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This quick note follows up on the most recent PGM developments in light of the Corona virus, conversations we have had on a potential supply response, and highlights the recently published JM report.
Overall, S.A supply should contract over the next few years with few growth CAPEX projects being planned. Its overly optimistic to assume a recent increase in capex is dedicated to new large growth projects; given flat-ish production/output, that simply indicates the additional spending is mostly maintenance/stay-in-business expenditure being used to make up for the past 'hard times' (consumer friendly price environment). According to JM*, palladiums deficit was 1.5m oz in 2019, the highest in 5 years, and is likely to deepen in 2020; Rhodium posted a deficit of 26K oz in 2019 and is also expected to deepen its deficit. Above ground known stocks have reached decade lows with only ~0.5m oz of supply left. The Corona virus continues to weigh in on the "Detroit of China" (Hubei) and while the quantity of demand being either lost or delayed remains uncertain, Rhodium and Palladium prices remain elevated. If, by the end of this epi/pandemic the tightness in Palladium & Rhodium does not alleviate (flat price doesn't re-calibrate lower,) it merely shows up just how fundamentally short the market is (just as 2019 "carcrash" and soaring prices proved emission regulations and higher loadings were real). Overall our view on Palladium and Rhodium since our last update has not changed —> The statement repricing in the Rand PGM Basket, synchronized repricing in Rhodium and Palladium and the 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.

Short-term supple response:

- **Primary supply**: Overall, S.A supply should mildly contract over the next few years (there are few growth/real capex projects with Mogalakwena, Stillwater and Booysendal together adding mabe >100K oz in *PGMS* in 2020). Russian production (due to new projects/South Cluster, improvements in efficiencies) has a material impact but only starts to ramp up in 2021 and NA growth is strong but insufficient at current consumption rate.
- **Investors**: A good proxy for **short-term availability and stocks** is above ground known stocks (which is represented by ETF + COMEX Warehouse stocks). That's <600K oz, but takeaways are 1) they're at decade lows with only ½ m oz of "supply" left from this group, 2) even at the current extreme forward and outright levels, they haven't unwound to zero, implying further upside is required to entice this metal back to market
- **Secondary supply** will begin to play a larger role, with the next wave expected to come from China (given their voracious appetite for Palladium & Rhodium). For now and in the short-term there are major hurdles in ramping up recycling as the technology (in place since the mid 2000s) is not equipped to handle the more complicated auto cats (these are not simple 3-way cats) that developed in response to stricter emission regulations beginning in 2008. The newer/more complicated autocats are lined with Silicon carbide which have created large-scale bottlenecks at some scrap recycling/refining plants.

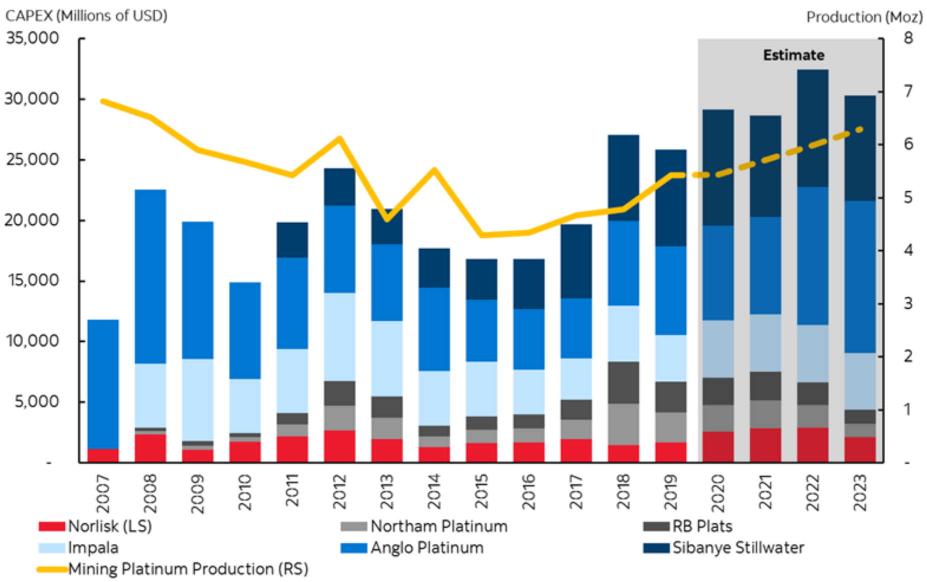
Corona Risk: Hubei is the "Detroit of China", thus with a slew of auto plant closings in not only China, but Asia as well, the risk, theoretically should be to the downside in PGMs as production is halted. However, both Palladium and Rhodium remain bid; they are factoring in supply fears (threat of Eskom disruptions, current lack of availability) and technical changes (emission regulations) vs demand fears (reduced or only temporary demand stall because of the automaker closures in Asia). Even with an expected short-lived slowdown in Chinese car sales due to this virus, 2019 auto sales vs palladium price trends clearly proved that endusers would rather pay up or "do whatever it takes" for those metals than face scrutiny and fines for emissions.

