

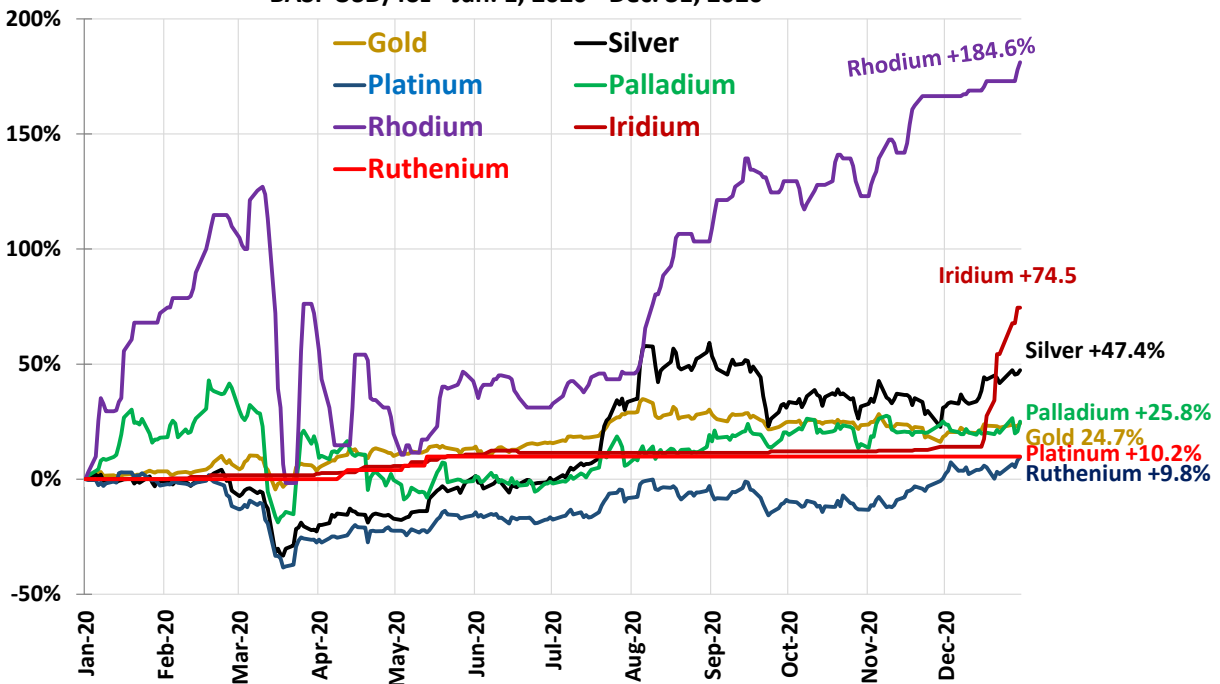


2020 Precious Metals Markets – A Year in Review

When this year started, who would have thought that a pandemic would have impacted our markets so dramatically. What a year. Let’s quickly recap the precious metals markets.

