that investment in these instruments is backed by physical metal that is segregated from the generally-available pool of “unallocated” physical metal, and is specifically “allocated” as identifiable ingot/plate to the order of the fund in question. Metal allocated in this fashion is held separately by the fund’s custodian for the sole benefit of the shareholders in that fund, and may not be used for any other purpose.

Since their inception in 2007, physically-backed platinum and palladium ETFs have enjoyed considerable investment inflows. Platinum ETF allocations rose to almost 2.75 Moz (78.6 t) by the end of 2014, accounting

for 42% of global above-ground bullion stocks. More dramatically, interest in palladium ETFs surged in 2014 and they ended the year up more than 40% year-on-year. This was predominantly due to the new ‘South African’ ETFs, although it is worth noting though that this metal is held loco London.

While held separately from the generally available pool of “unallocated” physical metal, we regard all allocated holdings in physically-backed ETFs as an integral component of global above-ground platinum and palladium stocks. We treat year-on-year increases or decreases in these allocations as “below the line” items, separate from fabrication demand, or indeed new supply. Our rationale for this is that all metal allocated to these ETFs is in the form of plate or ingot, which not only complies with the terminal market’s “good delivery” standards, but is also stored in secure facilities in close proximity to the vaults of the terminal market. Therefore, by virtue of its physical form and location, there is no impediment to immediate two-way flows between ETFs and the terminal market as investment in these funds rises or falls. Additionally, ETF holdings are by definition non-fabricated metal, with year-on-year movements in allocations generally reflecting a change of ownership between the fund(s) and positions in the terminal market.

COMMODITY EXCHANGES

The final component of above-ground stocks is exchange-deliverable metal in NYMEX and TOCOM depositories. After substantial increases for three successive years, platinum stocks abruptly changed direction in 2014, falling by more than a third to 0.19 Moz (6.0 t) by year-end, the vast majority of this residing in NYMEX depositories. Futures exchange stocks of palladium also slumped, and at a faster rate than for platinum, as they more than halved to 0.22 Moz (7.0t) by end-2014. The stocks held on futures exchanges are by far the smallest component of global above-ground stocks, with the levels at the end of 2014 representing just 3% for both platinum and palladium.

FUTURES EXCHANGES - YEAR END STOCKS

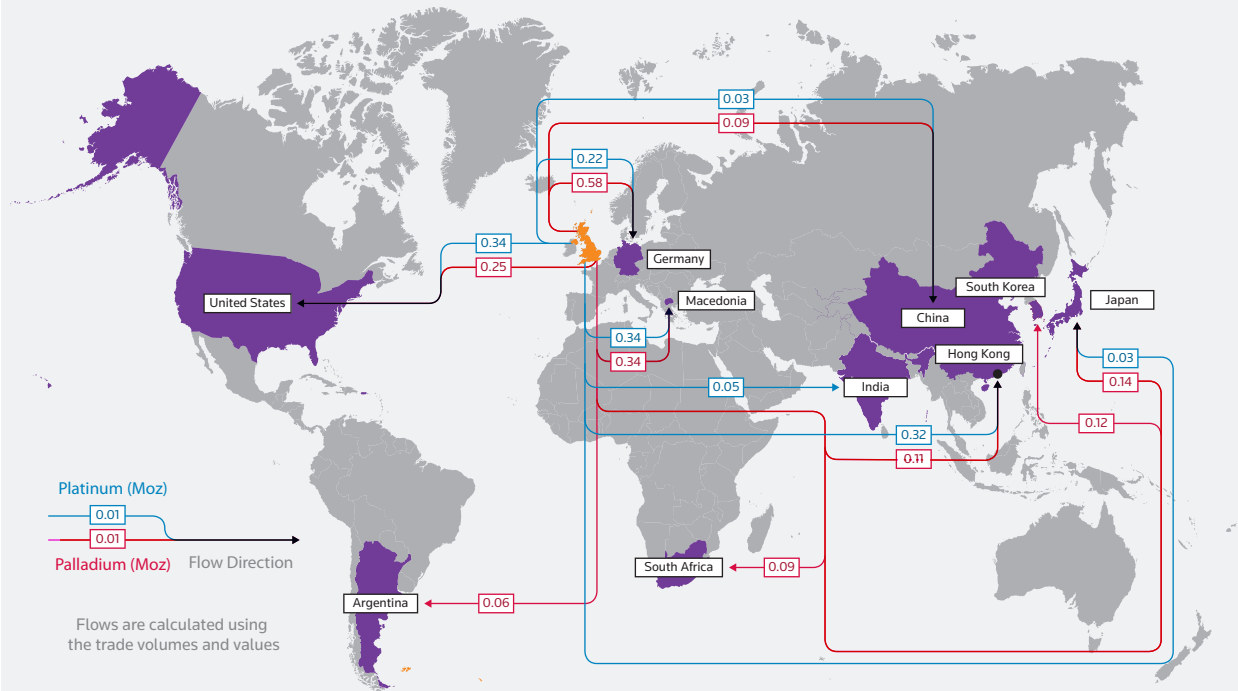
(000 ounces)	2013	2014	Change +/-
PLATINUM			
NYMEX	251	135	-115
TOCOM	50	58	8

PALLADIUM

NYMEX	545	221	-324
TOCOM	3	2	-1

Source: NYMEX and TOCOM

MAJOR TRADE FLOWS IN PLATINUM AND PALLADIUM BULLION AND POWDER FROM THE UNITED KINGDOM IN 2014

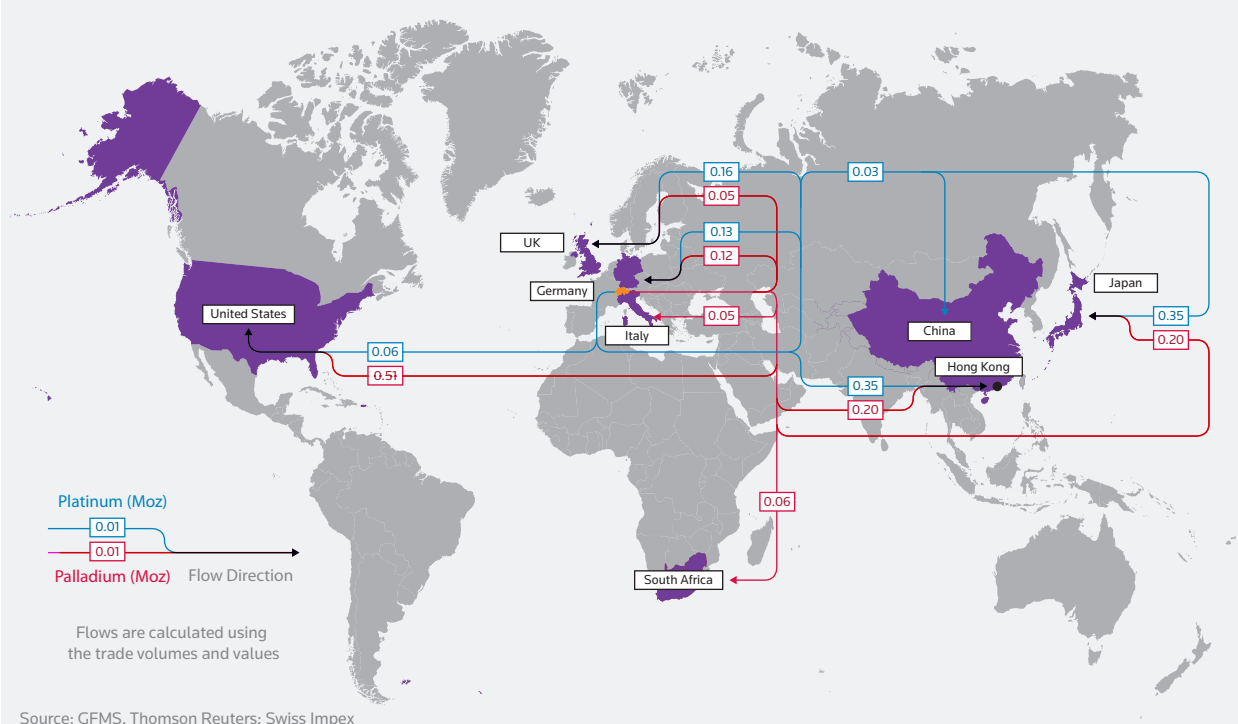


Source: GFMS, Thomson Reuters; HMRC

To assess trade patterns it is important to look at the major trading centres for platinum and palladium bullion, which are the UK and Switzerland. Last year the UK exported 1.44 Moz (45 t) of platinum and 1.78 Moz (55 t) of palladium in bullion and sponge forms, up 28% and 5% respectively on 2013. The large flows going to Macedonia are due to a large catalyst plant opened there by Johnson Matthey in 2010. The UK imported 0.78 Moz (24 t) of platinum and 0.68 Moz (21 t)

of palladium, down 10% and 32% respectively versus 2013. The large trade deficit for both metals can be explained by a drawdown in stock held in the UK to supplement constrained primary supply. Swiss total exports of platinum at 0.79 Moz (25 t) and palladium at 1.12 Moz (35 t) were down 49% and 21% respectively, while imports of platinum fell 46% to 0.62 Moz (19 t) and palladium by 44% to 0.49 Moz (15 t) as imports from Russia and South Africa fell substantially.

MAJOR TRADE FLOWS IN PLATINUM AND PALLADIUM BULLION AND POWDER FROM SWITZERLAND IN 2014



Source: GFMS, Thomson Reuters; Swiss Impex



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5. DEMAND

FABRICATION BY REGION, 2005 - 2014

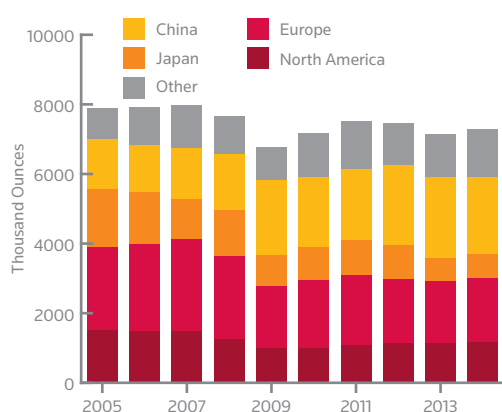
(000 ounces)

PLATINUM	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
North America	1,516	1,467	1,485	1,256	994	987	1,077	1,147	1,144	1,161
Europe	2,365	2,514	2,633	2,371	1,788	1,954	2,014	1,815	1,758	1,840
Japan	1,667	1,491	1,148	1,350	865	964	1,018	993	669	688
China	1,455	1,357	1,472	1,590	2,179	1,986	2,028	2,283	2,348	2,234
Other regions	886	1,086	1,230	1,081	924	1,281	1,365	1,222	1,234	1,362
Total	7,889	7,914	7,969	7,648	6,750	7,172	7,501	7,458	7,153	7,284

PALLADIUM	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
North America	2,308	2,298	2,258	1,987	1,606	1,872	1,885	2,050	2,092	2,068
Europe	1,588	1,684	1,770	1,705	1,524	1,846	1,995	1,964	1,941	2,002
Japan	1,355	1,486	1,515	1,515	1,224	1,360	1,250	1,400	1,349	1,360
China	1,413	1,427	1,497	1,531	1,663	1,714	1,749	1,840	1,987	2,078
Other regions	1,058	1,255	1,443	1,561	1,522	1,865	1,939	1,983	1,994	2,074
Total	7,722	8,150	8,483	8,299	7,539	8,656	8,818	9,236	9,364	9,583

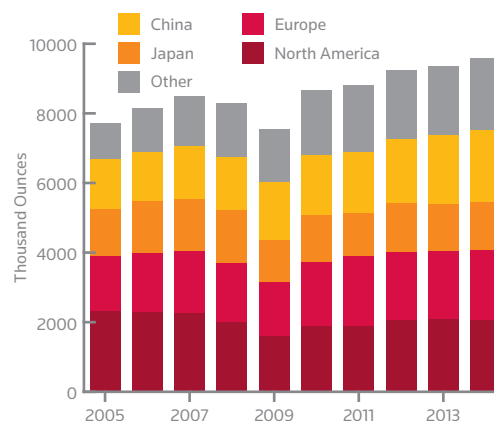
- Global platinum demand rose 2% in 2014 to 7.28 Moz (226.6 t), as gains in a number of industrial applications offset a modest drop in jewellery offtake.
- Demand for platinum in autocatalyst applications increased 4% last year, with gains in Europe and China offsetting weaker Japanese and North American demand.
- Lower platinum prices failed to boost jewellery fabrication which retreated 3% in 2014 to 2.57 Moz (79.9 t), led lower by falls in China, Europe and Japan.
- The chemical and petroleum sectors saw marked growth in 2014, while glass and electronics recorded losses.
- Total palladium demand increased by 2% in 2014 to 9.58 Moz (298.1 t), led primarily by healthy growth in autocatalysts and a rise in the other industrial segment.
- Palladium autocatalyst demand increased 5% last year to a record high, pushed higher by uplift in all key markets and substitution gains at the expense of platinum in diesel engines.
- Other key industrial segments were all weaker in 2014, with falls recorded in dental, electronics and chemical.
- Palladium jewellery demand declined 9%, due largely to double-digit declines in China and North America.

PLATINUM DEMAND BY REGION



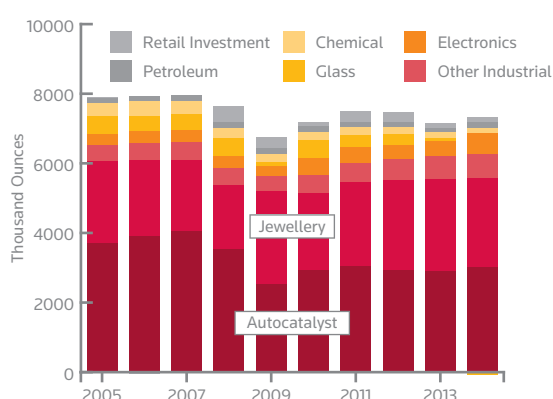
Source: GFMS, Thomson Reuters

PALLADIUM DEMAND BY REGION



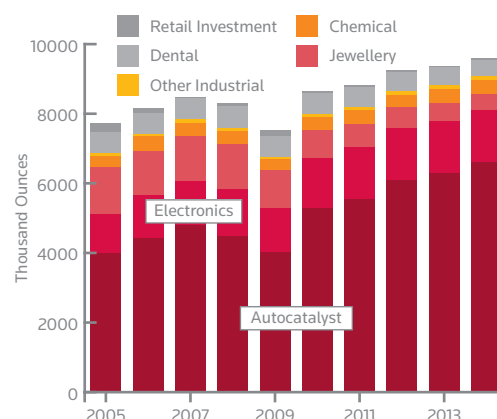
Source: GFMS, Thomson Reuters

PLATINUM DEMAND BY SECTOR



Source: GFMS, Thomson Reuters

PALLADIUM DEMAND BY SECTOR



Source: GFMS, Thomson Reuters

AUTOCATALYST DEMAND

- Demand for platinum in autocatalyst applications rose by 3.6% to 3.00 Moz (93.4 t) last year, mainly driven by improved vehicle purchasing in Europe.
- Palladium demand in autocatalyst applications grew 5.1% to 6.61 Moz (205.4 t). China lead the way, but Europe and North America still remain the largest palladium consuming regions.

OVERVIEW OF 2014

Last year global vehicle production rose 2% to reach 90.5M units. The main story in 2014 was that of fewer extremes and outliers, with moderate to relatively strong expansions in vehicle production across the board. China continued to take the lead relative to other countries, increasing its vehicle production by another 6%, which was, however, significantly lower compared to the 16% growth recorded the prior year. Vehicle output growth in North America was also significant, rising by 5% last year to 17.9M units. There are risks to future growth, however, such as the exceptionally high volume of car loans outstanding and historically low financing costs.

European vehicle production rose a solid 2% to 20.6M units last year. The bulk of the rise was in Western Europe, as light vehicle production in Eastern Europe only improved marginally. In Japan vehicle production also posted a modest improvement, reaching 9.5M units, but further growth for the country looks tough. Volumes in our Other regions category fell a substantial 4% last year, to just shy of 18M units. The countries responsible for the decline were Brazil and Thailand, where vehicle production fell by 16% and 22% respectively.

Demand for **platinum** in autocatalyst applications increased at a faster pace in 2014 compared to 2013,

rising 4% to 3.00 Moz (93.4 t). Unsurprisingly, the main country responsible for the rise was Europe, which was closely followed by China. In China, platinum demand reached 0.28 Moz (8.8 t) last year, a relatively low level, which is, however, catching up with the more established markets. Platinum demand in autocatalyst applications in our Other regions category also increased moderately, mainly as a function of higher loadings. The increase in platinum loadings was due to increased stringency of emissions legislation in various countries and greater usage in the heavy duty diesel (HDD) sector. Platinum demand in North America fell marginally whereas Japan recorded the largest decline in autocatalyst applications of almost 3%.

Demand for **palladium** in autocatalyst applications rose by 5% to 6.61 Moz (205.4 t) in 2014. Contrary to platinum, the picture was more upbeat and the increases were spread amongst the various regions, with Europe

AUTOCATALYST DEMAND

PLATINUM

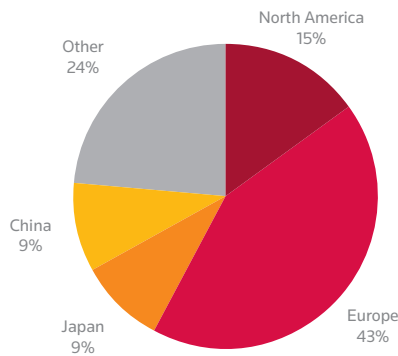
(000 ounces)	2013	2014
North America	463	450
Europe	1,237	1,285
Japan	288	279
China	224	283
Other regions	687	706
Total	2,898	3,003

PALLADIUM

(000 ounces)	2013	2014
North America	1,643	1,680
Europe	1,535	1,611
Japan	855	894
China	1,389	1,534
Other regions	860	886
Total	6,282	6,605

Source: GFMS, Thomson Reuters

PLATINUM DEMAND IN AUTOCATALYSTS, 2014



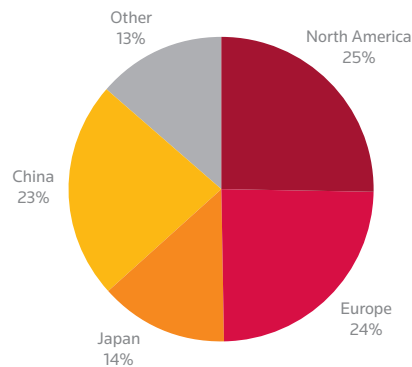
Source: GFMS, Thomson Reuters

and North America responsible for half of the overall demand, equally spread between the two of them. In terms of absolute growth, once again China led the way, making up 45% of the global increase, which consequently boosted the country's market share of palladium autocatalyst demand to just shy of a quarter. More modest growth was recorded in Japan and our Other regions category, pushing their respective volumes to 0.89 Moz (27.8 t) and 0.88 Moz (27.6 t).

