Both Palladium and Rhodium have had wild moves in both outright and forwards, culminating in what looks like a blow-off top reaction last week. Palladium surged through $2550, at one point (already) posting 35% YTD gains and putting in a monthly range of $750+ (10x the average monthly ranges*); similarly Rhodium repriced +$3800 so far this year toward $10,000 (more than its entire range traded during during the bear market years of 2010-2018). Clearly both moves outdid the major record-breaking repricings in 2001 (Palladium) and even 2008 (Rhodium) on just scale alone. This disorder warrants a quick take (see our 2020 Precious Outlook* here for further insights).

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5 takeaways:

1. The path of least resistance is higher; the collective markets expectations/forecasts and hedges weren't and aren't bullish enough

2. Palladium outright prices and forward rates have overshot in the short-term, very similar to Q4'18/Q1'19 tightening episode; this seasonal tightness should be alleviated somewhat into Q2'20.

3. However, short term forward rates are unlikely to *fully* unwound (to low single digit rates), given critically stock levels, an expected auto market recovery in Europe and China & tighter the emissions regulations that will outweigh only incremental increases in production in 2020.

4. The statement repricing in the Rand PGM Basket, synchronized repricing in Rhodium and Palladium and lack of viable substitution outside of the complex marks a new cycle - an era of higher (PGM) prices vs the previous decade but also higher volatility.

5. Palladium 2020 forecasts require a revision (already!): $2000 low, $2300 average, $3000 high. Palladiums largest downside risk stems from the macroeconomic backdrop – the later the business cycle extends, the larger the subsequent risk to US auto sales & risk assets (its favored tailwind)

FUNDAMENTALS: Nothing has officially changed --> stricter emission regulations and technology (especially in Europe and China) moving faster than supply responses have created structural deficits in both Palladium an Rhodium for ~3 years now. There is good coverage in the following Reuters and FT articles outlining this fundamental story the market has known (but its full price implications seems underappreciated). The market is structurally under owned and any fresh uncertainty or trigger (trade, price risk, supply-side fears) injects a flurry of buying and/or borrowing in a very opaque market. These recent parabolic moves in Rhodium & Palladium had only a handful of core 'triggers' which accentuated many underlying 'contributors':

- **Triggers:** Eskom power cuts & supply fears beginning in December 2019, the strong Rhodium repricing and seasonally lower PGM supply (Northern Hemisphere) accentuated the supply gap needed to fulfill demand, especially Asian contractual obligations.

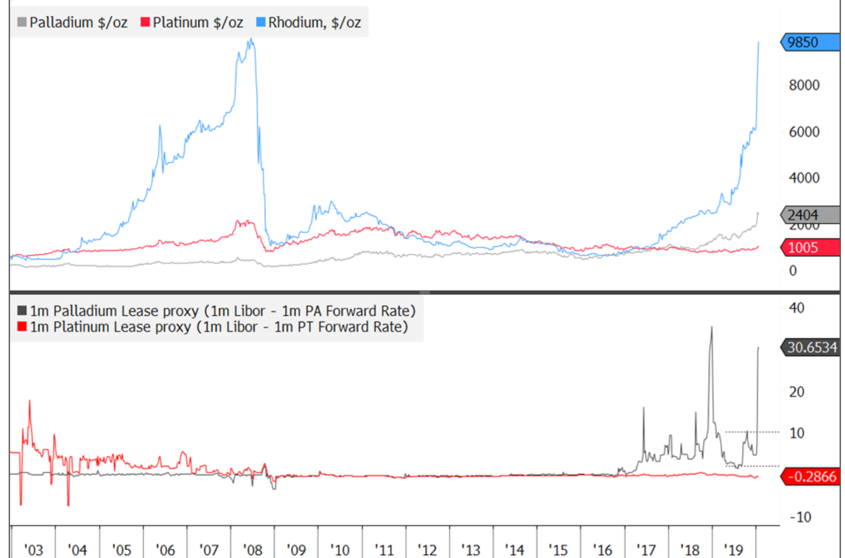
- **Contributors**: multi-years of structural deficits; critically low levels of stocks; insatiable Asian demand due to emission regulations (despite slower auto sales in 2019); structurally declining diesel market share in Europe; stronger auto sales in Europe (recent data surprises) and China (low base) expected in 2020; reduced sell-side market visibility & research (and thus arguably liquidity)