Comparative Fix Change - Jan 2020 Baseline

BASF USD/Toz - Jan. 1, 2020 - Dec. 31, 2020

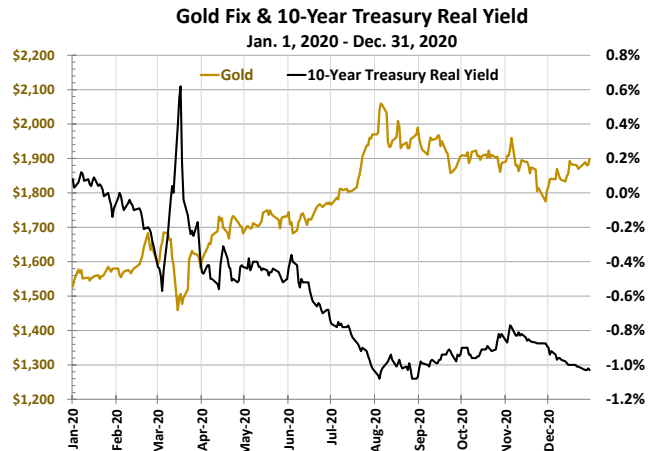


Precious Metals Basket Indexed Prices -BASF/EIB USD \$ Since Jan 2, 2020

2019 Ending (12/31/19)	\$ 1,523.00	\$ 18.05	\$ 985.00	\$ 1,940.00	\$ 6,025.00	\$ 1,490.00	\$ 255.00
High	\$ 2,060.00	\$ 28.75	\$ 1,085.00	\$ 2,790.00	\$ 17,150.00	\$ 2,600.00	\$ 280.00
	6-Aug-20	1-Sep-20	4-Dec-20	19-Feb-20	15-Dec-20	Late Dec.	Since May 14
Low	\$ 1,459.00	\$ 12.05	\$ 610.00	\$ 1,585.00	\$ 6,000.00	\$ 1,490.00	\$ 255.00
	16-Mar-20	19-Mar-20	19-Mar-20	17-Mar-20	Mar 20-24	All Jan.	Jan-March
2020 Ending	\$ 1,899.00	\$ 26.60	\$ 1,085.00	\$ 2,440.00	\$ 17,150.00	\$ 2,600.00	\$ 280.00
y/y % Change	24.7%	47.4%	10.2%	25.8%	184.6%	74.5%	9.8%

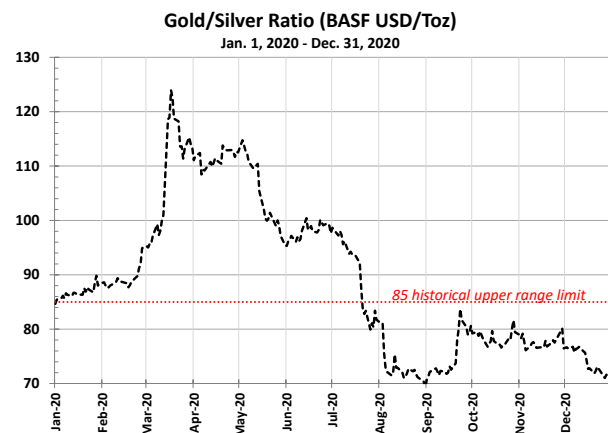
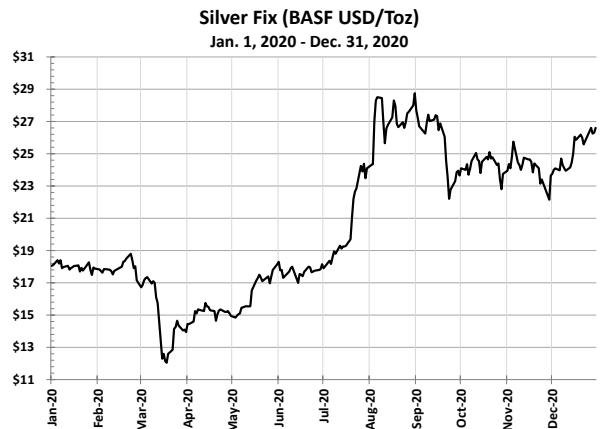
Gold +24.7%

- Gold ended 2019 at \$1,523
- End of 2020 at \$1,899, +24.7%
- High - after touching \$2,060 in mid-August.
- Gold's mathematical relationship with the 10-year US Treasury Real (inflation indexed) Yield remains intact.
- Outlook: Inflationary pressures are certain to continue into 2020 as global economies continue to spur additional relaxed monetary policies in relief of the COVID pandemic. Gold is likely to regain its record high levels in route to \$2,400 in 2021.



