

HERAEUS PRECIOUS APPRAISAL

Heraeus

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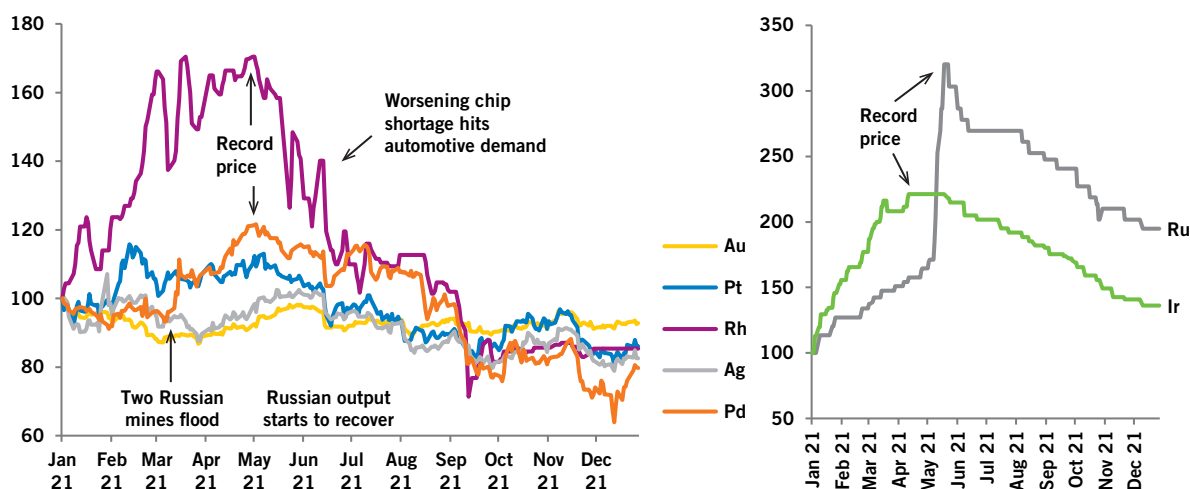


MARKET SPOTLIGHT

Iridium and ruthenium were the only price winners in 2021

Last year, iridium and ruthenium were the only precious metals to hold on to some of their price gains. Early 2021 was characterised by tight markets for the small PGMs, owing to processing problems in South Africa which had restricted refined output. Industrial demand was good for ruthenium in chemical manufacturing and hard disk drives, and for iridium as crucibles to produce lithium tantalate for surface acoustic wave (SAW) filters for 5G smartphones. There was likely also some positive sentiment towards these two metals in relation to the growth of the green economy and their use in hydrogen electrolyzers and fuel cells. Later in the year, liquidity improved as South African output recovered and some stockpiled material was processed, leading the prices to give back some of their gains.

Prices indexed to 100 1 Jan 2021



Source: Heraeus Precious Metals

Palladium was the worst performing metal (-20%) and rhodium fared little better (-15%). Palladium and rhodium prices rose between January and May, prompted by a production outage in Russia, but they then subsided as the full effect of the semiconductor chip shortage on light-vehicle production became evident. Global light-duty vehicle production ended the year marginally higher than in 2020, but it was almost 10 million units lower than had been expected at the beginning of 2021.

Platinum, with its broader demand base, was less volatile in price last year. Although not as well supported as in 2020 by investment purchases of ETFs, demand for platinum for emission controls on heavy-duty vehicles increased strongly due to tighter emission regulations in China and India. This, along with some substitution to platinum from palladium in light-vehicle autocatalysts, overcame the negative impact of the chip shortage. Industrial demand recovered from the pandemic-related fall in 2020 which delayed installation of new production capacity in the petroleum and chemical sectors. However, the coronavirus continued to dampen platinum jewellery demand.

Gold and silver prices were curiously subdued in 2021, trading sideways to lower despite increasing inflation. In an environment of rising consumer prices but lax monetary policy, there were expectations of a pick-up in investor demand for gold, yet gold ETF holdings declined during the year. Physical silver demand, driven by bar and coin purchases and production of solar cells, was at a five-year high, but there was little or no follow-through in price development.



PRECIOUS METALS REVIEW

79 Au Gold

	Close	Weekly change	High	Date	Low	Date
\$/oz	1,819	1.37%	1,829	14/01/2022	1,790	10/01/2022
€/oz	1,593	0.86%	1,604	11/01/2022	1,582	13/01/2022

Physically backed gold ETFs suffered global outflows of 173 t last year, resulting in collective gold holdings slipping by 5% to 3,570 t (source: World Gold Council). This total was significantly above pre-pandemic levels after record inflows (875 t) during 2020. The metal faced headwinds from higher bond yields, especially during Q1, and a stronger dollar relative to other developed market currencies. Gold received some support from the rise in inflation which pushed real interest rates more into negative territory, but this was not enough for the price to climb back above \$2,000/oz. Speculative interest in COMEX gold futures was also down, falling by the equivalent of 173 t over the year, to 663 t.