NORTH AMERICA

Vehicle production in North America rose 4.8% last year to 17.9M units, a slower rate of growth than in recent years. The main driver behind the increase came from the light duty vehicles (LDV) segment, which recorded solid increases in gasoline as well as diesel applications. Somewhat surprisingly, diesel-powered cars scored a significant increase last year, boosting volumes above 1M units in the region. The strongest growth was in the United States, where lower fuel prices and superior fuel economy standards boosted diesel-powered vehicle demand. Diesel-powered vehicles in the US are around

PALLADIUM DEMAND IN AUTOCATALYSTS, 2014



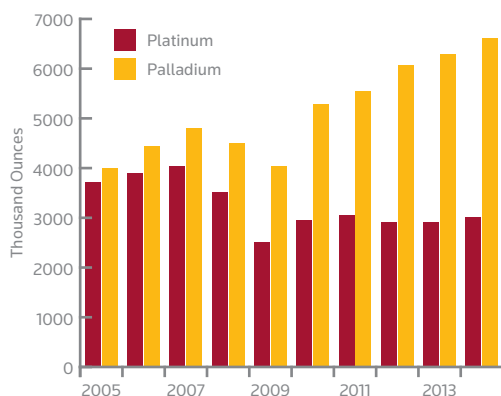
Source: GFMS, Thomson Reuters

20% more expensive than gasoline, but higher low-end torque and greater efficiency have dented some of the total costs and improved the general sentiment towards this mode of transport.

Last year, light duty gasoline (LDG) vehicle production rose 3.4% to 15.8M units in North America. The United States accounted for two-thirds of that total. Mexico also contributed to growth, with a significant rise in gasoline-driven vehicle production. We expect this positive trend to continue, due to expected production capacity additions and expansion plans in the US and Mexico. Given the lower production costs in Mexico, the majority of capacity additions will be there and production will mostly focus on small and compact vehicles.

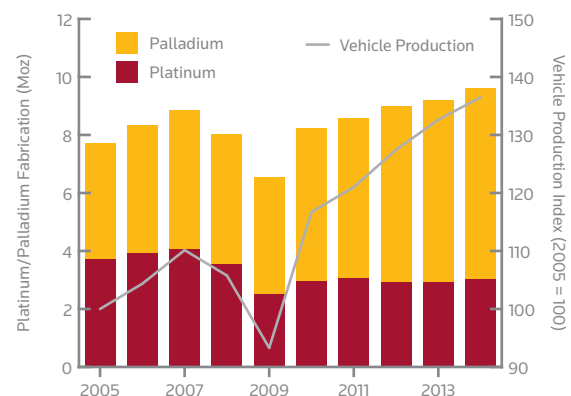
Platinum demand in the region fell 2.6% to 0.45 Moz (14 t). Light duty diesels (LDD) and heavy duty off-road applications increased steadily whereas road going HDD saw platinum usage contract. In the case of the latter this was due to continued thrifting, while in the light duty gasoline segment it came from substitution into palladium.

PLATINUM & PALLADIUM AUTOCATALYST DEMAND



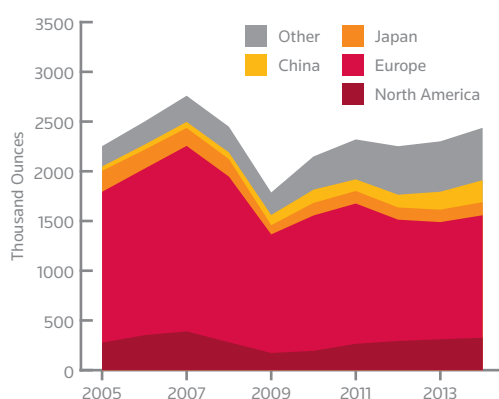
Source: GFMS, Thomson Reuters

AUTOCATALYST DEMAND VS VEHICLE OUTPUT



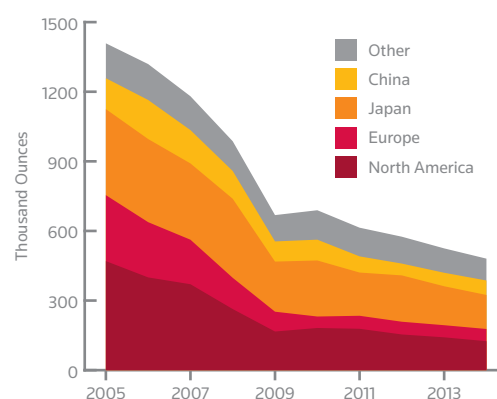
Source: GFMS, Thomson Reuters

DIESEL PLATINUM DEMAND



Source: GFMS, Thomson Reuters

GASOLINE PLATINUM DEMAND



Source: GFMS, Thomson Reuters

Demand for **palladium** in North America increased by 2% to 1.68 Moz (52.3 t) in 2014. With the overriding majority of demand coming from the light duty gasoline segment it comes as no surprise that even a small percentage change had a considerable effect on the overall palladium demand in the region. Despite thrifting activity, strong vehicle sales, particularly in the United States, more than offset this factor. The US emissions legislation is one of the strictest. Recently, the focus shifted to reducing greenhouse gasses. As a result, original equipment manufacturers came up with an array of measures such as engine downsizing and the increased focus on hybrids and electric vehicles, which in case of the latter, albeit from a low base, have seen significant production increases last year. All these developments are likely to keep pressure on PGM demand in this region.

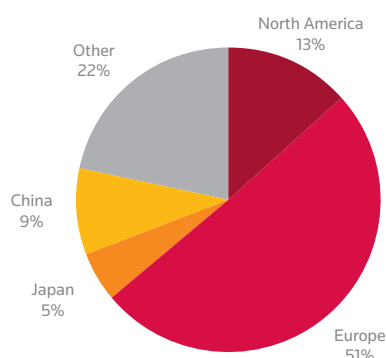
EUROPE

Vehicle production in Europe (including heavy duty on road and off road) rose 2% last year, reaching 20.6M units. The majority of the growth came from the LDD

segment, with an increase of 5%, but the marginal rise recorded in LDG also played a part. Vehicle production in Germany, which is one-third of European production, increased 3%. France and Spain also grew, by 4% and 8% respectively. This growth, however, was somewhat offset by the crisis in Russia, where production fell 9%. Surrounding nations, such as Romania, Serbia and Ukraine, were also adversely affected.

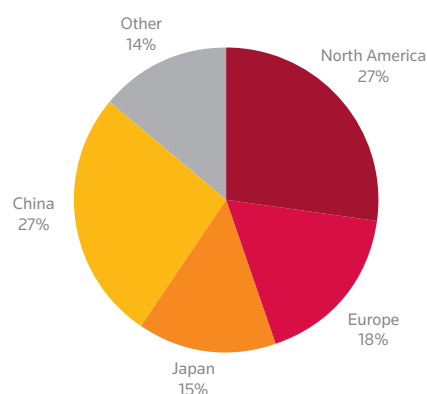
European exports of domestically produced vehicles continued to rise last year. Indeed, the North American and the Asia Pacific region saw shipments rise 8% and 13% respectively. Europe follows the US closely in regard to reducing emissions. Last year it introduced Euro 6 for passenger cars, both diesels and gasoline, and light duty trucks (below 1,305 kg). This new set of legislation forced hydrocarbons and NOx levels further down for diesel vehicles and introduced for the first time a particulate number (PN) limit for positive ignition vehicles (gasoline). The PN fraction of particulate matter (PM2.5) is considered the most harmful, responsible for 90% of PM toxicity. Medium-sized trucks were granted an extra year before being forced to adopt this new legislation.

PLATINUM IN DIESEL, 2014; REGIONAL DEMAND



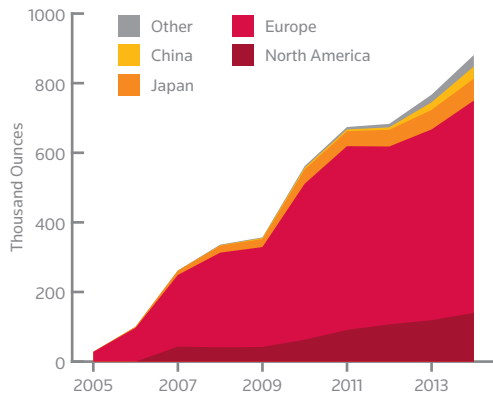
Source: GFMS, Thomson Reuters

PALLADIUM IN GASOLINE, 2014; REGIONAL DEMAND



Source: GFMS, Thomson Reuters

DIESEL PALLADIUM DEMAND

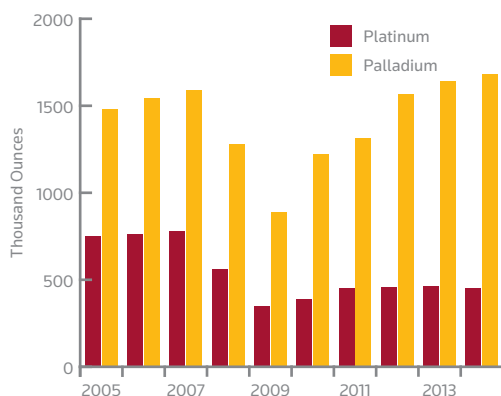


Source: GFMS, Thomson Reuters

Stricter emissions limits have a bearing on the use of various autocatalysts and their metal content. Tighter legislation, in combination with robust vehicle sales, boosted platinum demand in Europe rose 4% last year to 1.29 Moz (40 t), driven by solid increases in the LDD sector. Demand for palladium rose by 5% to 1.61 Moz (50.1 t). Growth was especially strong in LDD, where substitution for platinum continued. The light duty gasoline segment only slightly improved whereas solid gains were recorded in off-road HDD.

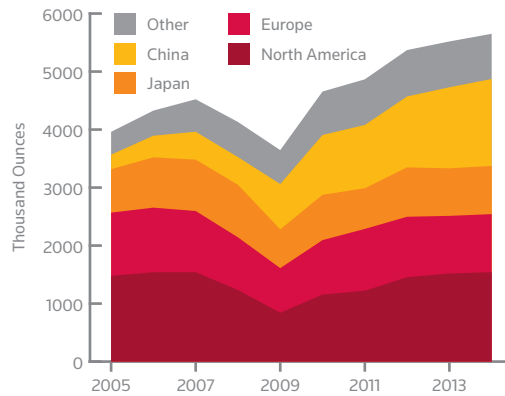
Stricter emissions legislation typically requires higher PGM loadings to reduce levels of pollution. This is more often the case in light duty vehicles, which tend to be installed with precious metals containing diesel oxidation catalysts (DOC), a NOx scrubber, and a diesel particulate filter (DPF) to adhere to the respective standards. Some catalytic conversion systems are base metals intensive, such as the selective catalyst reduction (SCR) catalyst which is mostly used in the HDD sector. Smaller cars, which are predominant in Europe, will more likely have platinum, palladium and rhodium solutions installed.

AUTOCATALYST DEMAND: NORTH AMERICA



Source: GFMS, Thomson Reuters

GASOLINE PALLADIUM DEMAND



Source: GFMS, Thomson Reuters

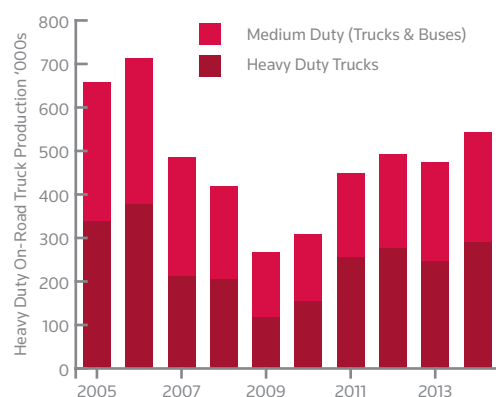
In spite of the uniform emissions legislation in Europe, countries differ in their introduction of further measures to combat emissions. Improving the air quality in Europe has become a major focus in recent years, instigated by both Paris and London (Sweden and parts of Germany already have low emission zones). The main issue is to bring the NOx and PM levels down in the big cities, which are frequently far above their prescribed levels of allowance. Studies have shown that so called real driving conditions on average produce 25% more emissions than test environments utilised by OEMs. The EU has acknowledged this disconnect and is expected to introduce real driving test conditions by 2017. Scrapping old cars and replacing them with models with the latest emission compliant filters will also contribute.

JAPAN

Vehicle production rose by 1% to 9.5M units last year. Continued substitution plus thrifting efforts in a challenging economy resulted in a drop of almost 3% in platinum demand to 0.28 Moz (8.7 t). LDG, responsible for 95% of vehicles produced in Japan, was the main segment that weighed on consumption. Palladium demand, on the other hand, increased by 5%, pushing consumption to 0.89 Moz (27.8 t). Vehicle production is stagnating and expected to decline going forward. With its export share of 44% expected to remain stable, the country will become more reliant on sales abroad.

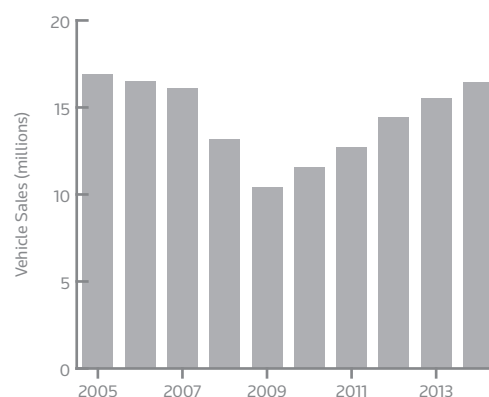
On a more positive note, Toyota and Honda will launch commercial sales of fuel cell vehicles this year. Expectations have been tempered as there still are many challenges that restrict a wider market penetration globally, such as lack of infrastructure, consumer awareness and a high price. But developments are promising and we expect fuel cell vehicles to become a strong growth area for platinum demand in the future.

NORTH AMERICA MEDIUM & HEAVY DUTY VEHICLE PRODUCTION



Source: LMC; GFMS, Thomson Reuters

US DOMESTIC PASSENGER CAR SALES



Source: GFMS, Thomson Reuters

CHINA

In line with economic conditions in China, vehicle production growth slowed last year to a more sustainable 6% reaching 24.1M units. China thus remained the world's largest vehicle producer in the world, having overtaken Europe in 2013. Including both on-road and off-road heavy duty vehicles, China accounts for more than one quarter of global vehicle production.

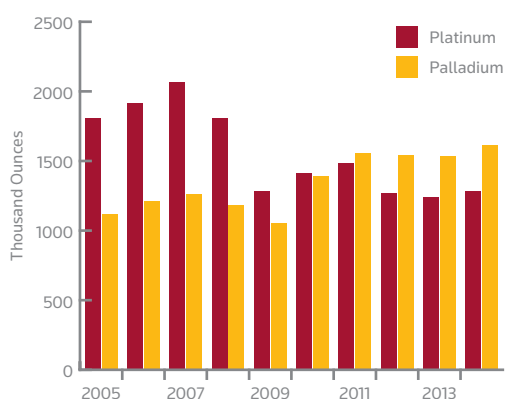
A topic widely debated over the course of the past decade has been the high levels of pollution in the country, particularly in some of the major cities such as Beijing, Shanghai and Guangzhou. Emissions of carbon monoxides (CO) and oxides of nitrogen from vehicles accounted for about 80% and 40% respectively of total pollution last year and together with the significant presence of PM have created a detrimental health environment. Internal pressures have been mounting to improve the situation and various measures have been implemented, however more will have to be done.

Plans to scrap a significant amount of old vehicles are

already in place and increased efforts to enforce stricter emission compliance are underway. Estimates vary wildly, but in general it is perceived that between 10% and 20% of vehicles on the road in China do not comply with the latest vehicle standards. In addition, various cities have introduced restrictions on vehicle licences, but that merely seems to be a drop in the ocean in the approximately 240M vehicle market. Emissions standards vary, with a nationwide rollout of China 4 recently implemented and the introduction of China 5 in major cities. This latest legislation will most likely require an additional DPF filter to further reduce PM levels, which is beneficial for future PGM consumption.

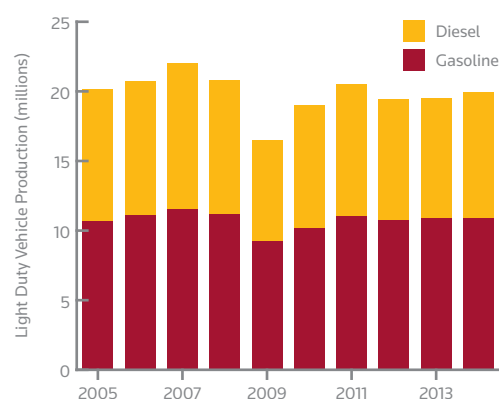
Demand for platinum in autocatalyst applications in China rose a whopping 27% to 0.28 Moz (8.8 t). Substitution pressures are less present in China. Diesel applications, both light and heavy duty vehicles, tend to be supported by the use of platinum, whereas the light duty gasoline sector largely adopts of palladium-based formulations. Palladium demand followed a similar trajectory as platinum, albeit slightly less extravagant, expanding 10% to 1.53 Moz (47.7 t) last year.

AUTOCATALYST DEMAND: EUROPE



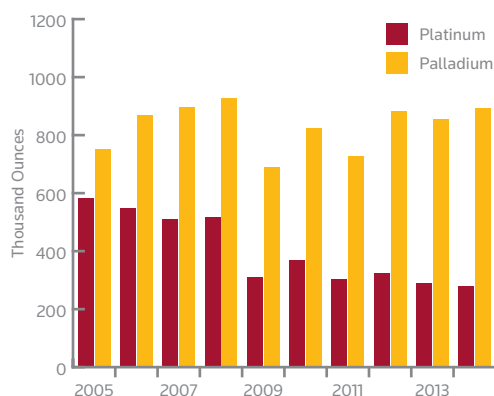
Source: GFMS, Thomson Reuters

EUROPEAN LIGHT DUTY VEHICLE PRODUCTION



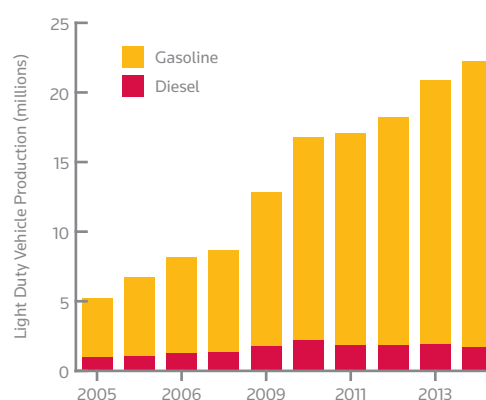
Source: GFMS, Thomson Reuters; LMC

AUTOCATALYST DEMAND: JAPAN



Source: GFMS, Thomson Reuters

CHINESE LIGHT DUTY VEHICLE PRODUCTION



Source: GFMS, Thomson Reuters; LMC

OTHER REGIONS

Our Other regions group represents a lot of different vehicle markets across the globe that all have their individual challenges and emissions legislation time schedules. The most interesting stories have been the three major countries reducing the group's production by 4% to 18M units, namely India, Brazil and Thailand. The latter two recorded declines in vehicle production of 16% and 22% respectively.

The main reason for Brazil's poor performance can be attributed to significant economic slowdown plus surging inflation, draughts and the Petrobras scandal, which hampered investor and consumer confidence. Exports also slumped due to economic woes in Argentina. In addition, government-controlled banks' who pushed car loans in recent years' slowed their lending.