- **ESKOM & other SUPPLY RISK:** While S.A labor risk is somewhat reduced in 2020 (given the 3 year pay deal struck between AMu and producers in 2019), the unexpected, frequent and rather stringent (stage 6) power cuts in December 2019 /January 2020, is a clear and growing risk for 2020. The system continues to be vulnerable, where load-shedding could be implemented at short notice, which will upend consumer buying trends, impact production and thus prices. Other less immediate threats to the SA PGM mining industry is the threat of rating downgrades (arguably this year) which lifts borrowing costs (and thus the PGM cost floor), and the unpredictable alliance between labor unions, the government and producers. The relatively fundamentally tighter PGMs – Rhodium and Palladium – have shown that they were and continue to be unusually more sensitive to any supply-side risk.

- **SUPPLY RESPONSE:** Supply-side adjustments (increases in primary supply and/or of scrap) is currently not occurring fast enough to offset the increase in auto demand, due to the rise in loadings. Palladiums by-product nature has historically complicated that supply response, but given the major and high conviction repricing in the Rand PGM Basket, it shouldn't but its still likely to complicate the response (for other reasons including lack of investment and Eskom). Overall, S.A supply should mildly contract over the next few years (there are few capex projects with only Mogalakwena, Stillwater and Booysendal together adding mabe >100K oz in PGMS, not Palladium, 2020). Russian production (due to new projects/South Cluster, improvements in efficiencies) only has a material impact in 2021 and NA growth is strong but insufficient at current consumption rate. The risk for a larger response in scrap continues to grow given surging prices. Ultimately, similar to the Q4'18/Q1'19 tightening episode, this seasonal tightness should be alleviated somewhat into Q2'20 (but not fully unwound given critically stock levels).

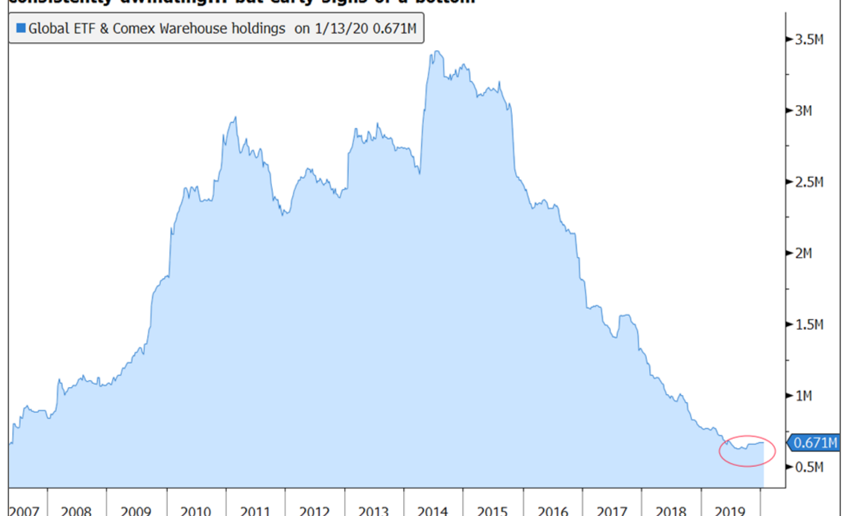
- **CHINA & DEMAND:** Chinas “car crash” in 2019, while prices remained in tireless price uptrends, proved that the complexity of catalyst technologies and emission regulations (China 6) are real, where changes (higher loadings) are occurring faster than supply responses. That has larger implications for 2020, given expectations that the worst of auto sales stats are behind us, combined with the tailwinds from a 'phase one' trade deal (its positive impact on Chinese consumer sentiment). The fact that industrial users consumption trends can switch *within* Palladium (from leasing to purchasing) but not to alternative metals suggests limited substitution, while auto / OEMs are hamstrung and in a “do whatever it takes” mode to meet (current and future) emission regulations. Overall, Palladium and Rhodium have been successfully marketed as the ‘go-to’ inputs in hybrids before the Electric Vehicles hit an inflection point, and given the lack of substitutes (except *within* the PGM complex), they will remain a key part of auto mix in the medium-long term.