Inflation continued to climb in December, but no rate rises yet. The minutes of the Federal Reserve's December meeting showed the Fed's discussions were more hawkish than initially assumed. This hit the gold price temporarily, as the market priced in a higher chance of a rate rise in March when asset purchases are scheduled to end. Then the latest inflation data showed that in the US, the CPI increased by 7.0% in December, while in Europe inflation rose by 5.0%, with prices in Germany up 5.3%. Interest rate rises are still some months away in the US and the ECB may not raise rates this year, so real interest rates remain firmly negative which should support the gold price.

47 Ag Silver

	Close	Weekly change	High	Date	Low	Date
\$/oz	22.93	2.90%	23.31	14/01/2022	22.24	10/01/2022
€/oz	20.09	2.39%	20.33	14/01/2022	19.65	10/01/2022

Indian investors get a new option with the first silver ETF being launched in early January. India is a significant market for jewellery, silverware and silver investment, but the market regulator only allowed silver ETFs late last year. When gold ETFs were first launched in India, they tended to start trading with 0.5 to 1.5 t after the

initial subscription period. For silver, the equivalent would be around 10 t. The initial level of interest will be an interesting indication of the current strength of investor demand. Global silver ETF holdings are currently 1,089 moz.

78 Pt Platinum

	Close	Weekly change	High	Date	Low	Date
\$/oz	974	1.38%	989	12/01/2022	927	10/01/2022
€/oz	853	0.89%	866	12/01/2022	819	10/01/2022

High metal prices are incentivising mine restarts in South Africa. Anglo Platinum (49%) and Atlatsa Resources' (51%) sale of the Bokoni mine to African Rainbow Minerals brings the prospect of restoring production from the mine on the Eastern Limb of the Bushveld Complex. Bokoni has been on care and maintenance since 2017 after becoming uneconomic when PGM prices were in the doldrums. The sale is subject to regulatory approval, which is likely to be granted. Anglo Platinum will purchase and process the concentrate from Bokoni for its 23-year life-of-mine. First production is slated for 2024, but the operation is only likely to begin delivering significant ounces in 2025 and reach steady-state

production of around 300,000 ounces of PGMs (6E) in concentrate by 2028.

Bokoni is a large resource with an interesting balance of PGMs from its mix of Merensky and UG2 ores. The UG2 Reef will be mined initially. Palladium accounts for 49% of the PGM content in the UG2 Reef, with rhodium also relatively high at 8%, while its Merensky Reef ore is lower grade but platinum-rich (61%), offering flexibility to meet changing market needs going forward. This will be key because the rise of battery electric vehicles (BEVs) will eventually impact palladium and rhodium demand more than platinum.



PRECIOUS METALS REVIEW

⁴⁶ Pd **Palladium**

	Close	Weekly change	High	Date	Low	Date
\$/oz	1,880	-2.08%	1,971	10/01/2022	1,859	14/01/2022
€/oz	1,647	-2.24%	1,736	10/01/2022	1,629	14/01/2022

A recovery in sales of light vehicles in China in 2021 is not entirely good news for palladium. Although total demand for light cars and trucks is forecast to have increased in 2021, purchases of BEVs by consumers in the world's largest vehicle market more than doubled last year and are predicted to almost double again to 6 million units in 2022, according to the China Passenger Car Association. If so, new energy vehicles (NEVs), which include electric cars, plug-in hybrids and fuel cell vehicles, will account for about one in five of new car sales. The surge in demand can be partly attributed to China phasing out subsidies on NEVs by 2023, but also to consumers trying to beat price rises, as material costs for BEVs are increasing sharply. Even so, automotive palladium demand in China is forecast to hit a record high of over 2.5 moz this year.

Toyota confirms that hybrid and fuel cell vehicles remain essential to its carbon reduction plans. Toyota, up until now a firm proponent of ICE-battery hybrids and fuel cells as a means to reduce carbon emissions from passenger cars, announced in December that it would spend \$70 billion by 2030 to add BEVs to its range of models. However, CEO Akio Toyoda said the company expects pure electric vehicles to account for only a third of its sales by the end of the current decade. Toyota has not joined its main competitors in a pledge to phase out internal combustion engines by 2040, on the grounds that not all parts of the world will be ready to do so by then. In addition to electrified cars, Toyota is developing internal combustion engines that run on hydrogen fuel.

