

Palladium premium indicates platinum opportunity

A sustained palladium price premium over platinum is likely to help platinum demand. In the late 1990s, palladium demand outstripped supply (left hand graph below) resulting in a large price premium over platinum in gasoline autocatalysts. The result was substitution of palladium and a significant demand increase for less expensive platinum. The current palladium price premium (right hand graph below) while smaller than in 2000 does open the door for auto manufacturers to reconsider Platinum Group Metals (PGMs) loading ratios in new cars, in our view. This, in turn, argues for greater platinum demand soon, as autocatalyst loadings shift, with a likely Pt:Pd substitution ratio of 1:1.

Historically, sustained relative premiums (e.g., Pd over Pt) of 18 months or more were needed to see significant autocatalyst loadings change among the 3 PGMs (i.e., the ratios used of Pt, Pd and Rh). Necessary R&D and certification to alter loadings while not trivial, are integral to the new car model development process. *In addition to cost reduction, palladium's elevated price is an availability signal that also argues for PGM diversification to maintain supply chain security.*

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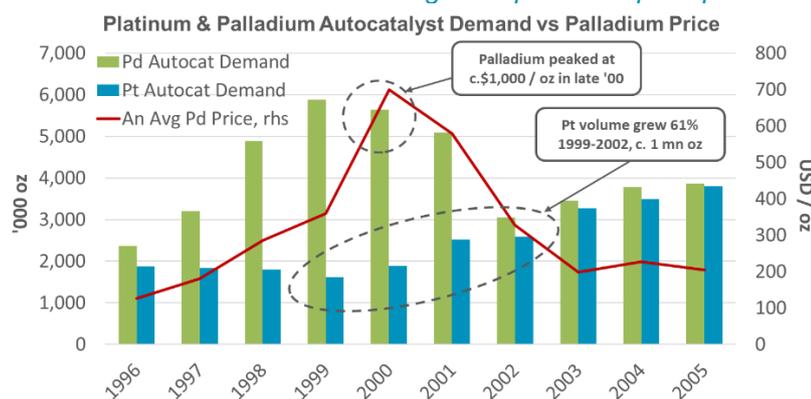
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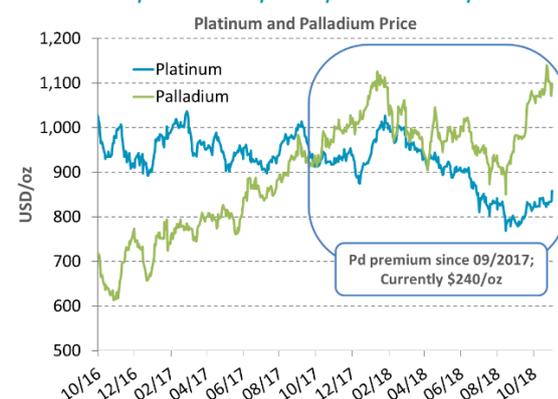
October 2018

Platinum demand benefited following 2000 palladium price peak



Source: Bloomberg, Johnson Matthey, WPIC Research

Sustained palladium price premium to platinum



Source: Bloomberg, WPIC Research

Automakers consider availability as, if not more, important as price.

When considering whether to shift autocatalyst PGM ratios, security of the supply chain is paramount. Automakers want to avoid a repeat of the rhodium supply events in 2004-2007, when the annual rhodium price averaged over \$6,000/oz (Figure 1). That said, price volatility is an indicator of availability issues as we saw with rhodium, a commodity with limited market liquidity. Platinum also has in its favour a larger market with capacity for additional demand.

Automakers are diverse, each with their own PGM conclusion. The current Pd/Pt price premium is unlikely to convince automakers to shift en masse to platinum-only gasoline auto catalysts, but Pd availability concerns and a 20% price discount do favour platinum. It would be surprising if a significant premium continued for another 18 months given the economic and security incentives.

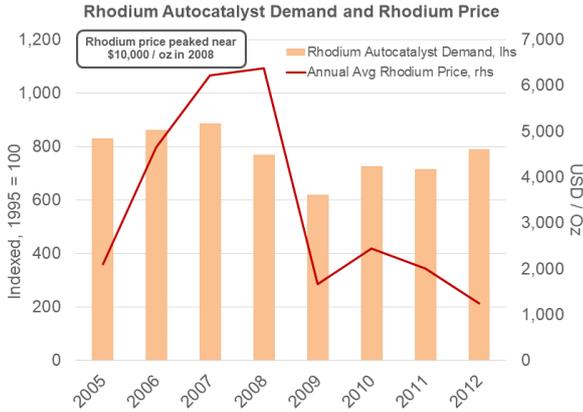
Rhodium also looks compelling, but memories of past price volatility linger. Rhodium could arguably replace palladium at an even more attractive ratio of 5:1 Pd:Rh. However, the small size of the rhodium market and excessive rhodium price volatility seen in 2000-2002 and 2006-2009 remain etched in the collective memory of automakers.