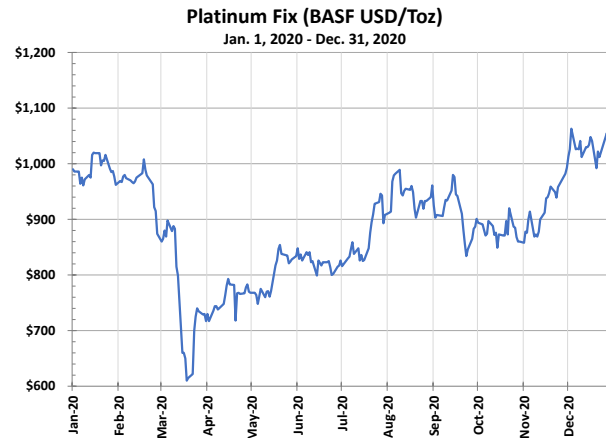
Silver +47.7% (with wild ride of -30% to +60% in between)

- Silver ended 2019 at \$18.05
- Low: And what a journey 2020 was for the Silver market. Who recalls Silver hitting \$12.05 on March 19, 2020? That sounds incredibly laughable now, but it did hit that low. What a buy on the dip if you were a savvy investor of 102.9% until years end.
- End of 2020 at \$26.60, +47.7%
- High was \$28.75 on Sept. 1.
- Silver has seen COVID supply disruptions from the 4 largest producing countries.
- Silver's Solar PV demand had a remarkable year with 115 GW of new installations in spite of the pandemic. Solar PV new installations are forecast to double by 2025.
- Outlook: Look for Silver's to continue its shift to becoming an industrial metal, and less of an investment instrument. Silver will gain another 5% of industrial demand by 2025.



Platinum +10.2%

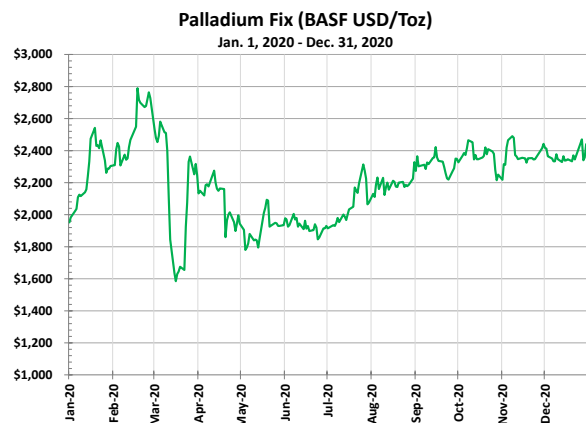
- Platinum ended 2019 at \$985
- By the End of 2020 at \$1,085, +10.2%
- Platinum had hit a 17.5 year low of \$610 in mid-March.
- Platinum has enjoyed a resurgence since May 2020, driven largely by new investment demands. Platinum ETF holdings have been growing from a low in 2008 of just 200 koz to 3.7 Moz in 2020.



- 2021 Outlook: I forecast that Platinum will steadily increase over the next decade as the hydrogen economy continues to grow. Green Hydrogen generation, fuel cell vehicles, increased jewelry demand, and even continued ICE vehicle demands with additional Pd for Pt design swapping will all increase industrial demands of platinum. 2020's will be a steady decade of growth for platinum.

Palladium +25.8%

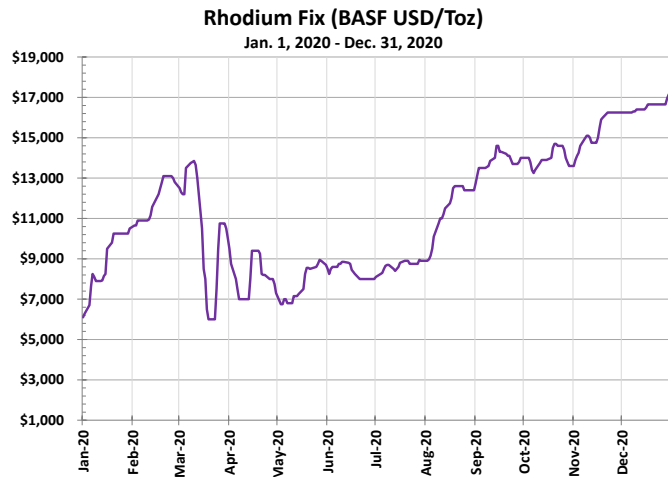
- Palladium ended 2019 at \$1,940
- By the End of 2020 at \$2,440, +25.8%
- Palladium had hit a COVID reactionary low of \$1,585 as Chinese and global vehicles sales imploded in February and March.
- Palladium has since enjoyed a steady climb from those March lows driven largely by a steady recovery in global automotive demand.