PGMs: Rhodium, Palladium & Platinum
prices vs 1month lease rates



Source: Bloomberg, Scotiabank Commodities Strategy
PALL Comdty (PALLADIUM SPOT $/OZ) PGM lease vs Px 2 Weekly 05DEC2002-21JAN2020 Copyright© 2020 Bloomberg Finance L.P. 21-Jan-2020 12:42:36

Visible Palladium above ground stocks (COMEX + ETFs)
consistently dwindling... but early signs of a bottom



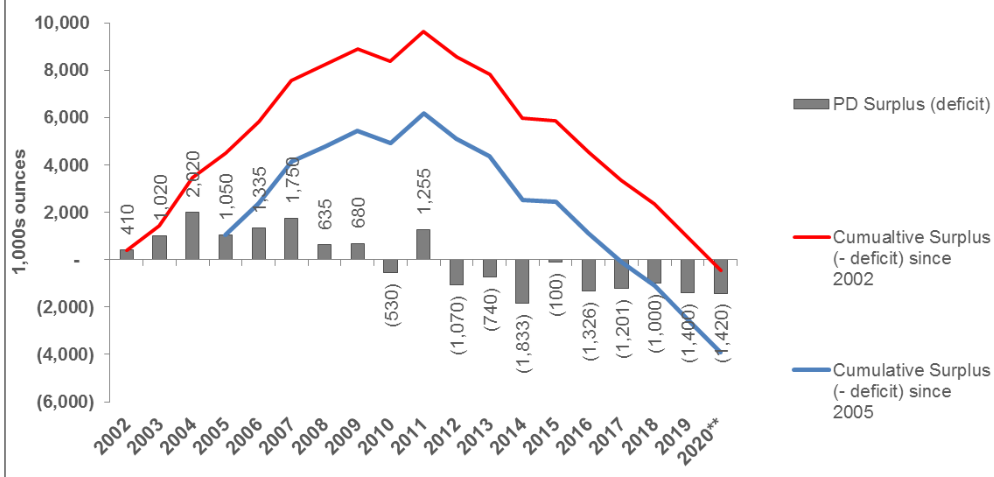
Source: Scotia Commodities Strategy, Bloomberg
ETFPPDTO Index (Palladium Holdings All Known ETFs) pall etf + comex stocks Week Copyright© 2020 Bloomberg Finance L.P. 21-Jan-2020 12:37:51

- **STOCKS:**

    - Nornickels Global Palladium Fund (established in 2016) delivered and supplied ~1 moz over 2 years (2017-2018), and aims to bridge the deficit in the medium-term by supplying 300-500K oz of palladium (above current production). This was sufficient in keeping volatility subdued and limiting price spikes during 2017-2019, but the synchronized repricing (in forwards, physical, outright and vol) in January '20 suggests either metal is very scarce or demand has abnormally ramped up.

    - Overall, known visible Palladium stocks (Comex + ETF holdings***), are at 671K oz; those would in theory run out in less than 3 months if the unwind rate the past 3 years continues. Others estimates** have Palladiums above ground (unknown) stocks basically finished in 2017, which not coincidentally marked the year when forwards started to 'react' and when ETFs really began drawing down, essentially verifying a new era of structurally shortages.

Palladium: yearly balances vs above ground stocks estimate
-- price action suggests a larger than expected deficit



**** 2020 Palladium deficit forecast average of GFMS, Nornickel (excluding investment demand!)**

Source: Scotiabank Commodities Strategy, Bloomberg, Johnson Matthey, GFMS, Nornickel Company estimates

- **CYCLES: PRODUCER OR CONSUMER ERA?** OEMs and consumers have mostly benefited from price risk & availability risk being exceptionally low across all PGMs during the bear market years 2009 - 2017. That was at the expense of producer community who had to contend with increasing labor and other unit costs, and a complex regulatory, operating and political environment that fostered a lack of capital investment now arguably coming home to roost. The PGM basket price (in R/kg) ran through the psychological R1m/kg, which puts even the most costly shafts back in the black - however frustrating for some, the fact that while prices have turned around (vs 2011-2018 bear years), Eskom (amongst other country-specific factors) likely remain their Achilles heel in capitalizing fast enough. Overall, statement repricing across the complex, suggests that a new era has begun; higher (PGM) prices but also higher volatility.