Thailand on the other hand posted a considerable slowdown in vehicle production, driven by the unwinding of the government-led tax break for first-time vehicle buyers. Carmakers suffered a further blow from anti-government street protests that paralysed parts of Bangkok and undermined the economy

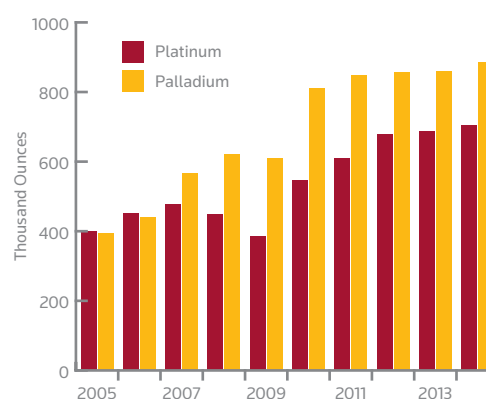
India is the largest vehicle producer in the Other regions group, representing almost a third of the total. India, however, scores one of the poorest marks on the Environment Performance Index and on air quality. Last year vehicles were responsible the bulk of NOx, PM, sulphur dioxide and CO2 emissions in India. The country currently has Bharat Stage IV in place in the major cities, which will be extended to five other provinces in 2016 before being rolled out nationwide in 2017. This legislation requires sulphur content to be reduced to 50 ppm, from the 350 ppm of BS stage III. However, the uptake of BS IV technologies has been rather

disappointing due to a loophole in the legislation which allows vehicles registered outside BS stage IV emission zones to enter the BS regulated cities.

The Indian government is now urging car manufacturers to pull forward the installation of Bharat stage V and VI emissions legislation to 2019 and 2023 respectively. This is an understandable measure, but at the same time somewhat surprising considering stage IV has still not been rolled out nationally, not to mention the still available tax loophole. More strict emissions regulations going forward suggest that the upside for increased demand for PGM's from this region is huge.

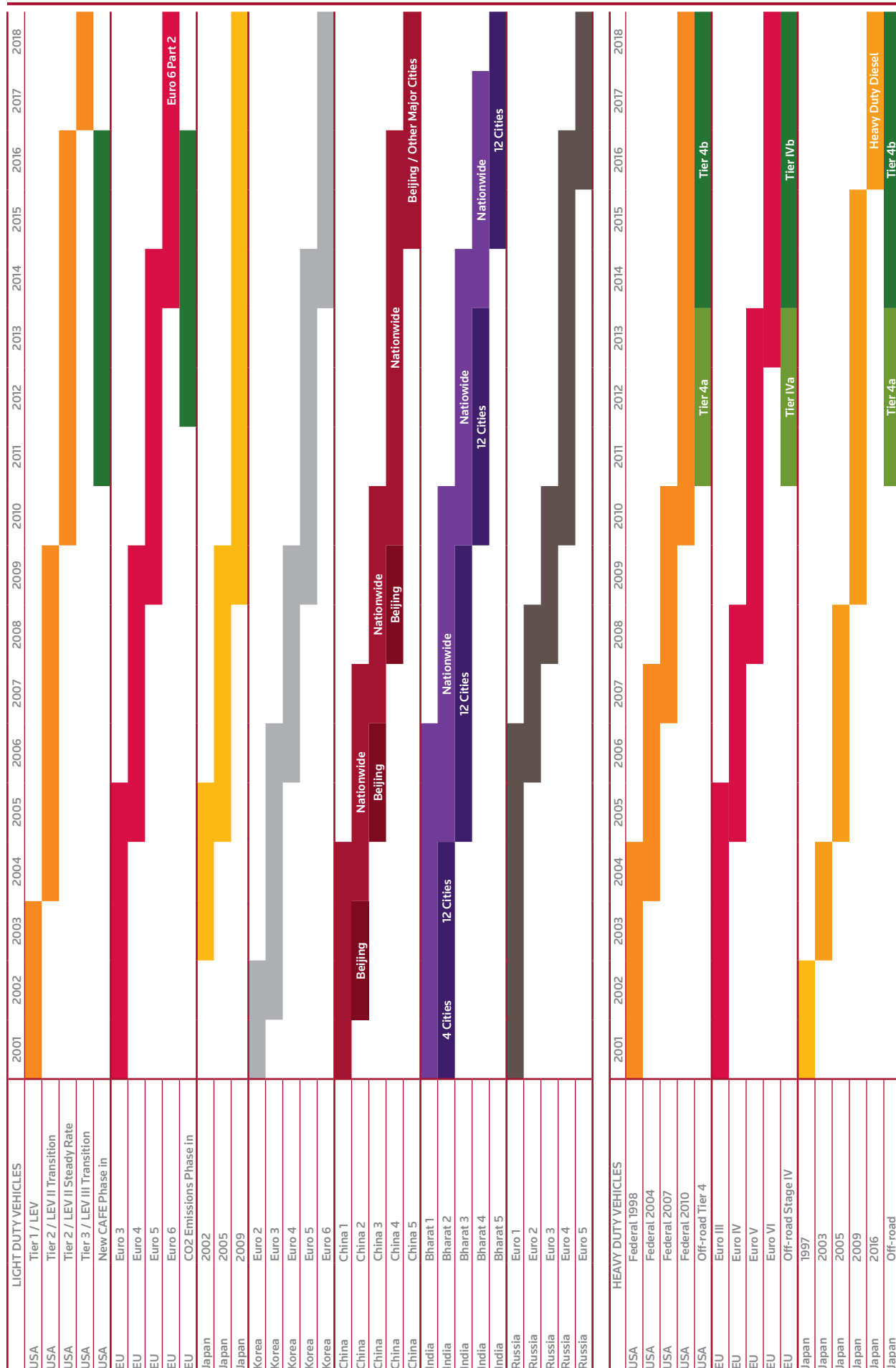
Last year, **platinum** demand rose a modest 3% to 0.71 Moz (22.1 t) mainly driven by increased demand from the heavy duty diesel on road and off road segments. Both segments have seen a modest rise in aftertreatments installed in various countries supporting both platinum and palladium consumption from the region. **Palladium** demand rose 3% to 0.89 Moz (27.6 t) last year.

AUTOCATALYST DEMAND: REST OF WORLD



Source: GFMS, Thomson Reuters

HIGHLIGHTS OF EMISSION STANDARD TIMETABLES



JEWELLERY

- *Global platinum jewellery fabrication declined by 3% to an estimated 2.57 Moz (79.9 t) in 2014 due to a slowdown in demand from Europe, Japan and particularly China.*
- *Palladium jewellery demand fell by 9% to 0.47 Moz (14.7 t), largely as a result of a significant pullback in China and North America.*

In 2014, global **platinum** jewellery fabrication retreated 3% to reach an estimated 2.57 Moz (79.9 t). This resulted in jewellery's share of total platinum demand reaching 35% last year, down from 45% at the start of the millennium. The decline in 2014 was mainly driven by falls in Europe, Japan and China, which saw demand retreat by 3%, 2% and 5% respectively. In contrast, demand for platinum jewellery from North America increased by 3% to an estimated 0.24 Moz (7.6 t), benefitting from a more robust economic environment. While recording a sharper decline compared to most other key regions, China still represented close to two-thirds of global fabrication. This drop in demand from the Asian giant can largely be attributed to the slowdown of the domestic economy, and, to a lesser extent, the continuation of the anti-corruption policy implemented by the Chinese government since mid-2013. Both of these factors led to material decline in sentiment and consumer spending.

Meanwhile, the use of **palladium** in jewellery fabrication fell for the sixth consecutive year, by 9% to 0.47 Moz (14.7 t), the lowest since 2004. The decline can be attributed mostly to China, where jewellery offtake

last year dropped 16%, although it was the smallest annual fall since 2009. China's share of the global total slipped to 36% last year, compared to the peak of 76% in 2005. Lower fabrication demand in China was due to a combination of factors discussed in detail below, with the declining trend not looking as if it will be tempered any time soon. Europe is the only region to have registered growth for palladium jewellery demand last year, thanks to continued strength in carat palladium, although demand remained largely confined to the bridal sector.

CHINA

Following a 2% rise in 2013, **platinum** jewellery fabrication declined 5% to an estimated 1.68 Moz (52.3 t) in 2014. In value terms, demand fell by 12% to approximately US\$2.3 billion, as the average price of platinum fell by 7%. It is worth highlighting that our jewellery fabrication series has undergone a considerable upward revision since the GFMS Platinum & Palladium Survey was last published. This is chiefly due to new information gathered during extensive field research last year, which has necessitated a thorough review of previous estimates. Specifically, feedback from the local jewellery trade indicated that our estimates for domestic consumption may have been overly conservative, underestimating the number of jewellery fabricators that have entered the platinum jewellery market in the last few years.

Thomson Reuters' estimate for platinum jewellery demand in China is also based on our interpretation of new bullion inflows to mainland China and neighbouring Hong Kong, as well as the total volume of metal traded on the Shanghai Gold Exchange (SGE). More importantly, though, our assessment is based on information collated during our many research trips to Shenzhen, China's centre for gold, platinum and palladium jewellery fabrication.

Traditionally, platinum jewellery offtake is at its strongest in the second and fourth quarters each year, helped by the Chinese Labour day holiday in May and National Day holiday in October, and during the run up to the celebrations at the end of the calendar year. Looking at the trend in 2014, however, it was the first quarter that performed the strongest out of the four quarters, while the second quarter was especially weak. We believe softer demand in 2014 was primarily due to the weakening Chinese economy, and the bundle selling with gold which took place in 2013 but did not repeat in 2014. These will be elaborated on in the following paragraphs.

JEWELLERY DEMAND

PLATINUM

(000 ounces)	2013	2014
North America	235	243
Europe	211	205
Japan	327	321
China	1,776	1,680
Other regions	110	119
Total	2,659	2,569

PALLADIUM

(000 ounces)	2013	2014
North America	75	65
Europe	149	151
Japan	50	47
China	204	172
Other regions	42	40
Total	521	474

Source: GFMS, Thomson Reuters

As outlined in previous editions of the GFMS Platinum & Palladium Survey, it can be challenging to analyse China's and Hong Kong's platinum inflows and outflows in isolation, as they often present more uncertainty than clarity, consequently leaving room for potential miscalculations and overestimation. However last year's platinum imports were a good proxy, as we believe the number of round-tripping activities that inflated metal flows in the past have been greatly reduced, given that the profit margin engaging these activities has been shrinking to less than 1%. A review of available statistics reveals that the Hong Kong platinum bullion imports decreased 2% to 1.4 Moz (43.4 t) last year. The volume was still 13% below the recorded peak in 2009.

Chinese mainland statistics, on the other hand, reported a 22% year-on-year decrease in platinum imports to 2.37 Moz (73.8 t). The sizeable drop in imports can be attributed to several factors, including a softer domestic economy that negatively impacted the consumption of platinum, particularly from the chemicals sector, where several petrochemical projects were delayed or suspended due to lacklustre demand and issues with obtaining funding; and the destocking activities as companies scrambled for liquidity, supplying the market with the inventories they had built up during 2013 and in prior years, thus increasing available domestic supply.

The majority of China's official platinum imports were destined for the Shanghai Gold Exchange (SGE), the country's only platform for purchasing the metal at a zero VAT rate. The remaining metal was brought in by industrial end users (autocatalyst and glass panel fabricators, for example). The turnover on the SGE declined by 28% to 1.04 Moz (32.4 t) last year.

China's annual GDP growth rate was 7.4% in 2014, which missed its official 7.5% target and was the slowest

growth since 1990. The softening of the Chinese economy last year was driven on several fronts, including: lacklustre exports demand; cooling of domestic property prices; local governments struggling under heavy debt burdens; and people under-estimating the impact the implementation of the anti-corruption culture introduced by the government would have on gifting activities throughout various sectors and across the country. Indeed, the crackdown by government authorities had a material impact on the economy, driving down sentiment and as a result consumer spending. A more accurate measurement on the growth of the Chinese economy can be through examining its electricity usage, which only grew 3.8% for the year.

Following healthy demand growth of 9% for platinum jewellery in 2012, Chinese demand slowed in 2013, with fabrication expanding by only a 2% year-on-year basis. However, we believe the fabrication number was considerably higher than the actual retail consumption that year. In 2013, the acute price drop in gold caused a gold buying frenzy in China, with bargain hunters clearing out all supply chain inventories. Fabricators were forced to work overtime in order to fulfil their order books, with many unable to meet commitments due to the surge in demand.

Several of the larger fabricators took advantage of this wave of demand by introducing a strategy of selling jewellery items in bundles to enhance their profit margins. Indeed, if retailers wanted to get their hands on gold jewellery from fabricators, they were required to enhance their orders by including platinum jewellery pieces as well in their wholesale purchases.

As a result of this successful strategy, the volume of platinum jewellery fabricated was inflated. However, importantly, these additional volumes did not necessarily flow through to higher retail sales. As the appetite for gold fell sharply in 2014, driving down domestic consumption, these bundle selling strategies were simply retired as fabricators had lost their leverage.

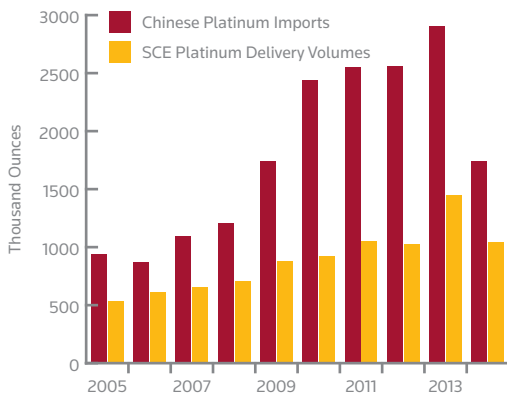
As mentioned above, Chinese demand for gold jewellery pieces cooled off considerably in 2014, due to the advanced consumption the year before and a lack of price volatility. As a result of the material drop in foot-fall retailers shifted their selling strategies by re-allocating shelf space to higher yielding items such as carat gold (18-carat), gem sets and platinum jewellery pieces. This reallocation of shelf space and increased and targeted promotion of platinum by retailers provided a much needed boost to margins, but also provided

CHINESE JEWELLERY FABRICATION



Source: GFMS, Thomson Reuters

CHINESE PLATINUM IMPORTS



Source: GFMS, Thomson Reuters; SGE

the opportunity to work through excess inventory that resulted from the bundle purchases in the year prior.

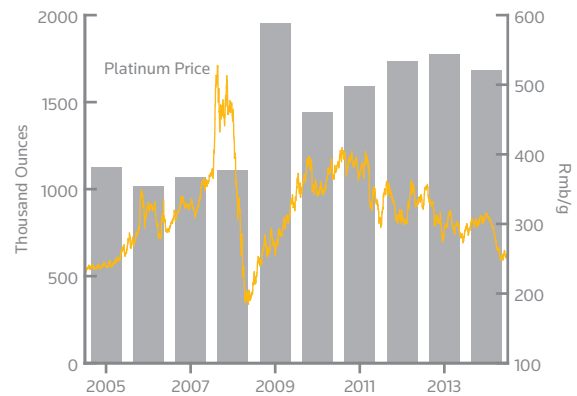
Turning to 2015, we believe that platinum jewellery demand is likely to return to growth albeit at moderate levels. This may surprise given the Chinese government recently lowered the target GDP growth to 7% in 2015, suggesting even maintaining that target may be a challenge. However, demand for consumer goods is likely to be a beneficiary of any stimulus measures the government introduces in an attempt to kick start the economy. Lower ticketed prices for platinum jewellery as retailers adjust to the lower spot prices of the white metal should also boost domestic consumption this year.

After surging by 53% in 2014, the Shanghai Stock Exchange Composite Index rose another 16% in the first quarter of 2015. While in theory a strong domestic stock market could drain capital away from the jewellery sector, in the longer run, any wealth created from the stock market could stimulate the demand for jewellery and other luxury goods. China's total platinum jewellery fabrication in the first quarter this year was on par with the level achieved during the same period last year with the trade expecting a lift in the second half.

Palladium jewellery fabrication in China dropped 16% last year, to an estimated 0.17 Moz (5.3 t). This was the sixth consecutive annual decline, but the smallest annual fall since 2009. That said, there were several negative forces facing the palladium jewellery industry, and it could possibly become much worse in the next two years.

Palladium imports into Mainland China are estimated to have risen 4% to 0.67 Moz (21.0 t) in 2014. The United Kingdom was the largest supplier of the metal to the Asian giant, followed by Japan. It must be pointed out, though, that the vast bulk of metal imported officially to

CHINESE PLATINUM JEWELLERY FABRICATION



Source: GFMS, Thomson Reuters

the mainland was destined for autocatalyst fabricators and other industrial sectors. Therefore changes in these import figures give us little clarity on the dynamics of the local palladium jewellery market. We thus benefit significantly from our extensive field research, our estimates for palladium scrap supply, and to a lesser extent, the flow of metal from Hong Kong.

One reason behind the importance of Hong Kong in the bullion trade is that palladium is still not available on China's Shanghai Gold Exchange (SGE), the country's official physical precious metals exchange, thus exposing importers to the full 17% VAT on imported metal. With no official price-making mechanism guidance and no official trading platform from which to source physical metal (unlike gold, platinum and silver), the bulk of the metal flow remains in the hands of dealers who are able to bridge the gap between international pricing and market practices and the still restricted foreign currency system in China. In addition, the proximity of Hong Kong to neighbouring Shenzhen, the hub for gold, platinum and palladium jewellery fabrication in China, makes Hong Kong the obvious location for the unofficial cross-border physical business.

After growing 25% in 2013, palladium imports into Hong Kong surged by 50% in 2014, to 0.68 Moz (21.1 t). However it was still a far cry from the record 1.45 Moz (45.0 t) imported during 2008. Close to 60% of the Hong Kong imports last year were from Russia. While analysing the Hong Kong/Mainland China bilateral metal flow, one has to keep in mind physical investment, which can involve private investors sourcing metal in Hong Kong yet holding stocks in Mainland China. We believe the huge surge in palladium imports into Hong Kong in the last few years was mainly due to physical investment and industrial usage (autocatalyst), rather than jewellery fabrication.

Unlike platinum, palladium jewellery suffers from impediments such as an absence of a transparent pricing mechanism (palladium is not traded on the Shanghai Gold Exchange) and relatively low recognition of the metal among the general public. Due to the low transparency of the palladium jewellery market, and only very few fabricators in the jewellery industry, palladium jewellery suffers from a huge pricing variance in the Chinese jewellery industry, which is even more obscure than the platinum jewellery market. A lack of marketing promotion or an adequate platform for consumers is also a big obstacle. Consumers do not have the chance to buy palladium jewellery if it is not on the shelves of the retailers, but at the same time retailers will not take the risk of stocking palladium jewellery unless there is strong demand for the product.

Palladium jewellery demand has also been weighed down by the solid popularity of the non-pure gold jewellery pieces, mostly for 18-carat gold jewellery. This has in turn enticed manufacturers to shift part, if not all, of their fabrication capacity to the latter. Adding to poor consumer awareness and a negative prejudice against palladium, the absence of a regulated and transparent market also prevented an expansion of fabrication beyond its well established base in Shenzhen.

Palladium as an investment also has a poor reputation in China. Back in 2008 and 2009, when precious metals fell sharply amid the global financial crisis, bargain hunters targeted platinum investment, when its price was lower than gold. Unfortunately, some took advantage of the situation and sold palladium while marketing it as platinum, to gain the price differential. This fraud made the consumer market even more cautious and created a wary attitude toward palladium, as it may be difficult for the general public to distinguish the difference between platinum and palladium, even with the metal on hand.