*See Johnson Mattheys PGM Market report here

**Chinas January car sales plunged 22% and its auto group expects a 30% plunge in Feb sales.

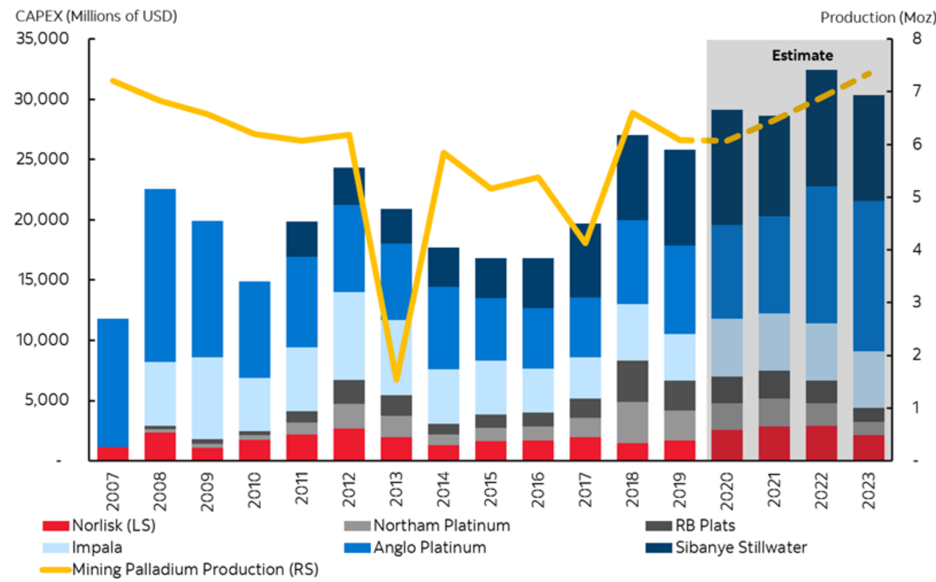
More questions being asked around the **structural availability of PGMs**, which is a complicated longer-term topic. There is public information around PGM resources and reserves (reserves is only the economically feasible ore within resources) from the major listed producers. However, ***accessing* reserves is key (capex).** Graphs below show the PGM industry capex from the Top Players vs their Platinum & Palladium production. The takeaway is that capex growth in the PGM market (supposedly) driving primary supply began ramping up in 2018, and is due to incrementally increase into 2023. However, given the bear market years of 2012-2017, the majority of this is simply maintenance/stay-in-business capital expenditure (e.g.: replenishing old equipment etc), with only a few growth projects (see above), committed to. Its overly optimistic to assume this capex is dedicated to new growth projects, and given flat-ish production /output, that simply indicates the additional spending is being used to make up for the past 'hard times' / consumer friendly price environment.

Platinum: Industry Top Players CAPEX & Production



Source: Scotiabank Commodity (Metals) Strategy, Bloomberg
Note: Production estimates are calculated using a 5 year industry average of total platinum output charted firms.