- 2021 Outlook: Palladium should continue its climb even in the face of USA increasing reports of Platinum for Palladium design swaps in gasoline auto catalyst designs. China 6a legislation and a recovering China auto demand is helping secure palladium as a very thin market, with very little above ground stocks. ETF holding ended 2020 at a very thin 400 koz, or about 1 month's supply of auto catalysts. Also watch for the USA to see a similar push for increasing Hybrids and PHEV's in response to rejoining the Paris Climate Accord. I also think that a US Biden administration will likely standardize the USA emission standards around the California Air Resource Board (CARB) standards, which are far tighter than the federal standards.

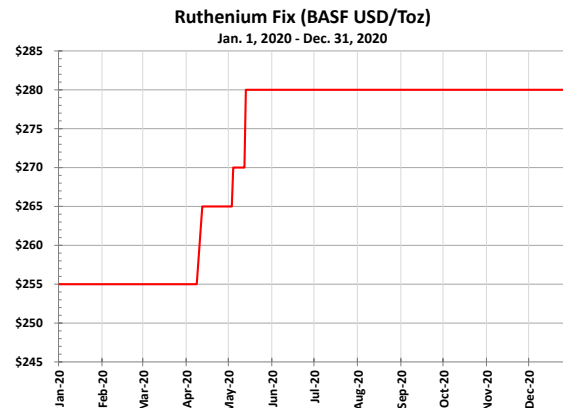
Rhodium +184.6%, or 2.85x climb

- Rhodium ended 2019 at what we know now as a modest \$6,025.
- By the End of 2020 Rh hit new all-time highs of \$17,150, +185%
- As predicted back in 2016, Rhodium and Palladium both are pulling a Thelma and Louise on us. They are hitting the gas as they are driving off the cliff. Pd in the next decade should shift to a surplus market.
- 2021 Outlook: For Rhodium, there is no end in sight. Design changes must occur for this market to see any relief. The best-known design changes involve dramatically higher Palladium loadings to offset Rhodium loadings in auto catalyst designs. Rhodium is key to combating NOX emission standards, and NOX numbers are the ones that tighten the most year over year around the globe. Look for Rhodium's climb to continue into 2021.