- **PALLADIUM FORWARDS, PHYSICAL VS PAPER**: Palladium forwards skyrocketed (1m lease rate PROXY spiking through 35%), the EFP was quoted $40 wide, Zurich was the source of main tightness which started affecting loco London all which indicated large scale illiquidity that mirrored the physical dislocation in Dec '18/Jan'19. Yet financially, volumes consistently traded on CME last week as though nothing has happened, there was no exchange halt (stop spike), which is wildly different to the palladium repricing in 2001 which had many casualties including an exchange. The disconnect between (physical) illiquidity, and perceived (paper) liquidity continues to grow, perhaps best depicted by a very volatile EFP.

- **TECHNICALS:** $2400 was palladiums (very short-term) lid, before being triggered and setting off run-away prices. For over a year, Palladium has a tendency to clock in very strong and convincing uptrend channels for a few months (which were getting incrementally bullish/steeper) before flushing out hard & fast and resetting; its 5 steps forward, 1 back on the chart. The breakup last week was very different in that prices broke UP through the uptrend channel (not down, as has been the case since 2018). We don't see that pattern changing (a continued affinity for prices to bust into a new higher ranges) and expect another uptrend to form. However major and painful intermittent price flush outs and unusually volatile forward rates still remain a key feature for 2020; any dips should be capitalized

Palladium technicals

series of contained uptrends and viscious flushouts

Source: Bloomberg, Scotiabank Commodities Strategy

PALL Comdty (PALLADIUM SPOT $/OZ) Palladium Daily 17JAN2018-21JAN2020 Copyright© 2020 Bloomberg Finance L.P. 21-Jan-2020 15:41:08

- **FORECASTS:** similar to last year, it seems like most expectations proved 'off-market' very quickly in Q1 (already current prices are well through our expected *high* price of $2300/oz). The average of all analysts (in LBMAs forecast survey) for 2019 was $1268; Palladium ended up averaging ~$1540 or 22% higher in 2019! The point is not to highlight how right/wrong forecasts are but to point to the severe dislocations and the fact that the collective market and street don't seem to be bullish enough.

- **PLATINUM:** at some point it will be the preferred input (low price risk & low availability risk) for OEMs, but timing the substitution switch is almost impossible given the opaqueness of consumer trends. There are 2 contending theories on how the byproduct repricing impacts platinum. 1) The idea that with the strong out performance in the Rand PGM basket (spiking to new ATHs), the higher Palladium and Rhodium rally, the larger the Platinums surplus becomes due to an imminent primary supply response. 2) The major repricing in its sisters does raise the platinum floor via either a resurgence in substitution talk or action, or the threat of consumers ensuring all Platinum needs are well-covered given 'lessons learnt' in the other two. The latter (#2) is likely to occur before the former in the immediate term.

- **INVESTORS:** Speculators are not the main culprit driving upside price action where exchange limits and lack of liquidity are also a deterrent. Known investor holdings (COT & ETF) only own 1/5th of their peak positioning held seen in 2014/15 of > 3m oz. Essentially, investor flows were 'kind' in 2019, by delivering metal back to market, to supply these structural shortages (they supplied a total of 110k oz, all driven by ETFs, whereas COT flows have remained rather range bound).