Palladium: Industry Top Players CAPEX & Production

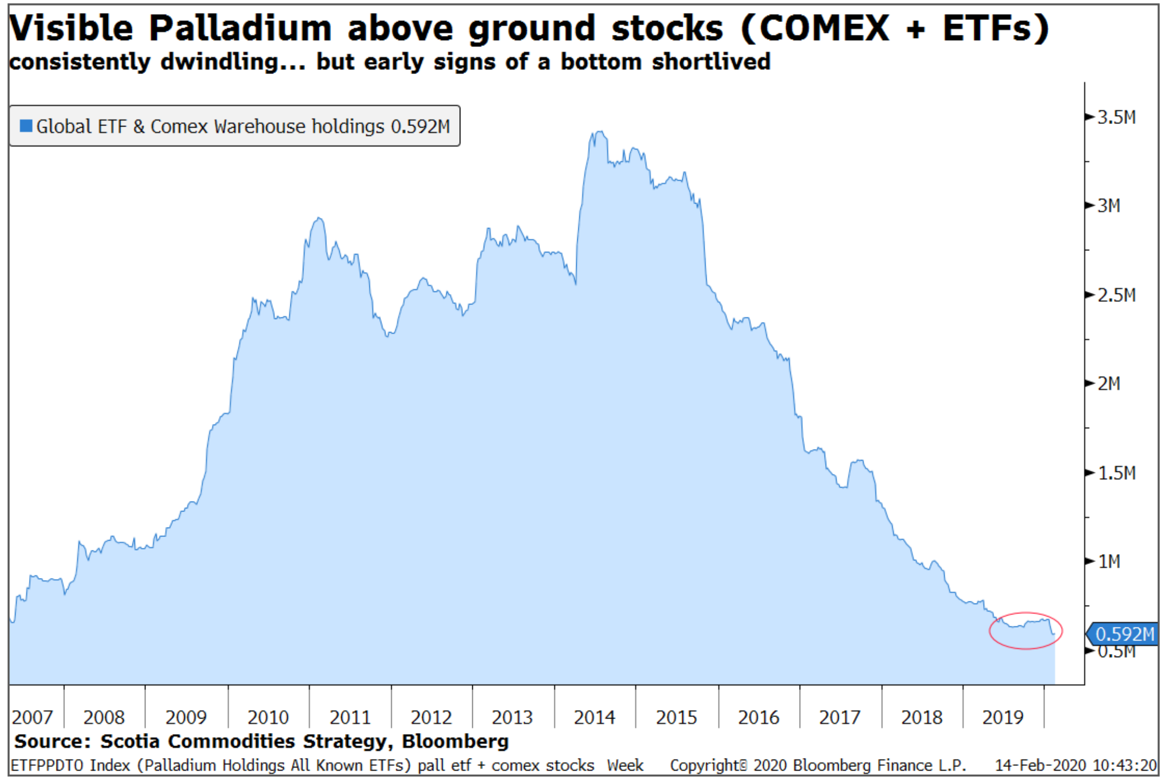


Source: Scotiabank Commodity (Metals) Strategy, Bloomberg
Note: Production estimates are calculated using a 5 year industry average of total palladium output charted firms, NOT 4E PGM guidance.

Recent JM data: Johnson Matthey, the perceived authority in the PGM market, out this week saying Palladiums deficit was 1.5m oz in 2019 (highest in 5 years), Rhodium posted a deficit by 26K oz (in a 1.1m oz market) while Platinum turned to a deficit in 2019. Both Palladium & Rhodium are expected to post steeper deficits in 2020 due to stricter emission legislation in Europe (Euro 6d) and China (China 6), while platinum is at risk of swinging back into a surplus UNLESS investors maintain strong appetite i.e.: Platinum will be in a fundamental surplus in 2020 driven by depressed jewelry market offsetting any increase in auto demand (from Indian & Chinese HDD trucks). An interesting point on page 14 of the report (below) adds some color and data in explaining Palladiums defiant price action in 2019 —> JM (and thus the market) underestimated China 6/regulations, from expecting it to affect 33% of new car sales in 2019, to it actually affecting 70% of new car sales

> "The cities and provinces affected by the early implementation of China 6 standards account for around 60% of annual Chinese car sales. On this basis, we forecast in our May 2019 report that around one-third of new cars produced in China last year would be China 6 models. This was a significant underestimate, with China 6 vehicles ultimately accounting for about 70% of new gasoline vehicles produced in 2019. As a result, and despite the fall in car production volumes, total palladium consumption on Chinese cars leapt by around 20%."

- Recent pertinent **comments/views from Producers**: rather pay up than get fired / fined for not meeting emission regulations. Palladium hasn't hit critical shortages yet like Rhodium,…
  - Mark Cutifani, Anglo CEO: "The way I put it, the CEO of an auto company won't get fired for spending $20 on a vehicle on a bit more palladium. What they might get fired for is not meeting their emissions targets. That's the critical issue," said Mr Cutifani. "Am I surprised prices have risen to this degree? Yes. And the reason is I thought there would be more substitution [from carmakers] back to platinum," he said. "It will still happen over time. I have not changed my view. What I underestimated, very clearly, was the focus on the automakers have on making sure they manage emissions."
  - Neal Froneman, Sibanye CEO: "You can't run deficits and consume surface stockpiles and inventories for ever and a day. At some point that turns into a real shortage. And that's what happened in rhodium and I dare say it could happen in palladium."