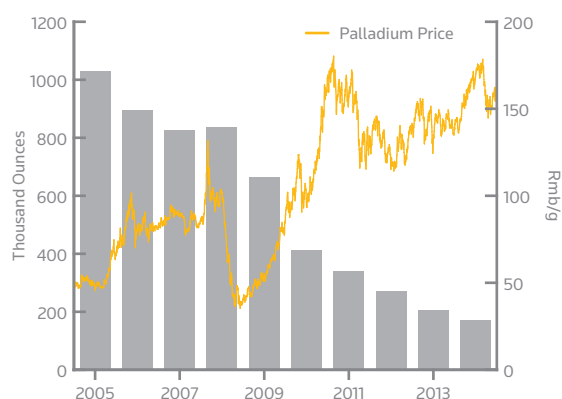
Turning to our forecast for this year, we expect palladium jewellery demand from China to continue declining. A lack of attention to the metal from Chinese consumers will persist, especially in the face of a strong domestic equities market. Even if there are more aggressive marketing campaigns focused on promoting palladium jewellery, it will take some time for many consumers to accept palladium as a viable precious metals alternative. Significant volatility and price upswings in palladium should also help gain traction in the metal, but it will most likely stir up interest from the investment side (physical bars, ETFs) first before generating any significant growth in jewellery demand. Demand for palladium jewellery fell by over 20% year-on-year for the first two months of this year.

Jewellery fabricators in general are not optimistic about the future of palladium jewellery in China. In fact, one of the largest palladium jewellery fabricators in China is considering exiting the palladium jewellery business within the next two years, switching focus to gold carat jewellery designs, due to the lacklustre demand and the dim outlook in the country. This particular fabricator has at least a third market share of the domestic palladium fabrication industry, and if they do indeed leave this sector, it will mark another significant blow to this already weak market and perhaps signal the final downfall of this relatively short lived jewellery sector.

JAPAN

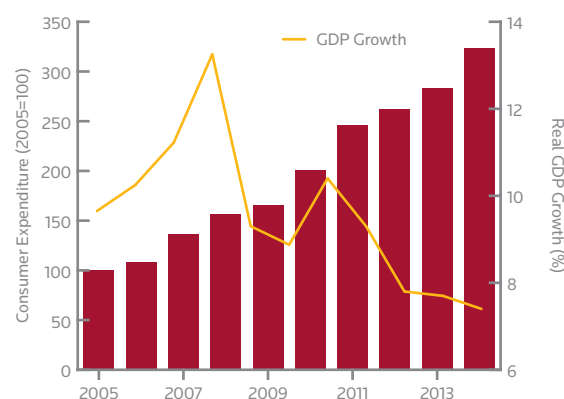
Japanese **platinum** jewellery fabrication reversed the gains from the previous year to register a fall of approximately 2% in 2014 to an estimated 321,000 ounces (10 t) on a gross basis, the first decline since 2010. This was, however, a surprising outcome for many, who believed that after a robust start to the year 2014 would deliver another increase for the industry.

CHINESE PALLADIUM JEWELLERY FABRICATION



Source: GFMS, Thomson Reuters

CHINESE ECONOMIC INDICATORS



Source: GFMS, Thomson Reuters; National Bureau of Statistics

Demand in early 2014 was indeed quite healthy at the retail level as consumers rushed to purchase goods ahead of the 3% rise in the consumption tax rate, which was lifted to 8% on 1st April. Jewellery was no exception, with retailers reporting a surge in demand for all jewellery segments, as consumers front-loaded purchases ahead of the tax hike.

Demand, however, faltered thereafter as the economy again failed to find a firm footing, with retail sales growth declining in the second quarter by almost 2% according to the Japanese Ministry of Economy, Trade and Industry, before slipping back into recession in the third quarter. The lack of growth affected consumer sentiment and discretionary spending as the consumption tax rise curbed consumers' purchasing power. This was because the broad price increases outpaced wage growth, causing a steady decline in real wages.

The higher-end of the platinum jewellery market was not as badly affected by the slowdown as the more generic segments, with demand for imports and high-end items holding up well. In addition to the country's economic malaise, an unseasonably wet summer holiday period in 2014, typically when foot traffic is at its highest level, also did not help retailers either.

Field research last year found that the platinum market was the most resilient of the precious metals markets in 2014 despite the price increasing in local terms, easily outperforming gold jewellery fabrication, which retreated by 8% year-on-year. Indeed, platinum jewellery demand rebounded faster than most retail segments once the economy began to show the first glimmers of a rebound. The modest recovery was aided by a drop in the yen platinum price to below ¥4,240/g in October, the lowest level since July 2013. While this had little impact on the ticketed prices as retailers largely failed to pass on the

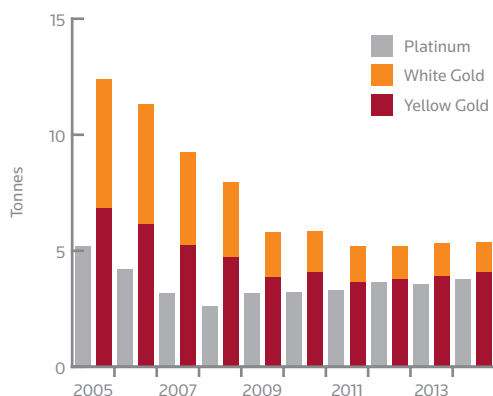
savings, it did stimulate the fabrication sector due to a rise in restocking levels.

Another important boost to domestic retail sales last year, and one that helped offset a deeper decline, was a significant uptick in tourist visitors. According to Japan's National Tourism Organisation, international tourist arrivals rose 29% last year to a record 13.4 million, with their spending increased by 40% to more than yen 2 trillion. This significant rise was led by a 83% jump in Chinese visitors, who like many who travelled to Japan in 2014, were attracted by the plunge in the yen which increased their purchasing power and helps to explain why the branded and high-end sector was broadly well-supported. Furthermore, the weaker Japanese currency last year is also believed to be responsible for the turnaround in the export trade, which according to available customs figures reversed the hefty fall seen in 2013 to record a sizable increase. A sharp rise in gross weight shipments to Switzerland helped offset weaker jewellery exports to Australia and Hong Kong, which together remain the top three export destinations.

Domestic demand growth in volume terms was stronger among contemporary chain and discount stores in 2014. The gains in these sectors helped offset the modest falls seen in departmental stores and independent retailers, with the largest declines seen in the Kimono & Apparel channels. The bridal segment continues to dominate offtake, with platinum jewellery retaining a market share of over 80% in this segment, down slightly on 2013 estimates. In contrast, the non-bridal segment, where platinum maintains a far lower market share than gold, enjoyed a rise in market share. Indeed, there has been a sustained growth in the latter segment over a number of years now and is seen as an area where the industry expects further expansion.

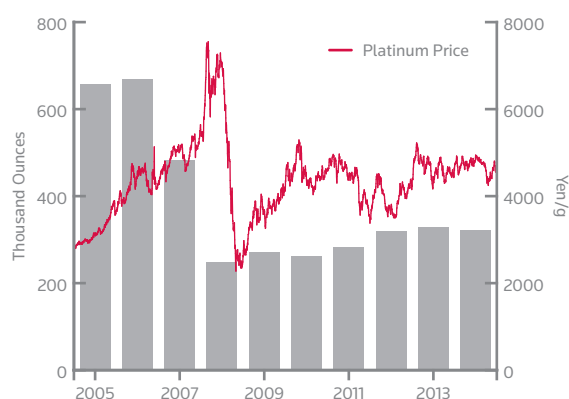
The bridal sector remains the backbone of the platinum jewellery in Japan, accounting for 20% of the entire jewellery market, and traditionally the most price inelastic. Weddings are generally planned for the summer months. In 2014, there were clear signs early in the year that consumers planning a wedding, or indeed an engagement, brought forward purchases to save the 3% rise in consumption tax prior to April. This left the market weaker thereafter as part of the consumption from the bridal segment had already been satisfied. Despite platinum's market share of wedding jewellery easing last year it is still highly regarded as the metal of choice for most couples. Indeed, platinum wedding rings enjoy a market share of almost 80% of the precious metals space compared to approximately 7% for white

JAPANESE JEWELLERY FABRICATION



Source: GFMS, Thomson Reuters; Japan Chain Makers Association

JAPANESE PLATINUM JEWELLERY FABRICATION



Source: GFMS, Thomson Reuters

gold (6% for yellow gold), while for engagement rings the market share is even more impressive at almost 94%. Despite these striking numbers, the bridal sector faced stiff headwinds last year. Firstly, for economic reasons, couples reigned in spending in an uncertain economy as the country slipped back into recession; then competition from other consumer goods (household durables, for example) also limited expenditure. Finally, the further decline in Japanese marriages has also played a significant role in the erosion of offtake in this segment with marriages retreating to near 650,000 in 2014.

One notable trend that began in the bridal sector and which has continued to expand into the wider fashion jewellery market is the adoption of higher purity platinum used in jewellery. This continued last year with fabricators indicating that Pt990, Pt950, and Pt999 purity gained market share at the expense of Pt850. The greatest growth was seen in the Pt950 segment, which dominates the bridal sector and is now moving rapidly into the fashion segment where retailers are now requesting cast jewellery in higher purity styles.

The Pt850 market was initially aimed at the younger generations but clever marketing and lower metal prices have seen an uptick in the higher purity designs in recent years. Moreover, with the bridal sector under pressure and expected to record modest growth at best in the coming years, retailers are focusing heavily on the non-bridal or the self-gifting market for possible expansion.

Fashion and demand trends have shown only minimal change from previous years, perhaps with the exception of wider usage of precious stones and gems and the aforementioned rise in purity. Retail sales are dominated by the bridal segment at over 35% of the total platinum jewellery sold, although it is worth acknowledging that growth was observed in the fashion segment, where

necklaces/pendants and earrings both picked up market share.

Turning to Japanese **palladium** jewellery, we estimate that offtake declined 7% last year to 47,000 ounces (1.4 t), the first decline in three years. Palladium is primarily used in jewellery fabrication as an alloying ingredient, used in both white gold and platinum. Given that both of these precious metal segments retreated in 2014, it should not surprise that offtake of palladium was also a casualty.

As a white metal used for jewellery in its own right palladium is not widely recognised or accepted extensively in Japan as a standalone product. It does, however, maintain a niche clientele within the bridal market, particularly for wedding bands for men. Another important factor last year that traders suggested contributed to the annual decline was the drop in platinum's premium over palladium, providing less incentive to migrate to the cheaper metal. The premium is currently (late April 2014) at \$375/oz, from \$700/oz at the end of 2013, and closer to \$1,000/oz in 2012.

NORTH AMERICA

Platinum jewellery fabrication rose to 0.24 Moz (7.6 t) in 2014, a 4% increase over the previous year. This growth was slower than the 5% increase in 2013, mostly due to weaker consumer demand growth domestically. Jewellery store sales fell by 1% last year in value terms, according to the US Census Bureau, a contrast to the 8% growth in 2013. Also, retail sales rose 8% in ounces terms, a slower rate of growth than 11% in 2013, according to Platinum Guild International's "Retail Barometer" report.

Slower fabrication growth also can be attributed to increased consumption of foreign jewellery last year. Platinum jewellery imports surged 61% in volume terms, mostly a function of the 13% appreciation of the trade-weighted dollar by the end of 2014 from the end of 2013. A stronger dollar made imports cheaper, which was especially advantageous to platinum jewellery importers, given the majority share of imports attributed to Western Europe. Last year, Western Europe accounted for 72% of total US platinum jewellery import volumes, up from 58% in 2013. Additionally, imports from the region doubled from year ago levels while imports from other countries only increased by 7%. Given the euro's historically higher value over the USD, wholesalers took advantage of the relatively stronger dollar to import luxury brand and high-end jewellery from France and

other European countries. Domestically fabricated platinum jewellery's share of retail sales therefore fell to 79% in 2014 from 82% in 2013.

Platinum jewellery fabrication in the United States is predominantly for wedding bands and last year the number of weddings is believed to have increased by around 2%. An increase in the number of weddings is typically positive for platinum demand. Indeed, Tiffany & Co. reported a 5% increase in sales within its engagement & wedding bands category, the bulk of which is made with platinum. Only 8% of the segment was gold. Additionally, the average price point for this category was flat from 2013, which, holding all factors equal, suggests an increase in platinum usage. Platinum is the second most popular choice after white gold, which commands around a 70% share of engagement ring sales in the country. White gold is cheaper; however since the turn of the century, platinum has gained in popularity and market share. Particularly, millennials are more interested in platinum rings because of their greater affinity toward more unique and rare options. The estimated increase in the number of weddings last year comes from an increase in the marrying age population and a small rise in the portion of couples opting to wed. The 2% growth in weddings last year is in contrast to the compound annual decline of 0.7% from 2000 to 2012, according to statistics from the Center for Disease Control and Prevention.

Palladium jewellery fabrication fell to 0.07 Moz (2.0 t) last year, down 13% from a year ago. Palladium is not as widely used in the United States as platinum; however it has gained more use in wedding bands in recent years, particularly when gold prices were higher than current levels. Palladium more often is used in lieu of platinum for the lower price, particularly in men's wedding bands, when white gold is not preferred. Last year's decline was

mostly due to the narrowing of the platinum:palladium ratio, which made the cost savings of palladium against platinum less enticing to potential buyers.

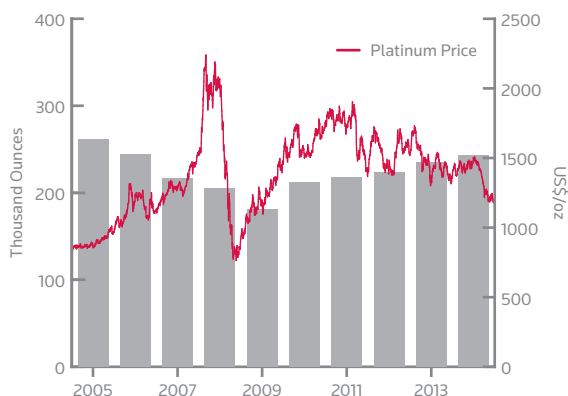
EUROPE

European **platinum** jewellery fabrication dropped by 3% in 2014, the seventh consecutive annual decline. The drop in demand, which fell to 0.21 Moz (6.5 t) last year is part of a longer term downward trend driven by weak economic conditions and little marketing for platinum jewellery in the region. A key contributor to the weaker fabrication volumes was the lower cost of gold, with the accompanied shift from platinum to white gold. One other factor in most markets was the drop in consumption of platinum jewellery in China, which had a knock on effect to European fabrication centres. European made platinum pieces, in particular watches, in China.

Platinum jewellery fabrication in **Switzerland** fell sharply in 2014, driven by weaker watch sales, but this belies major structural changes in the industry. After a stellar 2013, when sales were up 140% to a record high, hallmarking of Swiss watch cases saw demand drop back by 16% last year. Nonetheless, this was still up 102% from the 2012 level, showing that these higher levels of fabrication are sustainable. Indeed early figures from 2015 show a return to growth in this segment. As before, the Swiss brands import watch cases from other countries and we allocate the fabrication of those imports to their origins.

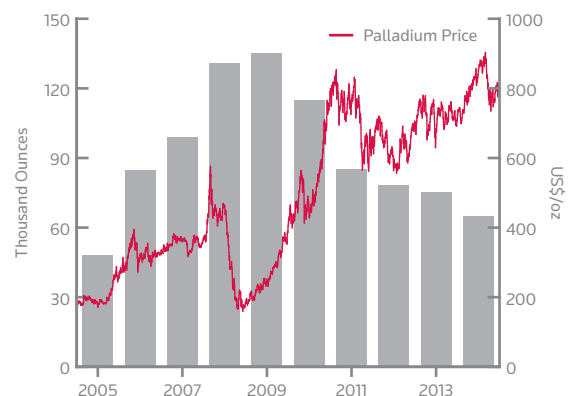
This fall in platinum hallmarking was not due to a fall in the size of the watch industry but was more reflective of a move back to white gold as for most of the year gold was substantially cheaper than platinum. The price differential becomes even greater when one factors in the

NORTH AMERICAN PLATINUM JEWELLERY FABRICATION



Source: GFMS, Thomson Reuters

NORTH AMERICAN PALLADIUM JEWELLERY FABRICATION



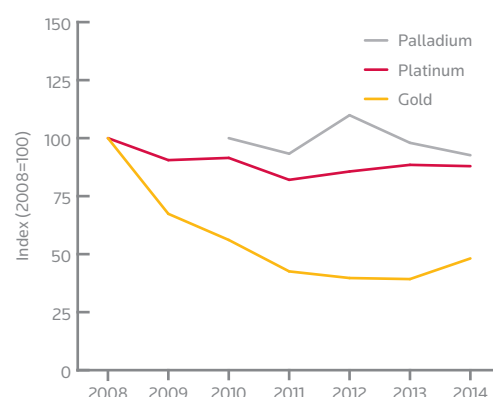
Source: GFMS, Thomson Reuters

higher making cost (due to difficulty in working platinum) and the higher caratage of platinum watches (950) compared to gold watches (18 carat, 750). The shift from gold to platinum in 2013 was partly due to an anti-corruption drive by Chinese authorities and the decline we saw last year was a curtailment on platinum watches as well. Indeed, the share of Swiss watch exports (of all types) to China and Hong Kong, which has been the key growth market actually declined in 2014, albeit only marginally to 25%.

Fabrication of platinum jewellery in **Germany** fell, albeit much less sharply than in 2013 as demand started to stabilise; however, stiff competition from Swiss-based manufacturers persisted. Platinum 600, an alloy, predominantly consisting of platinum (60%), palladium and iridium (a combined 35%) and other metals (5%), with a price range equal to that of 18-carat, continued to see reasonable demand. It is particularly popular with younger consumers. Palladium demand was stable for white gold, while at the lower end of the market there has even been a move towards stainless steel.

Last year, platinum jewellery fabrication in the **United Kingdom** remained flat. This stable picture however masks two distinct trends, driven by lower gold prices in the first nine months, and the reverse picture in the final quarter. High-end gemset pieces are most popular in white gold or platinum, where consumers' choice between the two is driven largely by price differences between the two metals. When white gold reaches or exceeds the platinum price, the switch occurs, however when the opposite is the case, the switch does not happen so readily. This is partly because platinum is a much better setting for diamonds, predominantly because of its higher reflectivity, which shows the stones off to better advantage. With the decline in the platinum premium in the last few months of 2014, hallmarking

UK JEWELLERY HALLMARKING*



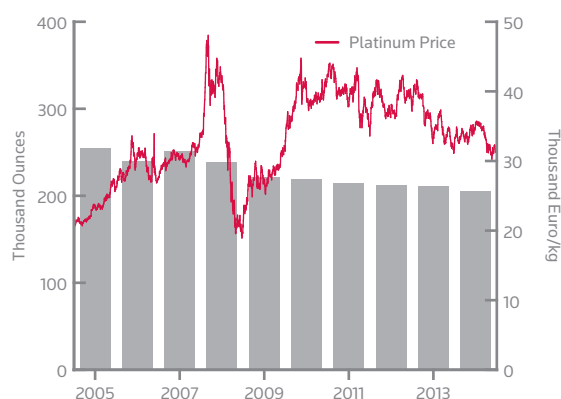
*Hallmarking of palladium required from 2010, Index based on sum of items hallmarked
Source: GFMS, Thomson Reuters; London Assay Office, British Hallmarking Council

statistics showed a significant increase in platinum hallmarking over 18-carat gold.

Tastes are not uniform across the Kingdom, with platinum and white gold more popular in London and the South East where the economic recovery is most pronounced and yellow gold and silver more popular in other districts. It is also important to note that platinum consumption in Britain has a bimodal distribution, with peaks centred before Christmas and during the traditional matrimonial months in the summer. Despite a drop in the hallmarking of plain palladium pieces, demand actually rose in 2014, as gold fabrication, using palladium as an alloy rose substantially.