- **MACRO:** Palladium is the best responder to sentiment-on / liquidity-on macro backdrop:

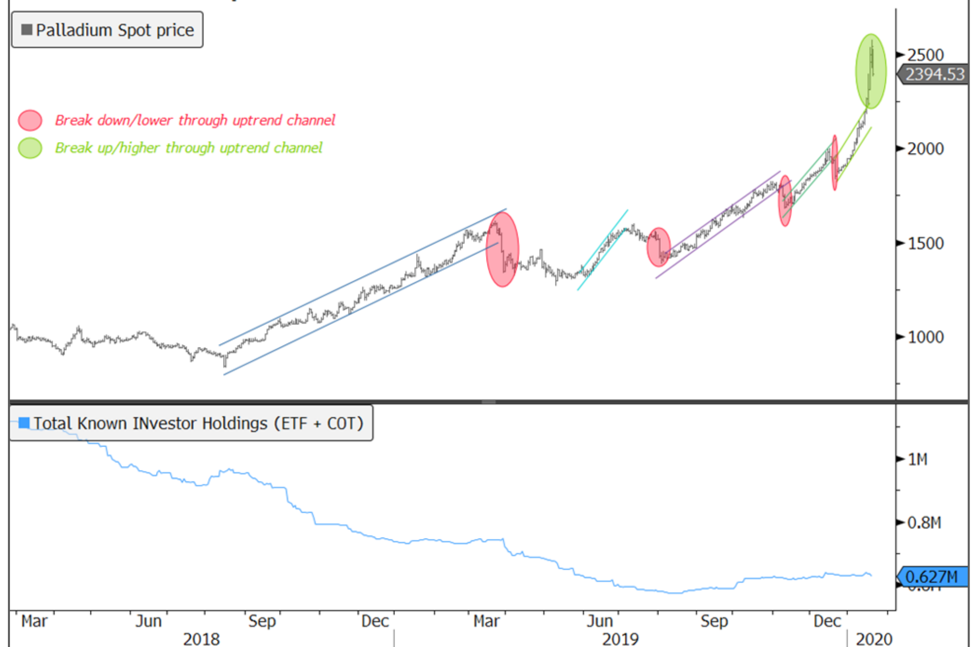
    - **SENTIMENT:** it is perhaps no coincidence that the palladium rally aligns with the recent breakout in small sub sectors (Small cap stocks, "IWM"') which all ties back to the Feds expansion of its balance sheet leading to a "meltup" in US Stocks. Liquidity will always find where it is 'best treated' (high beta higher performers like Palladium and small caps); Silver being the better responder to QE 1/2/3 (over Gold) is a standout example.

    - **TRADE DEALS :** The 18 month period of uncertainty over global trade has arguably upended consumer buying trends especially in those physically tightening metals with no substitute with - Rhodium, Palladium. Thus, in theory, the "phase one" trade deal could alleviate some physical tightness in PGMs as it simply alleviates uncertainty. That was not the case, since global supply chains will continue to shift (post 'phase one'), uncertainty remains over a EU/US trade deal, and the core fundamental dislocations are still too powerful for swings in macro & financial sentiment .

    - **CLIMATE DEALS:** The (overlooked) climate development last week was the European parliament vote for a greater push to "go green" (steeper 2030 EU emissions cuts). That was responsible/cited for the aggressive Nickel repricing to $14,400, and it certainly is a 'contributor' and explains away the major tightness in Palladium and Rhodium . While there are roadblocks & issues to be worked out, Ursula von der Leyen intends to make this her cornerstone of European policy, 50% of EU citizens say climate change (above UE and health!) is their biggest worry, and a quarter of the EUs budget is dedicated to tackling climate change (shifting EUR1tn in investment).

Palladium technicals

series of contained uptrends and viscious flushouts



Source: Bloomberg, Scotiabank Commodities Strategy

PALL Comdty (PALLADIUM SPOT $/OZ) Palladium Daily 17JAN2018-21JAN2020 Copyright© 2020 Bloomberg Finance L.P. 21-Jan-2020 15:41:08

Overall, the skittishness of the intraday Palladium moves, ranges and forward markets, and dislocations between physical and paper (which remain tough to explain given the opaqueness of the market) has not been comforting the past 3 years. Thats led to this recent 'showdown' but its unlikely to stop there. Rhodium has broken up and out serves as a bullish reminder which could drive further potential substitution into (Palladium) in gasoline vehicles. That'll draw down the very last of stocks before substitution switches again and begins to favor Platinum. There'll thus be a continued affinity for Rhodium & Palladium prices to bust into a new higher ranges, but major and painful intermittent price flush outs and unusually volatile forward rates still remain a key feature for 2020; soon that'll become a feature of the (notoriously) boring Platinum market.