⁴⁵ Rh ⁴⁴ Ru ⁷⁷ Ir **Rhodium, Ruthenium, Iridium**

	Rhodium	Ruthenium	Iridium
Reporting week	\$17,950/oz	\$575/oz	\$4,150/oz
Previous week	\$18,750/oz	\$575/oz	\$4,150/oz

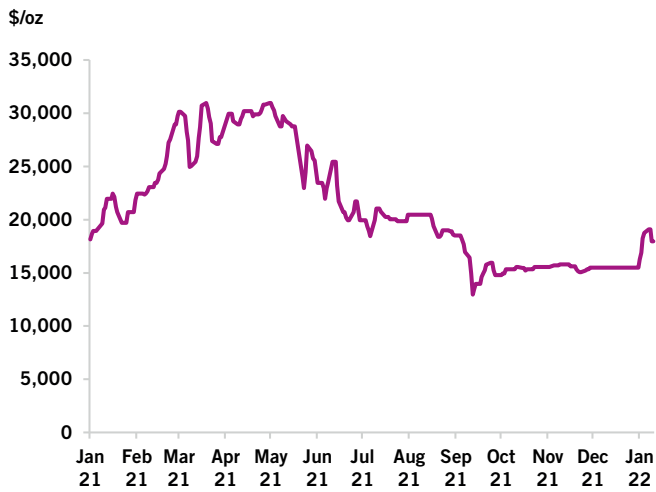
The rhodium price jumped in January. In the last fortnight, rhodium has decisively broken out of the narrow trading range it was in during the fourth quarter of 2021. Ending the old year at \$15,500/oz, it spiked sharply to \$19,100/oz at the start of last week before retracing to \$17,950/oz. The move reflects New Year purchasing by automotive OEMs, and Chinese consumers, prior to taking

their Lunar New year holiday break, juxtaposed with lower sales activity from producers. With the rhodium market remaining liquid and the South African and Russian holiday season coming to an end, prices are likely to ease. Iridium and ruthenium prices have been stable since mid-December at \$4,150/oz and \$575/oz, respectively.



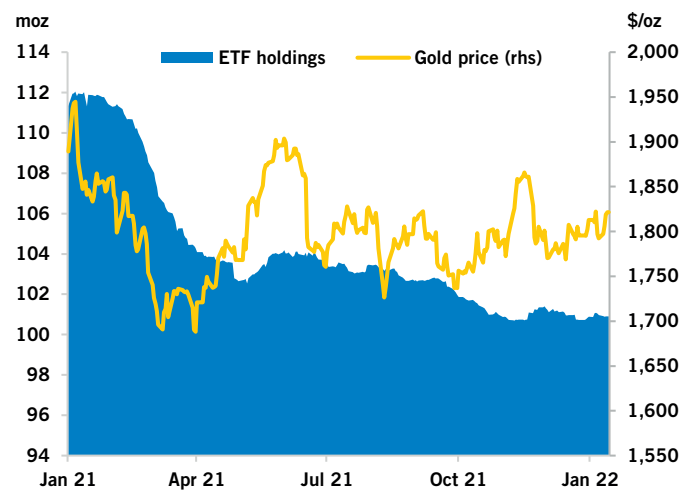
TRENDS AND INVESTMENTS

Rhodium price



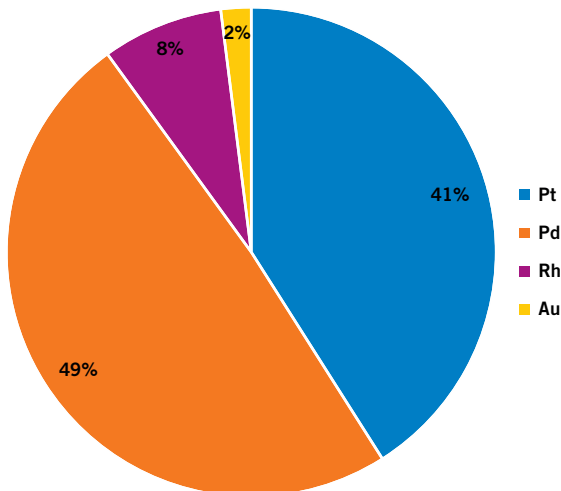
Source: SFA (Oxford), Heraeus Precious Metals

Gold ETF holdings



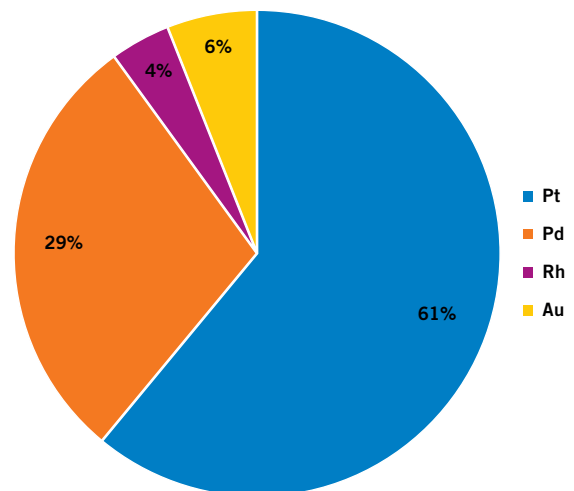
Source: SFA (Oxford), Bloomberg

Bokoni UG2 ore



Source: SFA (Oxford), ARM

Bokoni Merensky ore



Source: SFA (Oxford), ARM

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