S.A & Eskom risk: It's "game over" without structural reform, according to South African FinMin Tito Mboweni. Rather than a ratings downgrade (which is pretty much priced in by investors), Eskom is the most likely source of a near-term (country) but also a PGM crisis. Before December 2019 SA had never experienced anything higher than Stage 4 load-shedding (1000MW per stage); its now experiencing severe blackouts (at Stage 6 -- 1-3x per day consumers are without power for at least 4 hours). Ageing and/or poorly maintained infrastructure is increasing the number and severity of unplanned power cuts. At any given time, 10,000MW-13,000MW of the 46,000MW of installed capacity is offline due to unplanned maintenance. That fear overhang has and will continue to drive an overreach by consumers for the historically deficit metals such as palladium and rhodium.

Some **manufacturers/industrials do have WIP material** that is required for their leasing needs, but given the cost of financing Palladium & Rhodium, there is unlikely not much beyond actual near-term requirements. The theory that end-users / trade houses/ banks or OTC investors are hoarding metal and exacerbating these dislocations, makes little sense financially.

Our take on Palladium and Rhodium has not changed from the last Update:

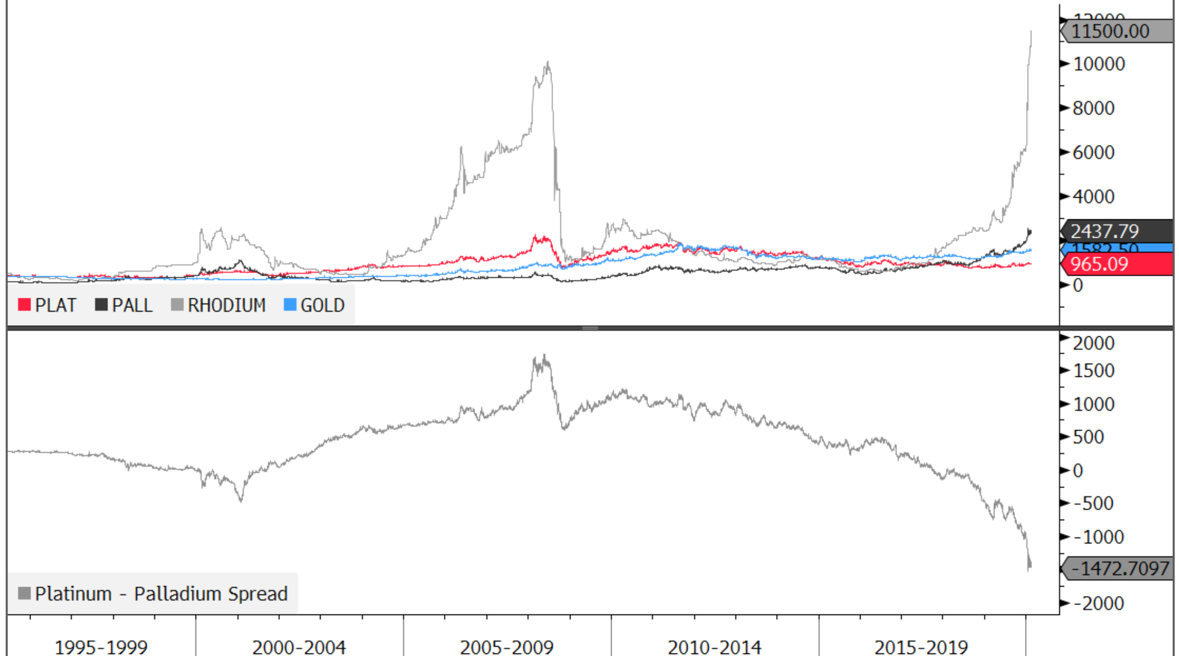
1. The path of least resistance is higher; the collective markets expectations/forecasts and hedges weren't bullish enough

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. Rhodium forwards remains somewhat stable, with most risk in outright pricing.

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.

PGM pricing

plenty of dislocations, but little sign of them easing up



Source: Scotiabank Commodities Strategy

PLAT Comdty (PLATINUM SPOT $/OZ) Plat Pall Rhod comp3 Daily 13JUN1995-14FEB2020 Copyright© 2020 Bloomberg Finance L.P. 14-Feb-2020 10:44:04

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). ***If the Corona virus, and contagion statistics do not materially change, a global recessionary dynamic develops (at the very least a L-shaped recovery) which could knock Palladium off its pedestal ** (new)*

Upcoming Calls:

WPIC: *Platinum Quarterly* conference call, presentation and discussion at 14:00 UK / 15:00 CET / 09:00 ET on Wednesday, 04 March 2020. While the focus is on platinum (limited price and availability risk), they usually touch on relevant PGM topics including the supply outlook and demand PGM demand trends. Register **here**

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