THE STRANGE SECURITIES, BIZARRE BONDS, AND UNCOMMON COMMODITIES BLOG

WHERE THE UNUSUAL AND (HOPEFULLY) PROFITABLE MEET

THE CASE FOR INVESTING IN RHODIUM

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DISCLAIMER: Nearly all articles on investing include a disclaimer urging readers to use their own due diligence before making any investment decisions. It would be difficult to imagine an investment where such advice is more imperative than in investing in rhodium. Rhodium's primary use is in a cyclical industry. Both its supply and its demand are inelastic, producing wild price swings. The price of an ounce of rhodium rose to $10,010 an ounce in June 2008 and fell to $765 an ounce in December 2008. Independent judgment and careful research are essential.

I. PURPOSE OF THIS ARTICLE

The primary purpose of this article is to present the long-term advantages of investing in rhodium. However, the disadvantages of investing in rhodium (especially its extreme volatility) are also presented. It is also acknowledged that this may not be the best time for investing in rhodium. Rhodium's primary use is in catalytic converters, which change toxic emissions from the engines of cars and trucks into benign emissions. The health of the world's auto industry is a serious issue at present. Fewer motor vehicles produced means less demand for catalytic converters and, thus, less demand for rhodium. Nevertheless, given that the future supply of rhodium is problematic, the long-term demand for motor vehicles is outstanding, and the amount of rhodium used in automobile catalytic converters from emerging markets is likely to rise to western standards, it is probable that a disciplined rhodium investment will produce outsized returns for patient, long-term investors.

There will be considerable discussion of the poor and declining health of the South African platinum mining industry. Eighty-five per cent of the world's mined rhodium is produced as a by-product of mining platinum in South Africa. The worse things are for South African platinum mining, the worse things are for rhodium production. Reducing the supply of rhodium will not automatically raise the metal's price since price is an effect of both supply and demand. Reducing rhodium's supply will, however, given the historically extreme price volatility caused by small imbalances in rhodium's supply and demand, potentially raise the mineral's price significantly higher than it might otherwise be..

This paper is about the possible advantages of investing in physical rhodium or funds holding it. The declining South African platinum mining industry has negative implications for South African society and for rhodium end users, especially car and truck manufacturers. *For investors* in physical rhodium, however, *these negatives are positives*. Poor fundamentals (such as low platinum prices and serious long-term labor strikes) for South African platinum mining are *negatives for the supply* of rhodium but *are positives for the price* of rhodium.

II. INTRODUCTION

A. General. Rhodium is one of the rarest minerals in the earth's crust and is the rarest of the *PGMs—platinum group metals*—platinum, palladium, rhodium, iridium, osmium, and rhenium. It is used in virtually every catalytic converter in the world (80% of its total use), which is why the demand for it is dependent on the cyclical auto industry. Since mined rhodium (Not all rhodium is mined. Rhodium is

also recycled from old catalytic converters) is produced only as a by-product, the supply of rhodium cannot adjust to demand, creating extreme price volatility. *The supply of rhodium depends on the demand for platinum, not on the demand for rhodium.*

B. Inelasticity of both supply and demand. Mined rhodium is produced only as a by-product of mining other minerals, especially platinum. There is no rhodium mine in the world—there never has been. Eighty-five percent of the world's mined rhodium supply is derived as a by-product of South African platinum mining. Therefore, if the demand for platinum increases, then the supply of rhodium will increase even if there is a decline in rhodium demand. If rhodium demand increases but the demand for platinum declines, then rhodium supply will not increase despite greater demand. In addition, demand is mainly determined by the cyclical auto industry. It would be difficult to imagine a better formula for gut-wrenching volatility than inelasticity of both supply and demand.

C. Supply issues. Eighty-five per cent of the world's rhodium is mined in South Africa and most of the rest comes from Zimbabwe and Russia "which in some circles are not considered the most stable countries."[1] Since rhodium mine production is a by-product, South African PGM (mostly platinum) mine production issues are the main factors affecting rhodium supply. Given the myriad number of issues negatively affecting South African platinum production, long-term rhodium supply issues could hardly be worse for rhodium end-users—or potentially better for rhodium investors.

D. Demand. The long-term demand for rhodium is excellent. China has already surpassed the U.S. as the world's number one automobile manufacturer. Auto sales are also rising fast in most of the rest of the developing world. The world's middle class is expanding and most will want a car. Even if auto production is static in the developed world, it is highly unlikely that, long-term, the demand for rhodium will not increase.

In addition to being the world's largest auto manufacturer China is also noted for having some of the worst air pollution in the world. Chinese cars have had catalytic converters for years, but the "loading" (amount) of platinum, palladium, and rhodium used is significantly less than the amount used in European, Japanese, and American catalytic converters. On February 1, 2013, in response to Chinese citizens openly criticizing their government for not doing something about the horrific, ongoing pollution problem in Beijing, the city banned the sale and registration of diesel vehicles that failed to meet China's toughest diesel standards ever, standards comparable to Europe's current Euro 5 standards.[2] Substandard gasoline vehicles were banned on March 1, 2013. The new standards apply to all new vehicle registrations, not to vehicles already on the roads.[3] The new standards only apply to the Beijing area, but it is not unusual for Beijing's standards to be eventually adopted nationwide. "'It is important, and I do expect (the new emission standard) to be rolled out nationwide,' says Steve Man, an auto analyst with Nomura Securities in Hong Kong. Historically, (officials) will introduce this type of standard (in Beijing) and the rest of the country will follow after a few months.'"[4] Chinese officials have said that by 2015 China will use comparable amounts of platinum group metals in its catalytic converters as are found in motor vehicles manufactured elsewhere. If China does increase the amount of PGMs in the

vehicles it manufactures, *this will likely result in the single largest rise in the demand for platinum, palladium, and rhodium in history.*