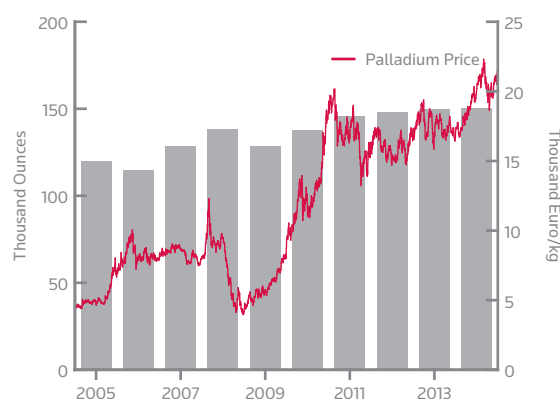
Platinum is only a very small segment of the **French** jewellery market, but demand only slightly declined last year compared to far steeper drops in gold jewellery fabrication. With lower gold prices, price-led switching helped to move higher-end consumers from platinum to white gold, while at the same time the lower end of the gold market shifted to silver, costume jewellery and out of jewellery entirely. Another factor in the decline in

EUROPEAN PLATINUM JEWELLERY FABRICATION



Source: GFMS, Thomson Reuters

EUROPEAN PALLADIUM JEWELLERY FABRICATION



Source: GFMS, Thomson Reuters

platinum jewellery in France is the decreasing prevalence of marriage.

We estimate platinum jewellery fabrication in **Italy** to have declined by 3% last year. The mass market in general does not tend to prefer platinum jewellery as it is considered too expensive, particularly when at a premium to gold. However the reversal in the platinum:gold premium and strong Italian jewellery exports meant that last year's decline was the smallest percentage drop since 2001. Having said that, the 2014 number is less than a third of the 2001 total.

An annual decline in fabrication for every year this millennium has been driven by a challenging economic climate, a decline in the number of marriages and thus falling demand for wedding bands. In general, the preference for jewellery leans towards yellow gold, but on the back of fashion related developments, palladium usage sometimes increases as well. In the cases where white gold is used, palladium has become the metal of choice, chiefly as a result of the tighter legislation on the use of nickel. Fabrication of jewellery containing palladium in Europe rose slightly by 1% year-on-year to 0.15 Moz (4.7 t), marking the fifth consecutive increase and the highest number on record. Europe was the only major regional demand category to post gains in palladium jewellery last year. The region's share of global fabrication has now risen from under 10% in the mid-2000s to 32% last year.

Palladium's role in jewellery has increased in importance over the years particularly as a non-visible but much cheaper alternative to platinum in gold-containing pieces. That trend continued last year but at a slower pace of growth due to the 24% decline of platinum's premium over palladium. This effect was buffeted by lower gold prices, which led to switching from platinum to white gold, which often contains palladium in alloy especially after nickel-free legislation was introduced. There was a mixed picture across the continent as France and Spain and the domestic Italian market continued to contract, driven by either structural factors or a challenging economic environment and a lack of promotion or advertising of palladium-containing jewellery. Consequently, the majority of customers in this area continue to prefer yellow gold jewellery pieces. Strong Italian exports helped to drag that country's palladium fabrication to increase year-on-year, the first time since 2007.

INDIA

Fabrication of **platinum** jewellery for domestic consumption in India rose by 24% in 2014 to 0.07 Moz (2.1 t), accounting for about 3% of the global total, as against 2% in 2012. That said, we have revised down the historical demand series based on fresh information gathered on fabrication volumes. End consumer demand continued to grow at a healthy pace, largely supplied from domestic fabricators and to a lesser extent from imported product, the latter at very low volumes as the customs duty of 15% on jewellery has been a significant deterrent, leading to a notable decline in imports of platinum jewellery. Restrictions with respect to gold imports and non availability of gold metal loans on the other hand are seen to have added to liquidity tightness, with retailers promoting sales of high value and high margin products.

Increased interest in platinum jewellery among some of the largest gold jewellery fabricators has also been attributed to the need to diversify product offerings, particularly to attract Millennials. One of the notable developments in 2014 on the marketing front, which has benefited demand, was the Platinum Guild International's (PGI) launch of the bridal jewellery collection brand EVARA for the first time in India.

One of the key factors driving fabrication volumes was the expansion of stores by jewellery retailers within the formal sector during 2012 and 2013, in addition to promotions initiated by the PGI in various regional languages. In volume terms the sales were underwhelming; even so, the gross margins charged per piece have attracted retailers to promote this category. In contrast to gold, platinum tends not to be sold basis the daily market price; instead it is sold with a fixed price tag, and margins are easily about 35 to 40%.

Platinum jewellery in India has never been positioned or marketed to the masses and has continued to be bought by consumers primarily in the higher end of the economic pyramid. While wedding bands continue to be the main volume driver, demand for jewellery in the men's category is growing exponentially (from a low base). This is specifically in the wrist band and chain category where item weights are significantly heavier per piece. Diamond set platinum jewellery has been popular for some years now and continues to be another high value driver for retailers, leading to more shelf space in showrooms.

DENTAL

— *Demand for palladium in dental applications declined 10% last year to an estimated 0.46 Moz (14.4 t), dragged lower by a sizeable fall in North America and Japan.*

Dental demand for palladium in **Japan** is estimated to have declined by 8% last year, reaching 243,000 ounces (7.5 tonnes), extending the long term trend of declines. This is largely determined by the level of demand for Kinpala 12 ('kin' is Japanese for 'gold', and 'pala' is 'palladium' abbreviated), the alloy that is used in almost 90% of dental treatments. Indeed, the government stipulates that to receive the generous medical rebate the alloy must contain a palladium content of 20%. This subsidy is determined by the relationship between the 'set' price – the amount paid out by insurance, fixed periodically by the Ministry of Health, Labour and Welfare and the actual material price (the cost of the alloy).

There were a couple of additional influencing factors last year that contributed to the annual decline in precious metals offtake. First, the domestic economy retreated back into recession during 2014 which may have seen consumers delay non essential dental work, and second, a change in the aforementioned insurance rebate that restricted cover to just the front five teeth weighed on demand. A move that industry contacts suggested was partly responsible for the drop last year, while a shift by younger consumers to more cosmetically pleasing zirconia and lithium ceramic applications is also having a bearing on the volume of Kinpala consumed.

North American palladium dental fabrication fell to 148,000 ounces (4.6 t), 9% below the 2013 level. Palladium's price increase weighed on demand last year, but substitution was a more important factor behind the drop. Palladium is mainly used in porcelain-fused-metal (PFM) crowns, which have been the predominant restoration of choice since the 1970s. During the 1980s, non-precious metals crowns gained market share in the

US due to the lower price, however PFMs maintained a majority share. Around 2005-2007, however, new monolithic restorations were introduced (unlike PFMs, monolithic restorations are not comprised of two distinct layers. Gold crowns are considered monolithic and remain to this day the best quality dental restoration) such as solid zirconia and lithium disilicate ceramic crowns.

These alternatives gained market share at an exponential rate over the past several years. Solid zirconia became increasingly popular because it degrades opposing teeth at a slower rate relative to PFMs and has a similar aesthetic. We have revised lower our estimates for North American palladium dental demand since 2007, as our initial estimates for PFMs' loss in market share were underestimated. According to LMT Research, metal-based units account for 40% of US crown and bridge restorations, compared to 80% in 2006. Going forward, it is likely that palladium demand from this segment will decline further as a consequence of increased usage of these alternative crowns.

Palladium dental fabrication in **Europe** continued to ebb in 2014, dropping sharply to 60,000 ounces (1.9 t). This represents the fourth successive annual decline. The main driver behind this structural decline has been a combination of technological developments of alternative materials and a wider adoption of these lower valued materials, namely ceramics, chromium-copper alloys or in some cases even plastics. Lower gold prices did not help either, as the incentive to switch to palladium based alloys somewhat eased.

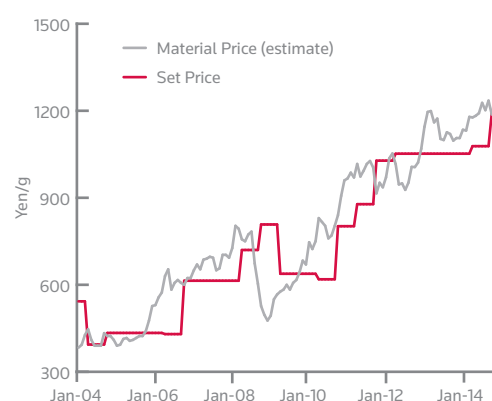
DENTAL DEMAND

PALLADIUM

(000) ounces	2013	2014
North America	163	148
Europe	72	60
Japan	263	243
China	2	2
Other regions	11	10
Total	511	462

Source: GFMS, Thomson Reuters

JAPANESE PALLADIUM DENTAL PRICING



Source: GFMS, Thomson Reuters; Ishifuku Metal Industry Co., Ltd and Ministry of Health, Labour and Welfare

ELECTRONICS

- **Platinum demand fell by 4% last year to 0.16 Moz (5.0 t) due to weak HDD shipments growth as SSD technologies continues to cannibalise HDD demand.**
- **Palladium uptake from the electronics industry declined by 1% last year to reach a total of 1.49 Moz (46.4 t) due to the shift towards mobile devices and away from traditional PCs, where miniaturisation hinders palladium consumption.**

The largest source of demand for **platinum** in the electronics sector comes from the hard disk drive (HDD) industry, where the metal is used as part of magnetic storage media to provide thermal stability and enhance data storage capabilities. Interestingly, platinum's sister PGM metal, ruthenium, is also used in the manufacturing of HDDs to reduce interference, with its consumption significantly exceeding that of platinum. We estimate platinum use in HDDs amounted to 0.15 Moz (4.6 t) in 2014, a 4% decline from the previous year and the lowest level in our 16-year data series.

The use of platinum in storage technologies has been structurally declining since 2007. The primary driver of platinum use, HDD shipments, has seen consecutive years of decline since 2011. While part of this decline can be attributed to economic malaise, disruptive storage technologies and changes in consumers' preferences for electronic gadgets account for the bulk of the decline.

The key driver behind the decline in platinum offtake in the storage sector can be attributed to substitution by new technologies such as solid-state drives (SSDs). SSDs, which are based on semiconductor storage media instead of magnetic media, contain no platinum and are mainly used in tablets and smartphones. They offer faster data access, reduced power usage and higher reliability compared to HDDs. Therefore when it comes to portability, size and speed, SSDs trump HDDs as the preferred storage technology. With the market firmly shifting into an era of mobile computing, the trend has been staunchly in favour of the adoption of SSDs as a means of storage. While the market is expecting HDD shipments to recover from previous years of recession to grow between 1% to 3% CAGR in the next couple of years, SSD shipments are projected to grow at a double-digit pace over the same time frame. Additionally, thrifting continued to affect platinum's electronics demand, with some uses substituting ruthenium at the expense of platinum. A long-standing industry drive for cost reduction has resulted in a cut in precious metals content by HDD producers. Over the last decade alone, average

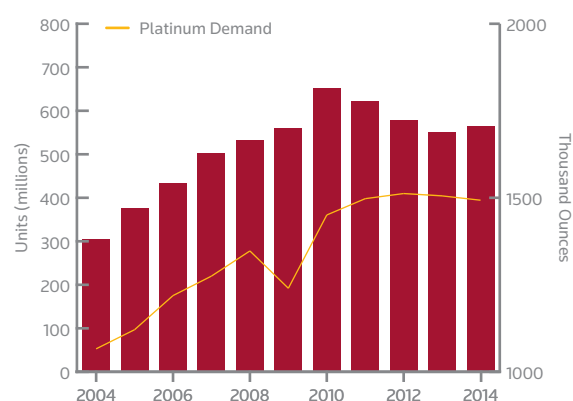
platinum loadings per disk have declined by 60%, a period in which HDD shipments have increased by 50%. Correspondingly, platinum uptake in HDD manufacturing has declined by 37% over the same period.

Despite feverish growth rates in SSDs at present, HDDs remain the primary storage medium for digital content. Given the enormity of future capacity needs, we think it is more likely for HDDs and SSDs to coexist together. SSDs will be employed where speed, portability and size are concerned, HDDs will complement by serving as the main archival medium for data that do not require frequent access as the most economic option. Furthermore, increasing demand to access data anytime and anywhere will facilitate demand for storage as a whole. These trends will provide new avenues of growth for HDDs in the interim. We expect that HDDs will be heavily employed in data centre media storage centres, particularly from the expansion of infrastructure to support cloud computing storage. These new areas of growth will somewhat negate other areas where demand is contracting. Indeed, the years of double-digit percentage declines in platinum use in the HDD sector appear to be ending.

Apart from HDDs, platinum is also used for high temperature, non-corrosive wires and contacts and thermocouple devices. Platinum's strong electrical properties, inertness, and radio-opaque character also render them suitable to be used in electrodes for medical equipment. The use of platinum is relatively small in this area and we estimate uptake for such uses remain unchanged at 0.01 Moz (0.4t) in 2014.

Demand for **palladium** in the electronics sector declined by 2% last year to reach a total of 1.36 Moz (42.2 t), its lowest level in six years. The main source of demand in the electronics sector comes from multi-layered ceramic

GLOBAL HARD DISK DRIVE SHIPMENTS



Source: GFMS, Thomson Reuters

capacitors (MLCCs), where palladium or silver-rich palladium alloys form a conductive electrode material sandwiched between ceramic wafers. These components are used in a wide range of end-use products, such as computers, broadcasting equipment, digital televisions, automotive vehicles and, increasingly, tablets and smartphones.

Continued softness in palladium uptake from the electronics sector was attributed to the shift towards mobile devices and away from traditional PCs. Miniaturisation in portable devices implies smaller uptake of metal per unit of device and the shift towards mobile computing amongst end users has not been favourable to palladium consumption. The growth in sales of handsets eased noticeably in 2014 from 14% per annum between 2010 and 2012 to a trickle in 2014 of 2%. While sales of digital televisions grew by a robust 10% thanks to the lure of sporting events such as the World Cup last year, lower levels of palladium uptake per unit of device failed to offset weakness in consumption elsewhere.

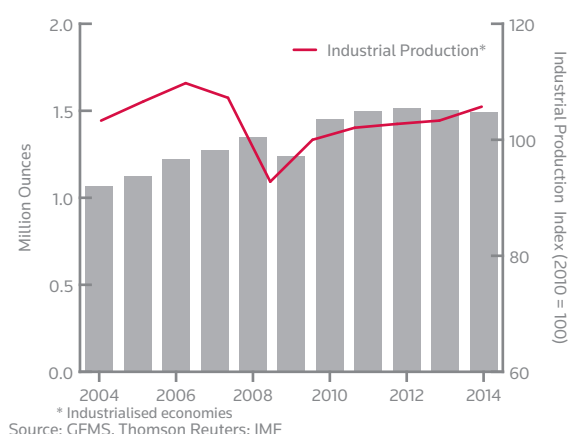
Another area contributing to the decline in palladium uptake last year was the growing flow of metal reclaimed in the process of electrical and electronic waste recycling. Tighter environmental regulations on electronic waste disposal, improving collection and recycling networks plus a gradually more environmentally-friendly legal framework in the developing world, have seen steady flows of secondary palladium entering the market as an alternative source of metal supply. With hundreds of millions of electronic products produced and scrapped each year, e-waste has become an "urban mine" to source for various metals. Old mobile phones have in particular proven to be a rich source of metals, with palladium content estimated at 8mg per set, while old computers and notebooks have about 80 mg per

unit. Unlike jewellery scrap, electronic scrap is less price-sensitive and its supply is a function of recycling infrastructure and metal content in old devices.

We believe the substitution of palladium in MLCC by cheaper alternatives such as nickel and copper is largely behind the market. MLCC manufacturers that intend to transition to base metals have already done so and remaining palladium-containing MLCCs are largely compulsory due to mission-critical requirements or exacting customer specifications. This is especially so in defence electronics, medical devices and aerospace designs where the choice of materials for capacitors remains rigid. The automotive markets are also large users of MLCC with palladium electrodes, although the Asian automotive industry has switched towards base metals where applicable. The sustained increase in the palladium price five years ago makes palladium MLCC use in the American and European automotive markets particularly vulnerable to switching.

Meanwhile, palladium is also used in hybrid integrated circuits whose vast array of electronic components are linked by thick film silver-palladium tracks. The largest market for such components is the automotive industry. Vehicle production growth rates have somewhat eased in the previous year, growing by a mere 2% in 2014 (compared to 4% in the previous year), failing to provide much support for palladium. Elsewhere, we expect palladium to continue to benefit from its growing use as a substitute for expensive gold in electroplating compounds. Palladium is also used to plate lead frames, an environmentally preferable alternative for manufacturers to traditional tin-lead solder varieties.

GLOBAL PALLADIUM ELECTRONICS DEMAND



ELECTRONICS DEMAND

PLATINUM		
(000 ounces)	2013	2014
North America	7	2
Europe	1	1
Japan	17	17
China	31	30
Other Regions	113	113
Total	169	162

PALLADIUM		
(000 ounces)	2013	2014
North America	45	0
Europe	0	0
Japan	151	149
China	301	299
Other Regions	1,008	1,045
Total	1,505	1,493

Source: GFMS, Thomson Reuters

GLASS

— *The glass industry was a net supplier of platinum to the market last year, as a number of LCD glass facilities in Japan were closed down and demand in China weakened. Glass makers supplied a net 0.03 Moz (1.0 t) of platinum to the market in 2014, compared to a net use of 0.08 Moz (2.6 t) in 2013.*

Platinum is used in the production of display glass and glass fibre, mostly due to its high temperature tolerance and its inert nature. As of the end of 2014, 5.5 Moz (170.6 t) of platinum was contained in glass manufacturing equipment around the world, which was equivalent to 87% of total annual platinum supply last year. One-third of this platinum was contained in “bushings” at glass fibre plants while the balance was contained in glass melting tanks at display glass production facilities. The bulk of platinum in capacity is located in China, which accounted for 23% of total platinum in installed glass production capacity at the end of 2014. The pie chart on this page illustrates the distribution of platinum at glass facilities globally.

Total platinum demand from glass manufacturers was -0.03 Moz (-1.0 t) in 2014, which means that the glass industry was a source of supply to the market rather than a source of demand. This was the first time that the glass industry was a net supplier of platinum in our data series, which began in 1999. The global glass industry is not expected to again be a net supplier of metal in the foreseeable future. Display glass manufacturers offloaded a net of 0.07 Moz (2.1 t) of platinum last year due to the decommissioning of manufacturing facilities in Japan as well as significantly less demand from Chinese glass producers. Major display glass producers have been moving capacity from Japan to Korea because power costs in Japan have increased significantly in the

GLASS DEMAND

PLATINUM

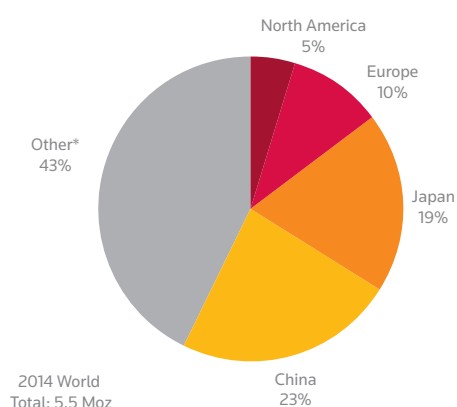
(000 ounces)	2013	2014
North America	5	5
Europe	21	14
Japan	-87	-109
China	125	17
Other regions	20	40
Total	84	-34

Source: GFMS, Thomson Reuters

past two years. At its peak in 2012, Japan accounted for 31% of total platinum contained in installed capacity. Japan accounted for 26% of capacity in 2014 and is expected to fall to 21% by 2016. Capacity in Korea meanwhile increased last year, by 2%. As capacity in Japan declines through 2016 as capacity increases in China, Taiwan, and Korea are expected to offset Japan's losses. That said the decline in installed capacity in Japan was not offset by increases in other countries last year.