Platinum charts – October 2018

We believe there are many reasons supporting consideration of platinum as an investment asset:

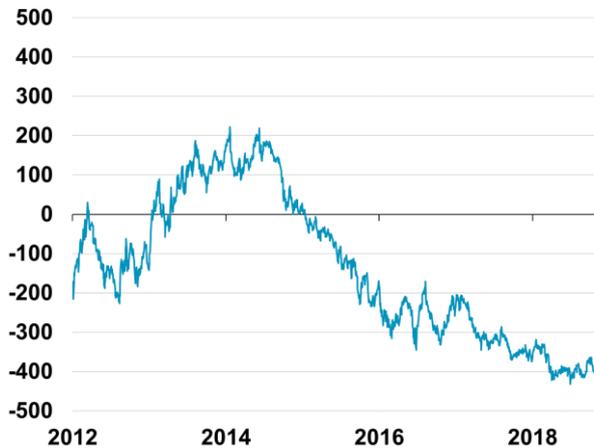
- Supply / demand fundamentals appear to be improving; ETF holdings are stable, despite price volatility
- Supply is relatively constrained, with limited investment going into new PGM mines
- Automotive demand shows some promise with tighter emissions regulation and potential Pd substitution
- Managed money positioning looks to be improving
- Platinum appears undervalued relative to palladium and gold

Figure 1: Price volatility in 2006-2008 arguably helped limit enthusiasm for rhodium



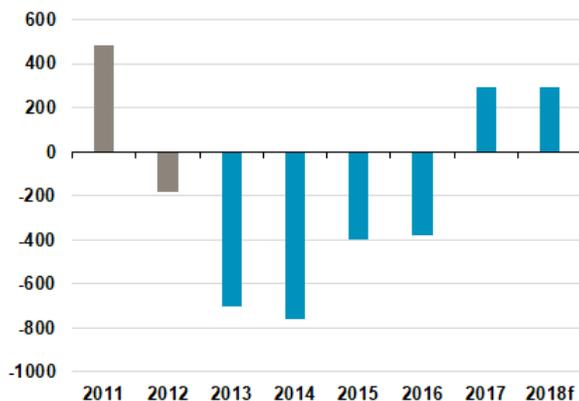
Source: Bloomberg, Johnson Matthey, WPIC Research

Figure 2: Platinum's discount to gold is near an all-time high of c.\$370/oz



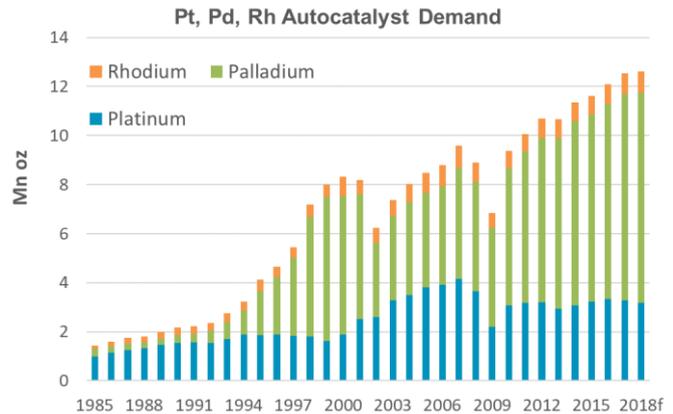
Source: Bloomberg, WPIC Research

Figure 3: Platinum supply / demand balance (koz)



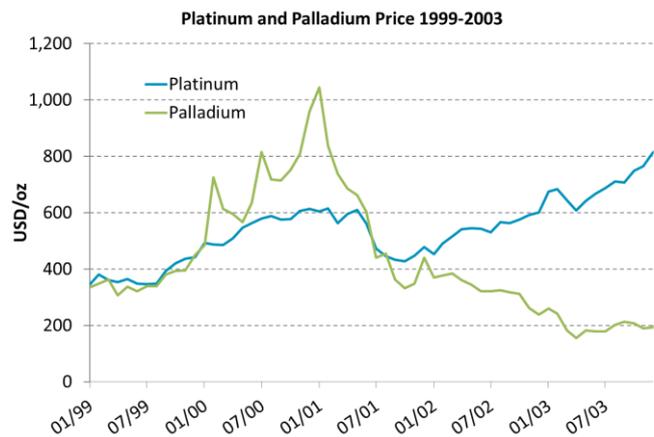
Source: Johnson Matthey, WPIC Platinum Quarterly Q4 2017, SFA (Oxford)

Figure 4: Auto demand has become increasingly reliant on palladium



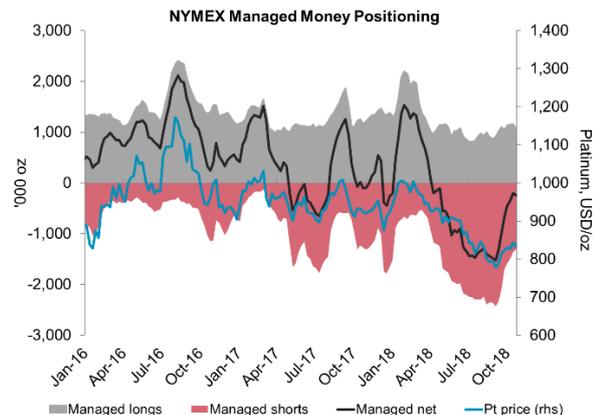
Source: Johnson Matthey, WPIC Research

Figure 5: Palladium price rise prompted substitution by platinum



Source: Bloomberg, WPIC Research

Figure 6: NYMEX net positioning has improved



Source: Bloomberg, WPIC Research.

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