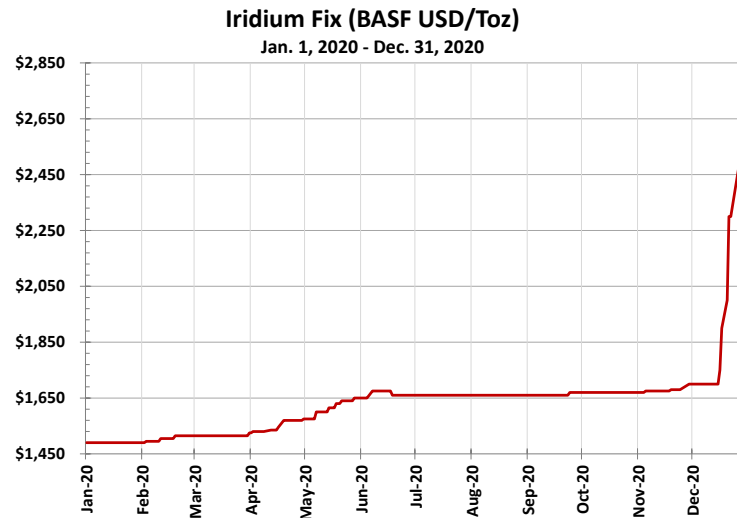
Ruthenium +9.8%

- Ruthenium ended 2019 at \$255.
- By the end of 2020 Ru was at \$280, +9.8%
- Ruthenium is still preferred in the passive component world for thick-film ruthenium resistors. Ruthenium is also still a key to the water treatment and chlor-alkali industries, as well as serving as a catalyst in the ammonia and fertilizer industries.
- Ruthenium supply is forecast to continue to decline year over year as existing S. African mines that tap into the UG2 reef approach end-of scheduled life.
- Ruthenium has the highest rate of annual recycle relative mined supply. Furuya metals alone is recycling close to 1.5 Moz of Ruthenium annually, versus a global mined volume of ~720 Koz. Understanding these products recycle processes is key to understanding this PGM minor metal.
- Outlook: Ruthenium is forecast to enjoy relative market balance in 2021 with no real major shifts. There is a risk on increased electronics demand coming from the Non-volatile memory markets (MRAM, SST-MRAM) and from advanced semiconductor IC node interconnect loadings.



Iridium +74.5%

- Iridium ended 2019 at \$1,490.
- By the end of 2020 Iridium was at \$2,600, +74.5%.
- Iridium's primary use is as a crucible for labware and for use in electronics settings to grow various crystal materials. LED's use Iridium crucibles, SAW and BAW acoustic filters used mobile



electronics markets need Iridium crucibles. Iridium, just like its brother Minor PGM Ruthenium, are both used as a catalyst in the water treatment and chlor-alkali industries.

- Outlook: Iridium is expected to climb further in 2021. New demand growth in PEM Electrolyzer for both Iridium and Platinum used as a catalyst for green hydrogen production ensure a growing demand. Both the frequency of PEM installations of water splitting electrolyser technologies, and the sheer growing size of these installations, bodes well for Iridium demand. Even though these catalysts can be recovered at end of life, recycling of Iridium is extremely difficult. Recovery rates of 70-80% are not uncommon.

Key macro level trends to watch relative to Precious Metals:

Supply of the entire precious metal's basket. Nobody is projecting dramatic increases in supply of the precious metal's basket, with the one exception of exception being possibly Palladium. Even with substantially higher prices, Gold and Silver global mined production is near its peak. Greenfield projects are well mapped, and new exploration needed to identify cost effective reserves that can be harvested at a reasonable projected cost.

Palladium over the next decade will enjoy both a growth in mining from Copper, Nickel and Chrome mining where Palladium is a by-product in Russia, North America, and even expanded Zimbabwe and S. African Northern Limb mines. Also, Palladium will see increased recycle returns as older vehicles are recycled and the Palladium loadings, mostly in gasoline vehicles, will be harvested. Increased auto catalyst palladium loadings over time ensure this process. Higher palladium recycle returns are baked into the global vehicle fleet already.

Investment Demand is key to Gold and Silver markets. Do we see commodity markets catch fire and investment into precious metals dwindle substantially? Remotely possible, but Not Very Likely. Instead continued global cash infusions and quantitative easing will likely drive further inflationary forces.

Electronics growth appears inevitable year over year. With it more demand for the entire basket of metals, but especially Silver and Gold. The growth of the average level of electronics per vehicle in automotive is a trend that will continue, as well as trends towards electrifying vehicles (Hybrids, PHEV's, BEV's and FCEV's all demand more electronics on board). 5G communication networks will continue to expand over the next decade, bringing with it more connected, and IoT devices. All of this spells out for more electronics content.

Global **Automotive** growth seems all but certain. China and Asia demand growth opportunities are the largest growth market globally. Disruption from BEV's and FCEV's is going to be far slower than most Green Advocates and governments think. All of the zero emission vehicle mandates in the world won't change the course of the internal combustion engine. Mineral constraints on Lithium, Cobalt, Nickel, Vanadium, and even Copper are likely to have very tangible market penetration delaying effects on EV market penetration trajectories by 2028. The lack of responsibly mined Nickel is already altering Tesla's LiB chemistries in both China and EU BEV markets.

Numerous Catalyst Demands should see overall growth. Over 60+% of the PGM's are used in a catalyst role.

Conclusion: Look for further gains in 2021 in the precious metal's basket.