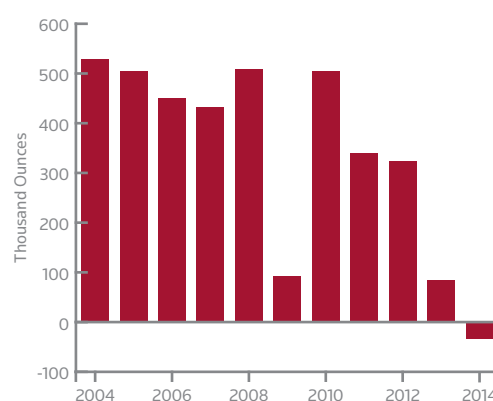
Glass fibre production capacity increased 1%, which resulted in net demand of 0.04 Moz (1.1 t) in 2014, down from 0.09 Moz (2.7 t) in 2013. The glass fibre market suffered a period of over capacity between 2010 and 2012 after aggressive expansion in the 2005 to 2009 period. Growth slowed to 1% in 2014. This sluggish capacity growth combined with an increase in rhodium's share of the bushings alloy resulted in a 58% decline in annual platinum demand last year. Rhodium prices fell below platinum prices in 2012, which triggered producers to reduce the platinum:rhodium ratio in order to reduce the total cost of the bushings. In general, a glass fibre bushing is coated in a platinum-rhodium alloy consisting of 80% to 90% platinum and the balance rhodium. Depending on relative prices, it is easy to shift the balance within this tolerance.

LOCATION OF PLATINUM INSTALLED IN GLASS FACILITIES, 2014



Source: GFMS, Thomson Reuters

GLOBAL PLATINUM GLASS DEMAND



Source: GFMS, Thomson Reuters

CHEMICAL

- *Platinum demand from the chemical sector rose for the second year in a row, growing 36% year-on-year to reach 0.59 Moz (18.4 t). Robust growth was recorded in all demand sectors, with paraxylene (PX) capacity growth leading the way.*
- *Palladium use in the chemical sector contracted in 2014, falling 1% year-on-year to reach 0.39 Moz (12.1 t).*

Demand for platinum and palladium from the chemical sector (in which we include demand from the petrochemical industry), arises from their use as catalysts. In the case of **platinum**, this is historically for the production of paraxylene (PX), nitric acid and Active Pharmaceutical Ingredients (APIs), while it is also used in the curing of silicones. More recent technologies have also recorded the use of platinum catalysts for use in production of on-purpose propylene and isobutylene derivatives via propane (and to a lesser extent butane) dehydrogenization reactions (PDH & BDH). We estimate that platinum use in the chemical sector grew by 36% year-on-year in 2014, after a 7% rebound in 2013. This brings platinum use in the sector to a total of 0.59 Moz (18.4 t), the highest level since our records began in 1999. Although growth occurred globally, Japan recorded the largest acceleration in demand (up 85% year-on-year), while 'Other regions' bolstered demand (recording an almost 60% rise year-on-year).

In terms of areas of usage, one of the largest elements of demand for platinum comes from the curing of silicones, a process that converts silicone from gel to solid form. The end product of this process is Pressure Sensitive Adhesives (PSA) used in tape applications and release liners, typically used in medical and hygiene applications. While platinum curing is the industry standard approach, the high cost of platinum historically posed a challenge to its growth compared to cheaper alternatives such as peroxide systems. However, in mid-July last year the price of platinum started its slump and had fallen by 12% or \$108/oz by 30th December, triggering a rebound in growth over the second half of the year towards the favoured platinum catalyst which ensures higher process control levels in addition to zero by-products post-cure.

As a catalyst in the production of nitric acid (a key ingredient in the production of fertilisers, adipic acid and raw material in the manufacturing of plastics), we estimate platinum use to have increased by 17%. This was driven by strong growth from our 'Other regions' category, increasing by over 50%, while a healthy

CHEMICAL DEMAND

PLATINUM

(000 ounces)	2013	2014
North America	74	79
Europe	77	96
Japan	24	45
China	119	152
Other regions	136	215
Total	431	587

PALLADIUM

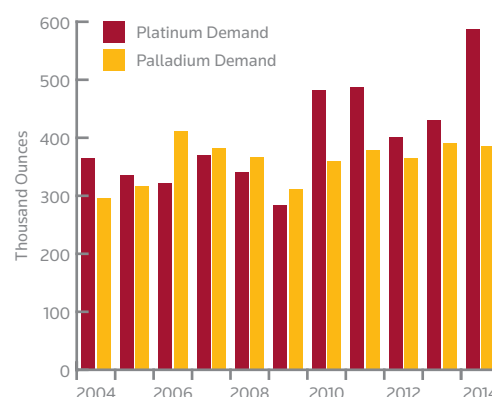
(000 ounces)	2013	2014
North America	55	56
Europe	157	156
Japan	22	21
China	86	67
Other regions	70	86
Total	391	385

Source: GFMS, Thomson Reuters

7% pickup in demand from China was recorded. Furthermore, both regions posted higher growth in the production area of non-fertiliser products, (which necessitates higher incremental catalyst gauge inventory), resulting in non-fertiliser demand outpacing that of fertiliser demand by three-fold.

Meanwhile, platinum demand as a catalyst in PX doubled in 2014, reflecting the vast increment in catalyst installed, with China as an example continuing its struggle to balance the supply deficit fundamentals it faces in order to feed its demand for Purified Terephthalic Acid (PTA), (with PX being the main feedstock) of which China is the largest producer, importer and consumer. However, it was our 'Other regions' that recorded the greatest increase in capacity, with new installations coming online across Asia and the Middle East. Platinum demand use in PX is a direct function of the rate of growth in PX capacity. Uptake from Active Pharmaceutical Ingredients

GLOBAL PLATINUM & PALLADIUM CHEMICAL DEMAND



Source: GFMS, Thomson Reuters

(APIs) also supported demand for platinum last year with demand stemming from Europe and Asia, while rapid growth was recorded for PDH in particular from China.

Palladium's usage in the chemical sector primarily derives from demand for catalysts in the production of vinyl acetate monomer (VAM), purified terephthalic acid (PTA), hydrogen peroxide, catchment gauzes in nitric acid synthesis and for use in the removal of acetylene during ethylene production. In addition to being a catalyst for the production of methyl ethylene glycol (MEG) from coal, palladium salts are used for electroplating purposes. We estimate that palladium use in the chemical sector fell by 1% in 2014, after acceleration in growth of 7% from the previous year. This brings palladium use in the chemical sector to a total of 0.39 Moz (12.1 t). PTA is an intermediate in the manufacturing of polyester whereas VAM is a key component in the production of polymers, textiles and plastics. A deceleration of PTA capacity growth, especially in China due to oversupply and heightened competition from cheap available cotton supplies, saw PTA capacity growth contract by a third in 2014, while capacity reductions were also recorded in western markets helping global demand fall by 65% year-on-year. Similarly, the capacity growth rate for VAM, also fell significantly with platinum demand falling by 60% in 2014; this was mainly due to reduced capacity in Europe and Japan, although a decline for palladium was recorded for all of our regions.

Palladium is also used as catchment gauze in the production of nitric acid to reduce losses of platinum and rhodium, which serve as catalysts. As mentioned above, nitric acid production grew strongly in 2014, which boosted demand for platinum as a catalyst; this has further supported demand for palladium in its use as catchment gauze. Meanwhile, use of palladium in ethylene production and MEG saw an increase of 3%, with MEG production solely concentrated in China.

PETROLEUM DEMAND

PLATINUM		
(000 ounces)	2013	2014
North America	45	48
Europe	5	23
Japan	-12	8
China	15	6
Other regions	69	73
Total	122	158

PALLADIUM		
(000 ounces)	2013	2014
Total	9	11

Source: GFMS, Thomson Reuters

PETROLEUM

- *Global demand for platinum in the petroleum sector rebounded strongly in 2014, rising 30% year-on-year to 0.16 Moz (5.0 t). This increase was mainly due to demand recovery from Japan and Europe in downstream crude refineries, while robust growth from emerging markets lent support to demand from alternative fuel producing technologies, including Gas-to-liquids (GTL), Coal-to-liquids (CTL) and Biomass-to-liquids (BTL).*
- *Palladium use in the petroleum sector expanded in 2014, growing by 23% year-on-year to reach 0.01 Moz (0.3 t).*

Demand for **platinum** and palladium from the petroleum sector arises from their use as catalysts. In the case of platinum, developments in oil refining capacity, specifically new catalytic reforming and isomerisation capacity, remain the largest elements of platinum demand. Platinum is also utilised in alternative fuel producing technologies, such as GTL plants, in which platinum (and to a lesser extent palladium) can be utilised as a promoter (on traditional cobalt or iron based catalysts) in the production of long chain waxy paraffins, a process known as Fischer-Tropsch (FT) synthesis.

In addition to use as a catalyst (in a following step to FT), platinum is used in upgrading waxy paraffins in a hydroprocessing step (via monofunctional hydrogenolysis) to create chemical feedstocks and fuel end products. We estimate that platinum's use in the petroleum sector grew by 30% year-on-year in 2014, the first increase since 2010, bringing total demand to 0.16 Moz (5.0 t).

One of the key regions responsible for the rebound in platinum demand last year was **Japan**, which saw an increase of 0.02 Moz (0.6 t) to reach 0.08 Moz (2.5 t) by year-end. Although no new capacity was recorded in reforming or isomerisation units over the year, neither were there any capacity reductions, a stark difference to 2013, in which more platinum metal was returned to the market than was used by Japanese refiners themselves. This was a consequence of Japan's Ministry of Economy, Trade and Industry's aim to rebalance the country's surplus refining capacity, where refiners were required to adhere (by March 2014) to a minimum Crude Distillation Unit-to-cracking ratio of 13%. With an ageing, shrinking population, smaller-engine cars and an economy which is shifting from oil to gas, domestic oil demand had been in decline since 2006, and therefore, many refiners chose to close capacity ahead of the deadline rather than make

expensive capital investments resulting in 0.01 Moz (0.3 t) of metal returning to market.

A second key region that boosted platinum demand last year was **Europe**, which recorded growth almost five times that of 2013, raising European demand to 2012 levels to reach 0.02 Moz (0.6 t) by year-end. The rise in demand came about as refiners aimed to optimise their plants rather than face closure, which saw the reduction in reformer units halve from the rate in 2013, while isomerisation units recorded an increase year-on-year. However, overall European refining fundamentals remained unchanged in 2014 with refiners facing a struggling economy, weak end-user demand, squeezed margins, over capacity, low utilisation rates and increased international competition resulting in the fourth consecutive year of capacity reductions for the region.

Turning to our **'Other regions'**, platinum recorded an increase in demand of 6% or 0.04 Moz over 2014 to reach 0.07 Moz (2.2 t). The main driver behind the increase in platinum demand arose as a consequence of replacement demand for existing alternative technologies, while total overall capacity for reforming and isomerisation units in traditional crude refining plants recorded a decline. Meanwhile, **North America** recorded a marginal increase in overall platinum demand of 7%, with the number of new isomerisation units expanding, increasing the flexibility of end-use products.

Looking at **China**, this was the one region where we recorded a contraction in demand last year, falling almost 60% to reach 0.06 Moz (1.9 t) by year-end 2014. The main driver behind the substantial decline was due to a contraction (of over 80%) in the growth of reforming units year-on-year. This decline comes on the back of two previous years of capacity expansions where last

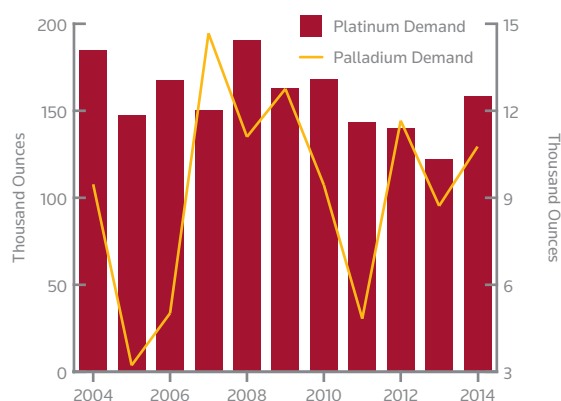
years aggressive growth was recorded particularly from small independent refineries or 'teapots'. However, in the first half of 2014 several project launches were delayed as China's government deepened its corruption investigation into the state sector (responsible for 70% of China's refining capacity), while a sluggish economy resulted in a further weakening of domestic demand, leading to overcapacity and low utilisation run rates. Furthermore, the halving in oil prices over the second half of the year subsequently resulted in further project delays as capital spending budgets were severely dented.

Palladium usage in the petroleum sector primarily arises from its use as a bifunctional catalyst in two-stage hydrocracking units (HC) associated with a large proportion of downstream crude refineries globally. Palladium is utilised as a hydrogenation-dehydrogenation agent alongside an acid catalytic function and they together 'crack' or break down long chain hydrocarbons (from typically heavier feedstocks) into more useful fractions to be further processed into fuel products. We estimate that palladium use in the petroleum sector rose by 23% in 2014, a rebound in growth from the previous year, which fell by 25%. This brings palladium use in the petroleum sector to a total of 0.01 Moz (0.3 t).

The largest driver behind the rise in demand came from **North America** in which total HC capacity increased by 9% year-on-year, more than doubling the demand for palladium over the same timeframe. The requirement for North American refiners to adjust to higher diesel and middle distillate product output in light of rising diesel export demand and falling domestic gasoline demand, while adhering to higher environmental legislations, has resulted in an increase of these HC unit extensions within plants. By replacing or complementing traditional Fluid Catalytic Cracking units (FCC), (which contain no platinum or palladium content), HC units are popular with refinery owners as they not only provide flexibility of production for the end-use product, but additionally produce ultra-low sulphur diesel (ULSD) requiring very little-end or no-end processing.

Looking to the rest of the world and it was only our **'Other regions'** that additionally saw any increase in palladium demand use, driven by capacity expansion in the Middle East and Asian markets (excluding **China**, which as mentioned above recorded a reduction in capacity year-on-year). Closures in refineries in Italy and the United Kingdom saw our European total capacity fall in 2014.

GLOBAL PLATINUM & PALLADIUM PETROLEUM DEMAND



Source: GFMS, Thomson Reuters

A BRIGHT SPARK FOR PLATINUM?

While catalytic converters make up over 90% of demand for platinum in the automotive sector, spark plugs constitute a considerable source of demand for the metal too. More advanced technology and stricter emission standards globally have increased requirements for more durable platinum spark plugs in recent years.

Since the platinum spark plug was invented in 1985, the use of the metal in ignition systems of petrol vehicles has increased markedly. Spark plugs are used within the engine combustion chambers of gasoline engines to ignite the mixture of fuel and oxygen to power the engine. Conventional spark plugs use a nickel alloy electrode tip, where durability is required, and copper for the electrode core, where conductivity is essential. Platinum's high melting point and resistance to chemicals in the combustion chamber make it the ideal material for the electrode tip.

Loadings of platinum per plug vary widely, depending on the type of plug and whether it has a single or double platinum electrode tip. Research done by the GFMS team at Thomson Reuters has indicated that on average a typical spark plug will contain around 5mg of platinum. Often, platinum plugs will replace original-fit conventional plugs part way through the lifecycle of the car. While platinum plugs have long been the choice for the aftermarket fitment, car manufacturers are increasingly fitting them to new vehicles. We estimate that of all spark plugs globally, approximately 70% contain precious metals.

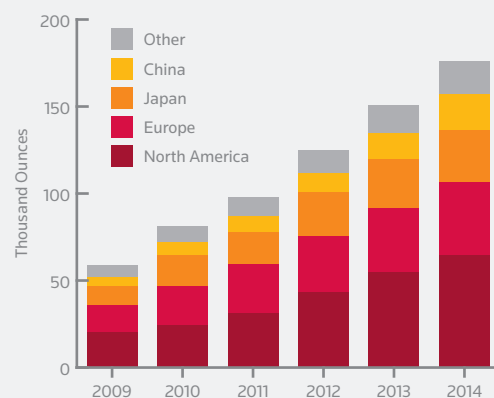
The main global manufacturing hub for platinum spark plugs is Japan, followed by the United States and Europe. We estimate that in 2014 approximately 176,000 ounces of platinum were consumed in sparkplugs globally. While all regions have seen growth, there has been a significant change in the make-up of the global market. Just over 35% of demand was consumed in North America, where V8 and six cylinder engines remain widespread and diesel engines for passenger cars uncommon. This proportion has increased from 30% five years ago and the total amount of platinum by over 164%, driven by strong vehicle production growth and aided by the decline in popularity of petrol cars in Europe and persistently sluggish car production in Japan. We estimate that Europe consumed just less than 42,000 ounces of platinum, which is 24% of the global market, while Japan, where consumption of platinum in sparks plugs has increased 69% in the last five years, used approximately 30,000 ounces in 2014. China has seen the biggest growth in platinum consumption, with an average annual growth rate of 32% from 2010 to 2014, driven by strong growth in vehicle sales.

Over the years, technological developments have allowed manufacturers to cut down on raw material cost. Initially the whole tip of the electrode was made of platinum, but as designs improved, thin wire technology was pioneered, allowing some of the platinum to be thrifted. With the introduction of Distributor Ignition Systems (DIS), spark plugs need to withstand arc erosion on both sides of the electrode, as the ignition oscillates. Therefore, a 'double platinum' plug was developed. Recently released research by Tanaka Kikinzoku Kogyo illustrated, however, that the amount of platinum in a spark plug tip could be halved without compromising the performance. Instead of welding the platinum alloy to the tip of the plug, a platinum cap is clad onto a nickel base, before the nickel base is welded to the rest of the electrode. All these factors will act to constrain growth in platinum consumption North America, Europe and Japan.

In China we estimate that tougher environmental legislation and more efficient engines will quadruple platinum consumption in spark plugs in the next seven years. It should be noted, however, that Japan is a major producer of platinum spark plugs, so while consumption will fall there, production figures should increase, reflecting the fact that Japanese manufacturers are best placed to take advantage of growth in China.

Overall, although technological developments are constantly finding ways of thrifted platinum, increasingly stringent emission legislation, higher performance engines and greater vehicle production in the developing world mean that demand for platinum in spark plugs is set to increase sharply over the next five years. This, we estimate, will be driven by a significant increase in platinum plug consumption in China and a move towards the fitment of platinum plugs as standard fitment.

SPARK PLUGS PLATINUM DEMAND



Source: GFMS, Thomson Reuters



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APPENDIX 1 - PLATINUM SUPPLY AND DEMAND 2005-2014

(000 ounces)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mine production										
South Africa	5,054	5,447	5,075	4,676	4,603	4,750	4,736	4,188	4,285	3,062
Russia	960	948	917	830	793	785	818	804	765	717
Canada	233	228	204	227	170	127	270	220	217	247
United States	125	138	120	115	123	111	119	118	120	119
Zimbabwe	160	167	169	180	229	286	341	335	409	398
Others	91	95	98	129	130	125	117	138	156	155
Total mine production	6,624	7,024	6,584	6,156	6,049	6,184	6,401	5,803	5,952	4,697
Autocatalyst scrap										
North America	502	510	528	557	393	449	475	413	463	387
Europe	174	199	247	295	258	299	346	312	374	432
Japan	55	56	63	68	55	61	54	57	59	67
China	2	4	6	7	10	13	17	23	30	36
Other regions	72	64	66	80	69	80	102	120	122	133
Total autocatalyst scrap	806	832	909	1,006	785	902	995	925	1,047	1,055
Old jewellery scrap										
North America	7	9	22	41	33	12	10	9	10.0	9.2
Europe	5	7	9	11	12	10	8	8	7	7
Japan	193	257	418	579	273	281	344	257	235	245
China	165	90	110	333	177	216	240	234	235	252
Other regions	1	1	1	2	1	2	3	3	3	3
Total old jewellery scrap	370	365	560	966	496	522	606	512	491	516
SUPPLY	7,799	8,221	8,053	8,128	7,330	7,608	8,001	7,239	7,490	6,269
Autocatalyst demand										
North America	749	761	781	562	346	386	453	458	463	450
Europe	1,805	1,915	2,064	1,806	1,280	1,412	1,486	1,269	1,237	1,285
Japan	582	549	510	517	308	368	303	323	288	279
China	177	220	204	187	189	223	198	185	224	283
Other regions	401	454	477	448	386	548	611	679	687	706
Total autocatalyst demand	3,713	3,897	4,036	3,520	2,509	2,937	3,051	2,914	2,898	3,003
Jewellery demand										
North America	262	244	217	205	181	212	218	224	235	243
Europe	255	240	251	239	222	219	214	212	211	205
Japan	658	669	482	249	270	262	283	320	327	321
China	1,126	1,018	1,069	1,110	1,953	1,439	1,588	1,736	1,776	1,680
Other regions	37	38	41	45	52	69	85	105	110	119
Total jewellery demand	2,337	2,210	2,061	1,847	2,678	2,201	2,388	2,597	2,659	2,569
Chemical demand										
North America	98	88	94	94	60	95	78	66	74	79
Europe	74	58	73	74	54	80	90	79	77	96
Japan	27	27	29	36	29	50	31	22	24	45
China	25	27	35	44	40	80	95	102	119	152
Other regions	110	122	139	93	103	178	193	132	136	215
Total chemical demand	335	322	370	341	284	483	487	401	431	587

APPENDIX 1 - PLATINUM SUPPLY AND DEMAND 2005-2014

(000 ounces)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Electronics demand										
North America	83	84	74	46	34	28	21	11	7	2
Europe	37	34	28	17	10	6	1	1	1	1
Japan	66	68	55	39	32	30	25	21	17	17
China	20	27	31	32	33	37	36	34	31	30
Other regions	160	190	209	159	144	150	141	128	113	113
Total electronics demand	366	404	397	292	253	251	224	195	169	162
Glass demand										
North America	22	(33)	(5)	3	7	(7)	12	13	5	5
Europe	12	49	(11)	(6)	(16)	15	9	33	21	14
Japan	294	168	40	114	31	142	108	84	(87)	(109)
China	78	48	112	177	(71)	157	56	165	125	17
Other regions	97	217	295	219	141	198	154	28	20	40
Total glass demand	503	449	431	507	91	505	338	323	84	(34)
Petroleum demand										
North America	37	64	58	27	56	30	28	49	45	48
Europe	33	52	44	38	40	35	16	21	5	23
Japan	6	18	12	26	9	21	8	8	(12)	8
China	21	3	5	22	4	7	7	11	15	6
Other regions	51	30	32	77	54	75	84	51	69	73
Total petroleum demand	148	167	150	191	163	168	144	140	122	158
Retail Investment										
North America	30	34	39	105	131	40	53	87	55	47
Europe	2	2	15	30	38	10	17	13	10	8
Japan	(13)	(60)	(32)	317	142	37	206	148	42	55
Other regions	3	3	1	0	3	8	36	34	34	28
Total Retail Investment	22	(22)	23	452	313	95	312	282	141	138
Other Industrial Demand										
North America	235	227	226	214	179	202	213	239	261	286
Europe	149	163	170	172	162	177	181	186	196	208
Japan	48	51	53	53	44	56	52	66	69	73
China	7	14	16	17	30	43	47	50	58	66
Other regions	27	31	37	40	42	56	62	64	65	68
Total Other Industrial Demand	466	486	502	497	457	532	556	606	650	700
DEMAND	7,889	7,914	7,969	7,648	6,750	7,172	7,501	7,458	7,153	7,284
Physical Surplus/(Deficit)	(90)	308	84	481	580	436	500	(219)	337	(1,016)
Identifiable stock movements										
Russia	0	0	0	0	0	0	0	0	0	0
Stillwater	0	0	0	0	0	0	0	0	0	0
US National Defense Stockpile	13	0	0	0	0	0	0	0	0	0
Industry Stocks	0	0	(200)	(300)	665	0	(100)	(300)	(1,000)	1,300
Exchange Traded Funds	0	0	(194)	(102)	(384)	(574)	(145)	(237)	(892)	(218)
Sub Total - stock movements	13	0	(394)	(402)	281	(574)	(245)	(537)	(1,892)	1,082
Net Balance	(77)	308	(310)	78	861	(138)	255	(756)	(1,555)	66

APPENDIX 2 - PALLADIUM SUPPLY AND DEMAND 2005-2014

(000 ounces)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mine production										
South Africa	2,591	2,857	2,677	2,365	2,481	2,646	2,685	2,397	2,371	1,892
Russia	3,133	3,164	3,049	2,701	2,677	2,722	2,704	2,627	2,580	2,660
Canada	502	558	570	524	281	352	560	557	530	520
United States	427	466	425	384	407	374	399	396	404	400
Zimbabwe	135	135	132	139	177	222	261	256	314	325
Others	165	176	197	268	299	296	252	271	260	243
Total mine production	6,953	7,355	7,050	6,381	6,322	6,612	6,861	6,504	6,460	6,039
Autocatalyst scrap										
North America	432	521	652	794	705	831	961	922	992	1,013
Europe	116	139	200	274	241	306	358	317	334	405
Japan	49	49	59	71	70	84	79	84	103	97
China	2	5	7	10	15	23	33	47	62	82
Other regions	30	35	39	50	46	64	84	104	99	121
Total autocatalyst scrap	629	749	957	1,200	1,077	1,308	1,515	1,473	1,590	1,718
Old jewellery scrap										
North America	0	1	2	4	3	1	2	3	4	4
Europe	5	6	7	9	9	10	12	12	11	9
Japan	38	47	64	84	25	32	39	29	28	30
China	56	177	108	87	71	129	190	172	181	197
Other regions	3	4	5	8	9	7	7	7	7	8
Total old jewellery scrap	103	234	185	192	116	179	248	223	230	248
SUPPLY	7,685	8,338	8,192	7,772	7,515	8,099	8,624	8,200	8,280	8,005
Autocatalyst demand										
North America	1,477	1,540	1,587	1,279	886	1,221	1,316	1,567	1,643	1,680
Europe	1,119	1,211	1,262	1,182	1,056	1,388	1,559	1,542	1,535	1,611
Japan	750	870	897	926	691	823	725	882	855	894
China	250	373	481	479	785	1,037	1,092	1,223	1,389	1,534
Other regions	394	439	567	623	609	811	848	858	860	886
Total autocatalyst demand	3,990	4,433	4,793	4,488	4,026	5,279	5,539	6,073	6,282	6,605
Jewellery demand										
North America	48	85	99	131	135	115	85	78	75	65
Europe	120	115	129	138	128	138	146	148	149	151
Japan	113	121	98	64	48	48	45	50	50	47
China	1,030	896	825	837	663	412	341	269	204	172
Other regions	52	64	130	125	135	85	55	48	42	40
Total jewellery demand	1,363	1,281	1,281	1,295	1,110	797	672	593	521	474
Dental demand										
North America	201	199	196	196	190	188	178	170	163	148
Europe	81	80	82	87	91	97	91	83	72	60
Japan	303	294	322	322	305	289	283	278	263	243
China	3	3	3	3	3	2	2	2	2	2
Other regions	9	9	12	12	13	14	13	13	11	10
Total dental demand	598	585	615	620	602	590	567	546	511	462

APPENDIX 2 - PALLADIUM SUPPLY AND DEMAND 2005-2014

(000 ounces)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Chemical demand										
North America	45	48	60	53	42	53	54	53	55	56
Europe	150	167	198	188	161	165	166	162	157	156
Japan	17	21	22	22	19	21	21	22	22	21
China	32	31	40	36	33	33	55	62	86	67
Other regions	72	145	63	68	56	88	82	65	70	86
Total chemical demand	316	411	383	367	310	359	378	364	391	385
Electronics demand										
North America	232	237	219	202	161	160	135	76	45	0
Europe	101	92	74	67	42	28	0	0	0	0
Japan	163	174	168	173	153	170	167	160	151	149
China	96	122	146	173	177	228	257	281	301	299
Other regions	529	595	669	731	707	865	939	996	1,008	1,045
Total electronics demand	1,121	1,219	1,275	1,347	1,240	1,451	1,497	1,512	1,505	1,493
Retail investment										
North America	253	132	35	68	140	68	47	27	30	35
Europe	2	3	10	26	30	12	14	10	8	6
Japan	0	0	0	0	0	0	0	0	0	0
Other regions	0	0	0	0	0	0	0	0	0	5
Total retail investment	255	135	45	94	170	80	61	37	38	45
Other industrial demand including petroleum										
North America	51	57	62	58	52	68	71	78	81	85
Europe	14	16	16	17	16	19	19	19	19	19
Japan	8	8	8	8	8	9	8	8	8	7
China	2	3	3	3	2	2	3	3	4	5
Other regions	2	3	2	2	2	2	2	2	2	3
Total other industrial demand	78	86	92	89	80	100	104	111	115	118
DEMAND	7,722	8,150	8,483	8,299	7,539	8,656	8,818	9,236	9,364	9,583
Physical Surplus/(Deficit)	(37)	188	(291)	(527)	(23)	(558)	(194)	(1,036)	(1,083)	(1,577)
Identifiable stock movements										
Russia	1,400	1,550	900	1,280	1,100	800	800	400	200	0
Stillwater	439	63	0	0	0	0	0	0	0	0
US National Defense Stockpile	19	0	0	0	0	0	0	0	0	0
Industry Stocks	0	0	0	0	0	0	(50)	(100)	(500)	300
Exchange Traded Funds	0	0	(280)	(381)	(507)	(1,089)	532	(448)	(0)	(899)
Sub total - stock movements	1,858	1,613	620	899	593	(289)	1,282	(148)	(300)	(599)
Net Balance	1,821	1,802	329	372	570	(847)	1,088	(1,184)	(1,383)	(2,176)

APPENDIX 3 - PLATINUM SUPPLY AND DEMAND 2005-2014

(tonnes)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mine production										
South Africa	157.2	169.4	157.9	145.4	143.2	147.7	147.3	130.3	133.3	95.2
Russia	29.9	29.5	28.5	25.8	24.7	24.4	25.4	25.0	23.8	22.3
Canada	7.2	7.1	6.4	7.1	5.3	4.0	8.4	6.9	6.8	7.7
United States	3.9	4.3	3.7	3.6	3.8	3.5	3.7	3.7	3.7	3.7
Zimbabwe	5.0	5.2	5.3	5.6	7.1	8.9	10.6	10.4	12.7	12.4
Others	2.8	3.0	3.0	4.0	4.1	3.9	3.6	4.3	4.9	4.8
Total mine production	206.0	218.5	204.8	191.5	188.1	192.3	199.1	180.5	185.1	146.1
Autocatalyst scrap										
North America	15.6	15.9	16.4	17.3	12.2	14.0	14.8	12.8	14.4	12.1
Europe	5.4	6.2	7.7	9.2	8.0	9.3	10.8	9.7	11.6	13.4
Japan	1.7	1.7	2.0	2.1	1.7	1.9	1.7	1.8	1.8	2.1
China	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.7	0.9	1.1
Other regions	2.2	2.0	2.1	2.5	2.1	2.5	3.2	3.7	3.8	4.1
Total autocatalyst scrap	25.1	25.9	28.3	31.3	24.4	28.1	30.9	28.8	32.6	32.8
Old jewellery scrap										
North America	0.2	0.3	0.7	1.3	1.0	0.4	0.3	0.3	0.3	0.3
Europe	0.1	0.2	0.3	0.4	0.4	0.3	0.2	0.2	0.2	0.2
Japan	6.0	8.0	13.0	18.0	8.5	8.7	10.7	8.0	7.3	7.6
China	5.1	2.8	3.4	10.4	5.5	6.7	7.5	7.3	7.3	7.8
Other regions	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1
Total old jewellery scrap	11.5	11.4	17.4	30.1	15.4	16.2	18.8	15.9	15.3	16.1
SUPPLY	242.6	255.7	250.5	252.8	228.0	236.6	248.9	225.2	233.0	195.0
Autocatalyst demand										
North America	23.3	23.7	24.3	17.5	10.8	12.0	14.1	14.3	14.4	14.0
Europe	56.1	59.6	64.2	56.2	39.8	43.9	46.2	39.5	38.5	40.0
Japan	18.1	17.1	15.9	16.1	9.6	11.4	9.4	10.0	9.0	8.7
China	5.5	6.8	6.4	5.8	5.9	6.9	6.2	5.8	7.0	8.8
Other regions	12.5	14.1	14.8	13.9	12.0	17.0	19.0	21.1	21.4	22.0
Total autocatalyst demand	115.5	121.2	125.5	109.5	78.0	91.3	94.9	90.6	90.1	93.4
Jewellery demand										
North America	8.1	7.6	6.8	6.4	5.6	6.6	6.8	7.0	7.3	7.6
Europe	7.9	7.5	7.8	7.4	6.9	6.8	6.7	6.6	6.6	6.4
Japan	20.5	20.8	15.0	7.7	8.4	8.1	8.8	9.9	10.2	10.0
China	35.0	31.7	33.3	34.5	60.8	44.8	49.4	54.0	55.2	52.3
Other regions	1.2	1.2	1.3	1.4	1.6	2.1	2.6	3.3	3.4	3.7
Total jewellery demand	72.7	68.7	64.1	57.4	83.3	68.5	74.3	80.8	82.7	79.9
Chemical demand										
North America	3.1	2.7	2.9	2.9	1.9	3.0	2.4	2.0	2.3	2.5
Europe	2.3	1.8	2.3	2.3	1.7	2.5	2.8	2.4	2.4	3.0
Japan	0.8	0.8	0.9	1.1	0.9	1.5	1.0	0.7	0.8	1.4
China	0.8	0.8	1.1	1.4	1.2	2.5	3.0	3.2	3.7	4.7
Other regions	3.4	3.8	4.3	2.9	3.2	5.5	6.0	4.1	4.2	6.7
Total chemical demand	10.4	10.0	11.5	10.6	8.8	15.0	15.2	12.5	13.4	18.3

APPENDIX 3 - PLATINUM SUPPLY AND DEMAND 2005-2014

(tonnes)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Electronics demand										
North America	2.6	2.6	2.3	1.4	1.1	0.9	0.6	0.3	0.2	0.1
Europe	1.1	1.1	0.9	0.5	0.3	0.2	0.0	0.0	0.0	0.0
Japan	2.0	2.1	1.7	1.2	1.0	0.9	0.8	0.7	0.5	0.5
China	0.6	0.8	1.0	1.0	1.0	1.2	1.1	1.1	1.0	0.9
Other regions	5.0	5.9	6.5	4.9	4.5	4.7	4.4	4.0	3.5	3.5
Total electronics demand	11.4	12.6	12.3	9.1	7.9	7.8	7.0	6.1	5.3	5.1
Glass demand										
North America	0.7	-1.0	-0.1	0.1	0.2	-0.2	0.4	0.4	0.2	0.2
Europe	0.4	1.5	-0.3	-0.2	-0.5	0.5	0.3	1.0	0.7	0.4
Japan	9.1	5.2	1.2	3.5	1.0	4.4	3.4	2.6	-2.7	-3.4
China	2.4	1.5	3.5	5.5	-2.2	4.9	1.7	5.1	3.9	0.5
Other regions	3.0	6.7	9.2	6.8	4.4	6.2	4.8	0.9	0.6	1.2
Total glass demand	15.7	14.0	13.4	15.8	2.8	15.7	10.5	10.1	2.6	-1.0
Petroleum demand										
North America	1.2	2.0	1.8	0.8	1.8	0.9	0.9	1.5	1.4	1.5
Europe	1.0	1.6	1.4	1.2	1.2	1.1	0.5	0.7	0.2	0.7
Japan	0.2	0.6	0.4	0.8	0.3	0.6	0.3	0.3	-0.4	0.2
China	0.7	0.1	0.2	0.7	0.1	0.2	0.2	0.3	0.5	0.2
Other regions	1.6	0.9	1.0	2.4	1.7	2.3	2.6	1.6	2.1	2.3
Total petroleum demand	4.6	5.2	4.7	5.9	5.1	5.2	4.5	4.3	3.8	4.9
Retail Investment										
North America	0.9	1.0	1.2	3.3	4.1	1.3	1.6	2.7	1.7	1.5
Europe	0.1	0.1	0.5	0.9	1.2	0.3	0.5	0.4	0.3	0.2
Japan	-0.4	-1.9	-1.0	9.9	4.4	1.1	6.4	4.6	1.3	1.7
Other regions	0.1	0.1	0.0	0.0	0.1	0.2	1.1	1.1	1.1	0.9
Total retail investment	0.7	-0.7	0.7	14.1	9.8	3.0	9.7	8.8	4.4	4.3
Other Industrial Demand										
North America	7.3	7.1	7.0	6.7	5.6	6.3	6.6	7.4	8.1	8.9
Europe	4.6	5.1	5.3	5.4	5.0	5.5	5.6	5.8	6.1	6.5
Japan	1.5	1.6	1.6	1.7	1.4	1.7	1.6	2.1	2.2	2.3
China	0.2	0.4	0.5	0.5	0.9	1.3	1.5	1.6	1.8	2.1
Other regions	0.8	1.0	1.2	1.2	1.3	1.7	1.9	2.0	2.0	2.1
Total other industrial demand	14.5	15.1	15.6	15.5	14.2	16.6	17.3	18.8	20.2	21.8
DEMAND	245.4	246.1	247.9	237.9	209.9	223.1	233.3	232.0	222.5	226.6
Physical Surplus/(Deficit)	-2.8	9.6	2.6	15.0	18.0	13.6	15.5	-6.8	10.5	-31.6
Identifiable stock movements										
Russia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stillwater	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
US National Defense Stockpile	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industry Stocks	0.0	0.0	-6.2	-9.3	20.7	0.0	-3.1	-9.3	-31.1	40.4
Exchange Traded Funds	0.0	0.0	-6.0	-3.2	-11.9	-17.9	-4.5	-7.4	-27.7	-6.8
Sub Total - stock movements	0.4	0.0	-12.3	-12.5	8.7	-17.9	-7.6	-16.7	-58.8	33.7
Net Balance	-2.4	9.6	-9.7	2.4	26.8	-4.3	7.9	-23.5	-48.4	2.1

APPENDIX 4 - PALLADIUM SUPPLY AND DEMAND 2005-2014

(tonnes)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mine production										
South Africa	80.6	88.9	83.3	73.6	77.2	82.3	83.5	74.5	73.7	58.8
Russia	97.4	98.4	94.8	84.0	83.3	84.7	84.1	81.7	80.2	82.7
Canada	15.6	17.3	17.7	16.3	8.7	11.0	17.4	17.3	16.5	16.2
United States	13.3	14.5	13.2	11.9	12.7	11.6	12.4	12.3	12.6	12.4
Zimbabwe	4.2	4.2	4.1	4.3	5.5	6.9	8.1	8.0	9.8	10.1
Others	5.1	5.5	6.1	8.3	9.3	9.2	7.8	8.4	8.1	7.6
Total mine production	216.3	228.8	219.3	198.5	196.6	205.7	213.4	202.3	200.9	187.8
Autocatalyst scrap										
North America	13.4	16.2	20.3	24.7	21.9	25.9	29.9	28.7	30.8	31.5
Europe	3.6	4.3	6.2	8.5	7.5	9.5	11.1	9.8	10.4	12.6
Japan	1.5	1.5	1.8	2.2	2.2	2.6	2.5	2.6	3.2	3.0
China	0.1	0.2	0.2	0.3	0.5	0.7	1.0	1.5	1.9	2.6
Other regions	0.9	1.1	1.2	1.6	1.4	2.0	2.6	3.2	3.1	3.8
Total autocatalyst scrap	19.6	23.3	29.8	37.3	33.5	40.7	47.1	45.8	49.5	53.4
Old jewellery scrap										
North America	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1
Europe	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.3	0.3
Japan	1.2	1.5	2.0	2.6	0.8	1.0	1.2	0.9	0.9	0.9
China	1.8	5.5	3.4	2.7	2.2	4.0	5.9	5.3	5.6	6.1
Other regions	0.1	0.1	0.1	0.3	0.3	0.2	0.2	0.2	0.2	0.2
Total old jewellery scrap	3.2	7.3	5.7	6.0	3.6	5.6	7.7	6.9	7.2	7.7
SUPPLY	239.0	259.3	254.8	241.7	233.8	251.9	268.2	255.1	257.5	249.0
Autocatalyst demand										
North America	45.9	47.9	49.3	39.8	27.6	38.0	40.9	48.8	51.1	52.3
Europe	34.8	37.7	39.3	36.8	32.8	43.2	48.5	48.0	47.8	50.1
Japan	23.3	27.0	27.9	28.8	21.5	25.6	22.6	27.4	26.6	27.8
China	7.8	11.6	15.0	14.9	24.4	32.3	34.0	38.0	43.2	47.7
Other regions	12.3	13.7	17.6	19.4	18.9	25.2	26.4	26.7	26.7	27.6
Total autocatalyst demand	124.1	137.9	149.1	139.6	125.2	164.2	172.3	188.9	195.4	205.4
Jewellery demand										
North America	1.5	2.6	3.1	4.1	4.2	3.6	2.6	2.4	2.3	2.0
Europe	3.7	3.6	4.0	4.3	4.0	4.3	4.5	4.6	4.6	4.7
Japan	3.5	3.8	3.1	2.0	1.5	1.5	1.4	1.5	1.6	1.4
China	32.0	27.9	25.7	26.0	20.6	12.8	10.6	8.4	6.4	5.3
Other regions	1.6	2.0	4.0	3.9	4.2	2.6	1.7	1.5	1.3	1.2
Total jewellery demand	42.4	39.8	39.8	40.3	34.5	24.8	20.9	18.5	16.2	14.7
Dental demand										
North America	6.3	6.2	6.1	6.1	5.9	5.9	5.5	5.3	5.1	4.6
Europe	2.5	2.5	2.6	2.7	2.8	3.0	2.8	2.6	2.2	1.9
Japan	9.4	9.1	10.0	10.0	9.5	9.0	8.8	8.6	8.2	7.5
China	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Other regions	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3
Total dental demand	18.6	18.2	19.1	19.3	18.7	18.4	17.6	17.0	15.9	14.4

APPENDIX 4 - PALLADIUM SUPPLY AND DEMAND 2005-2014

(tonnes)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Chemical demand										
North America	1.4	1.5	1.9	1.7	1.3	1.6	1.7	1.7	1.7	1.7
Europe	4.7	5.2	6.1	5.8	5.0	5.1	5.2	5.0	4.9	4.8
Japan	0.5	0.6	0.7	0.7	0.6	0.7	0.6	0.7	0.7	0.7
China	1.0	1.0	1.2	1.1	1.0	1.0	1.7	1.9	2.7	2.1
Other regions	2.2	4.5	2.0	2.1	1.7	2.7	2.6	2.0	2.2	2.7
Total chemical demand	9.8	12.8	11.9	11.4	9.7	11.2	11.8	11.3	12.2	12.0
Electronics demand										
North America	7.2	7.4	6.8	6.3	5.0	5.0	4.2	2.4	1.4	0.0
Europe	3.1	2.9	2.3	2.1	1.3	0.9	0.0	0.0	0.0	0.0
Japan	5.1	5.4	5.2	5.4	4.7	5.3	5.2	5.0	4.7	4.6
China	3.0	3.8	4.5	5.4	5.5	7.1	8.0	8.7	9.4	9.3
Other regions	16.5	18.5	20.8	22.7	22.0	26.9	29.2	31.0	31.4	32.5
Total electronics demand	34.9	37.9	39.7	41.9	38.6	45.1	46.6	47.0	46.8	46.4
Retail investment										
North America	7.9	4.1	1.1	2.1	4.4	2.1	1.5	0.8	0.9	1.1
Europe	0.1	0.1	0.3	0.8	0.9	0.4	0.4	0.3	0.2	0.2
Japan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
China	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other regions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Total retail investment	7.9	4.2	1.4	2.9	5.3	2.5	1.9	1.2	1.2	1.4
Other industrial demand (including petroleum)										
North America	1.6	1.8	1.9	1.8	1.6	2.1	2.2	2.4	2.5	2.6
Europe	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6
Japan	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
China	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Other regions	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total other industrial demand	2.4	2.7	2.8	2.8	2.5	3.1	3.2	3.4	3.6	3.7
DEMAND	240.2	253.5	263.9	258.1	234.5	269.2	274.3	287.3	291.2	298.1
Physical Surplus/(Deficit)	-1.1	5.9	-9.1	-16.4	-0.7	-17.3	-6.0	-32.2	-33.7	-49.1
Identifiable stock movements										
Russia	43.5	48.2	28.0	39.8	34.2	24.9	24.9	12.4	6.2	0.0
Stillwater	13.6	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
US National Defense Stockpile	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industry Stocks	0.0	0.0	0.0	0.0	0.0	0.0	-1.6	-3.1	-15.6	9.3
Exchange Traded Funds	0.0	0.0	-8.7	-11.9	-15.8	-33.9	16.6	-13.9	0.0	-28.0
Sub total - stock movements	57.8	50.2	19.3	28.0	18.5	-9.0	39.9	-4.6	-9.3	-18.6
Net Balance	56.6	56.0	10.2	11.6	17.7	-26.3	33.8	-36.8	-43.0	-67.7

APPENDIX 5 - NOMINAL PLATINUM & PALLADIUM PRICES, 1995-2014

Unless otherwise stated, US dollar prices and their equivalents are for the p.m. fixes of the London Platinum and Palladium Fixing Company Limited for prices prior to 1st December 2014 and the p.m. LBMA Platinum Price and LBMA Palladium Price from 1st December onwards.

	PLATINUM					PALLADIUM				
	USD/oz	EUR/kg	JPY/g	ZAR/kg	CNY/g	USD/oz	EUR/kg	JPY/g	ZAR/kg	CNY/g
1995	424.24	10,548	1,280	49,455	113.90	151.29	3,762	455	17,628	40.62
1996	397.43	10,206	1,388	54,685	106.24	128.12	3,290	447	17,610	34.25
1997	395.86	11,288	1,536	58,614	105.51	177.97	5,088	691	26,424	47.43
1998	371.77	10,679	1,566	65,931	98.96	284.12	8,144	1,198	50,669	75.63
1999	376.73	11,387	1,372	74,015	100.27	357.74	10,816	1,303	70,286	95.21
2000	544.14	19,085	1,886	122,049	144.83	680.33	23,907	2,361	153,087	181.07
2001	529.00	18,995	2,062	144,080	140.77	603.68	21,589	2,343	161,455	160.65
2002	539.26	18,340	2,166	181,217	143.50	337.56	11,589	1,364	114,859	89.83
2003	691.19	19,638	2,570	166,664	183.94	200.52	5,727	747	48,883	53.36
2004	845.52	21,891	2,940	174,601	225.00	230.22	5,974	801	47,661	61.26
2005	896.57	23,233	3,180	183,195	235.97	201.08	5,217	715	41,092	52.90
2006	1,142.55	29,227	4,268	248,841	292.82	320.00	8,188	1,195	69,557	82.01
2007	1,302.81	30,533	4,926	293,871	318.30	354.78	8,333	1,344	80,125	86.77
2008	1,577.53	33,941	5,296	405,082	353.49	352.25	7,579	1,182	90,399	78.98
2009	1,203.50	27,678	3,614	320,637	264.29	263.22	6,025	788	69,456	57.80
2010	1,608.98	39,046	4,534	377,477	350.06	525.24	12,738	1,473	122,595	114.11
2011	1,721.87	39,746	4,416	399,445	358.02	733.63	16,933	1,883	169,870	152.59
2012	1,551.48	38,780	3,979	408,396	314.65	643.19	16,075	1,650	169,206	130.45
2013	1,486.72	36,009	4,653	458,205	294.02	725.06	17,556	2,274	224,103	143.33
2014	1,385.70	33,482	4,695	481,674	274.47	803.22	19,460	2,730	279,495	159.12

Note: prior to 1999 Deutsche Mark prices have been converted into Euros at the official rate;

Source: GFMS, Thomson Reuters; LBMA

APPENDIX 6 - REAL PLATINUM & PALLADIUM PRICES, 1995-2014 (CONSTANT 2014 TERMS)

Unless otherwise stated, US dollar prices and their equivalents are for the p.m. fixes of the London Platinum and Palladium Fixing Company Limited for prices prior to 1st December 2014 and the p.m. LBMA Platinum Price and LBMA Palladium Price from 1st December onwards.

	PLATINUM					PALLADIUM				
	USD/oz	EUR/kg	JPY/g	ZAR/kg	CNY/g	USD/oz	EUR/kg	JPY/g	ZAR/kg	CNY/g
1995	659.07	13,974	1,301	150,929	173.82	235.04	4,983	463	53,799	61.99
1996	599.84	13,328	1,409	155,381	149.67	193.38	4,297	454	50,038	48.25
1997	583.84	14,470	1,532	153,490	144.58	262.48	6,522	690	69,194	65.00
1998	539.93	13,562	1,552	161,368	136.77	412.63	10,343	1,187	124,013	104.52
1999	535.41	14,380	1,364	172,283	140.56	508.43	13,658	1,296	163,604	133.47
2000	748.06	23,752	1,888	269,862	202.50	935.29	29,752	2,363	338,490	253.18
2001	707.26	23,180	2,080	301,326	195.42	807.11	26,345	2,364	337,663	223.01
2002	709.72	22,066	2,214	347,261	200.75	444.27	13,944	1,395	220,102	125.66
2003	889.50	23,387	2,623	301,606	254.37	258.05	6,820	763	88,462	73.79
2004	1,059.73	25,642	3,001	311,409	299.52	288.55	6,998	818	85,006	81.56
2005	1,086.84	26,800	3,255	316,241	308.51	243.75	6,018	732	70,935	69.16
2006	1,341.74	33,190	4,358	410,638	377.32	375.79	9,299	1,221	114,783	105.67
2007	1,487.50	33,894	5,027	452,334	391.55	405.07	9,251	1,371	123,330	106.73
2008	1,734.57	36,713	5,331	559,421	410.75	387.32	8,198	1,190	124,841	91.78
2009	1,328.04	29,845	3,688	413,250	309.28	290.45	6,497	804	89,518	67.64
2010	1,746.83	41,643	4,660	466,562	396.50	570.24	13,585	1,514	151,527	129.25
2011	1,812.17	41,528	4,552	445,188	384.70	772.11	17,692	1,941	189,323	163.97
2012	1,599.73	39,721	4,103	445,130	329.36	663.19	16,465	1,701	184,426	136.55
2013	1,510.84	36,336	4,781	483,639	299.88	736.82	17,715	2,336	236,542	146.18
2014	1,385.70	33,482	4,695	481,674	274.47	803.22	19,460	2,730	279,495	159.12

Note: prior to 1999 Deutsche Mark prices have been converted into Euros at the official rate;

Source: GFMS, Thomson Reuters; LBMA

APPENDIX 7 - PLATINUM AND PALLADIUM PRICES IN 2014

Unless otherwise stated, US dollar prices and their equivalents are for the p.m. fixes of the London Platinum and Palladium Fixing Company Limited for prices prior to 1st December 2014 and the p.m. LBMA Platinum Price and LBMA Palladium Price from 1st December onwards.

PLATINUM

	USD/oz	EUR/kg	JPY/g	ZAR/kg	CNY/g	CHF/kg
Annual Average	1,385.70	33,482	4,695	481,674	274.47	40,665
Maximum	1,512.00	35,720	4,944	522,461	301.69	43,367
Minimum	1,178.00	30,248	4,245	419,412	232.13	36,302
Range:Average	24.1%	16.3%	14.9%	21.4%	25.3%	17.4%

Monthly Average

Jan	1,423.18	33,609	4,749	496,558	276.87	41,347
Feb	1,410.50	33,177	4,630	495,200	275.77	40,505
Mar	1,451.62	33,758	4,776	500,072	288.07	41,091
Apr	1,431.50	33,327	4,717	483,705	286.47	40,625
May	1,456.43	34,111	4,767	485,519	292.08	41,628
Jun	1,452.76	34,345	4,766	498,566	291.01	41,820
Jul	1,492.65	35,450	4,883	511,455	297.48	43,072
Aug	1,447.85	34,947	4,790	495,828	286.46	42,338
Sep	1,362.36	33,964	4,701	480,788	268.87	41,012
Oct	1,259.76	31,940	4,374	447,809	248.08	38,576
Nov	1,208.85	31,160	4,523	431,018	238.07	37,458
Dec	1,217.32	31,734	4,668	449,411	242.11	38,146

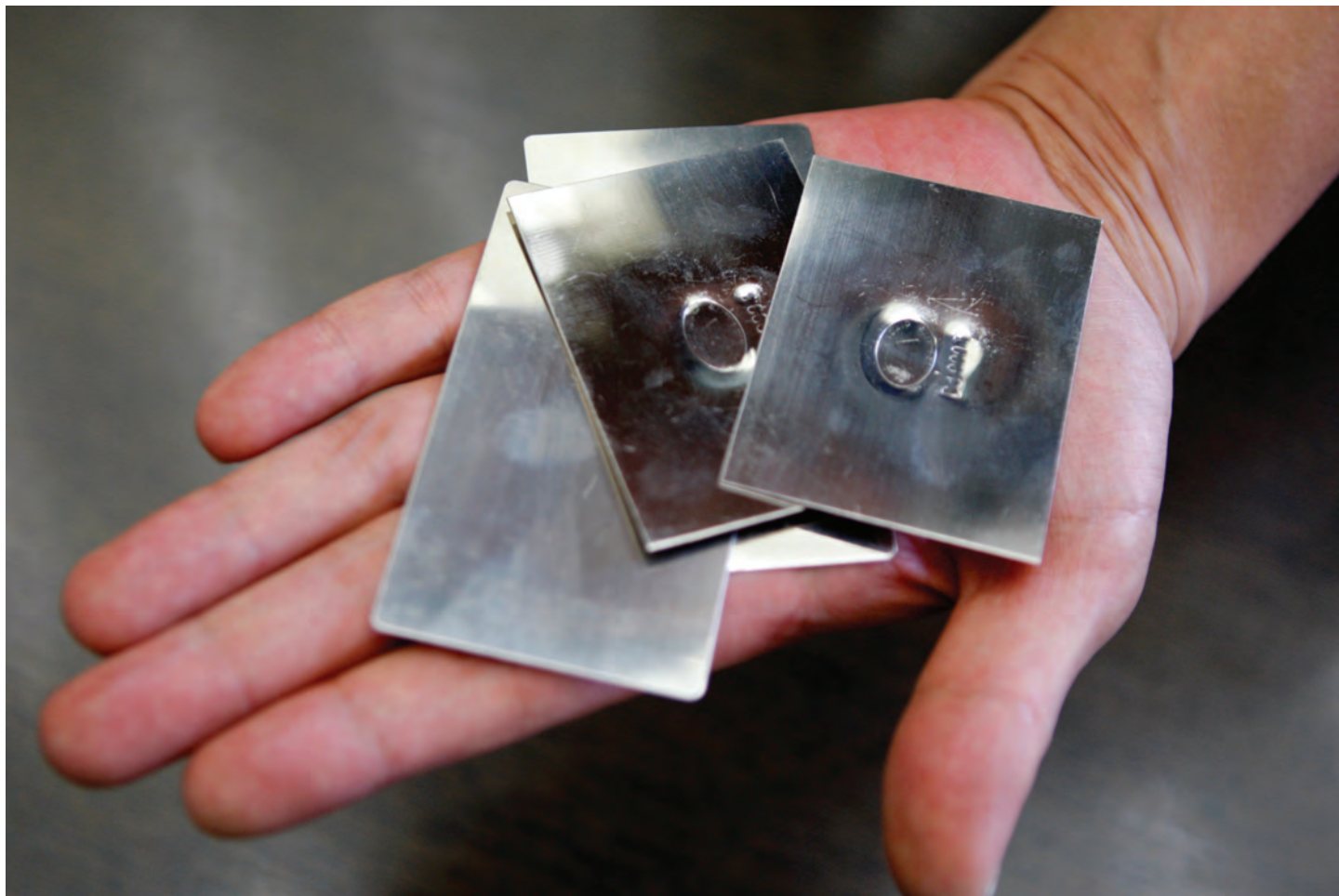
PALLADIUM

	USD/oz	EUR/kg	JPY/g	ZAR/kg	CNY/g	CHF/kg
Annual Average	803.22	19,460	2,730	279,495	159.12	23,623
Maximum	911.00	22,312	3,150	312,576	179.88	26,926
Minimum	702.00	16,696	2,294	247,187	136.77	20,394
Range:Average	26.0%	28.9%	31.3%	23.4%	27.1%	27.6%

Monthly Average

Jan	734.14	17,337	2,450	256,122	142.82	21,329
Feb	728.55	17,136	2,392	255,782	142.44	20,921
Mar	773.07	17,978	2,544	266,299	153.43	21,885
Apr	792.33	18,446	2,611	267,747	158.57	22,485
May	821.05	19,230	2,687	273,726	164.66	23,468
Jun	832.24	19,675	2,731	285,618	166.71	23,958
Jul	871.70	20,705	2,851	298,665	173.72	25,156
Aug	875.80	21,143	2,898	299,913	173.27	25,612
Sep	841.77	20,983	2,904	296,993	166.13	25,337
Oct	778.26	19,733	2,703	276,625	153.26	23,832
Nov	780.75	20,125	2,922	278,357	153.76	24,193
Dec	805.74	21,006	3,090	297,493	160.26	25,250

Source: GFMS, Thomson Reuters; LBMA



REUTERS/Yuriko Nakao

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