III. RHODIUM SUPPLY PROBLEMS RESULTING FROM SPECIFIC SOUTH AFRICAN PLATINUM MINING ISSUES

(Why Negatives for South African Platinum Mining are Positives for Rhodium Investors)

When examining rhodium supply, it is necessary to consider the health of the South African platinum mining industry. Since 85% of the world's mined rhodium is from South Africa and since most of that is a by-product of platinum mining, rhodium mine supply and platinum mine supply are interconnected. In February 2012 South African mine production and sales were the lowest they had been in 51 years—since 1961. There was a year-on-year decrease of 14.5% in production. Part of this can be attributed to the government's copious use of Section 54 work stoppages (see below) that resulted in a 27.7% year-on-year production decline in October.

Platinum mining costs have been relentlessly driven higher. According to the bank UBS South Africa, mining expenses rose 30% in 2010 and an additional 30% in 2011.[5] Platinum prices have been more range bound. South Africa's Anglo-American Platinum—the world's largest platinum producer—expected their production costs in 2012 to average $1567 per ounce. Given that platinum has been recently trading around $1400 an ounce one can see why there are serious profitability issues. Given that Anglo-American has enormous economies of scale, their own mills, refineries, infrastructure, and long experience, one can only imagine the difficulties some of the small and medium-sized miners face in terms of costs. Standard Bank's head of commodity research, Walter de Wet, "says that from a cost of production perspective, a price below $1400 an ounce is 'just too low'."[6] If some platinum mines close because their cost of production exceeds their revenue, then both platinum and rhodium production declines.

There are cost, supply, and demand concerns that are either outside, or mostly beyond, the control of the platinum mining industry. These issues include how many motor vehicles are manufactured worldwide, the demand for platinum jewelry from brides, and the general economy. There are, however, numerous challenges for the South African mining industry that are specific to that nation. Others, like the threat of confiscatory taxes, are not limited to South Africa but certainly play a significant role there. They also affect the industry's willingness to invest in new mines and the expansion of existing ones. In one way or another, all of these concerns with platinum mining affect the supply of rhodium including:

1. **Eskom**. Eskom is the state electric utility. It has been plagued for years by under-investment and by rate setting that was established as much on the basis of politics as economics. Voters do not like higher electricity bills and politicians do not like unhappy voters. Electric demand increased, but there was not a corresponding increase in plant and equipment. The result was the disaster of 2008. There were numerous and prolonged blackouts. Mines could not rely on the supply of electricity needed to transport miners down shafts as deep as 2,200 meters or for ventilating heat and exhaust from those shafts. Production plummeted. In recent years, there have not been any major repeats of 2008, but the possibility of blackouts is an on-going concern to the industry. Also, electric rates are increasing; ". . . power costs . . . have been rising by an annual 25% over the last three years. . ." [7]

2. **Depletion**. UG2 is the underground reef that more and more platinum mining has gone to from the Merensky Reef. Historically, the Merensky Reef provided most of the country's platinum output. It has generally had higher (often, much higher) yields per ton of ore crushed than the UG2. Unfortunately, much of the Merensky has been depleted, so increasingly more platinum mining has been moving to the UG2. The trend has been to go deeper for less platinum, not the best formula for better profitability.

3. **Section 54**. Work stoppages can be ordered by the Department of Mineral Resources under a decree known as Section 54. The stoppages are related to safety and used to happen mainly after accidents but now occur even without them. Anglo American Platinum had 32 Section 54 stoppages in the fourth quarter of 2011 compared to about half as many in the third quarter. The precious metals strategist at BNP Paribas said that Section 54 work stoppages lowered platinum production in South Africa in 2011, as noted in earnings reports of the major miners.[8] Most of the dramatic 27.7% decline in year-to-year PGM production in October, 2011 was the result of government safety stoppages. Given that Section 54 closures are unexpected except after serious accidents, the closures add further uncertainty to an industry that is already full of uncertainty. Obviously, this discourages investment.

4. **BEEs, taxes, and nationalization threats**. Even though the platinum industry has marginal to no profitability, mining companies face the real possibility of confiscatory threats by the government. Black Empowerment Enterprises (BEEs) were created by the South African legislature in 2002. They have similarities to minority set-asides in the U.S., but BEEs are companies that have been given and have purchased significant portions of the entire South African mining industry, not just the platinum industry. There have been problems with BEEs not performing to expectations, whether from managerial incompetence or also, as in platinum's case, poor industry conditions. Regardless, there have been frequent revisions to BEE agreements, which have expanded the mining industry's contributions to the plans.

There have also been calls for increasing mining taxes. The militant ACMU union has called for a 50% tax on all mining profits. Although the younger, more militant wing of the African National Congress, the nation's dominant political party, has called for nationalization of the mining industry, most of the nation is opposed to it—at least for now. Zimbabwe's government has no such qualms—nationalization is a reality. Its National Indigenization and Economic Empowerment Board was able to get Impala

Platinum, South Africa's second largest platinum miner, to hand over 51% of the company's Zimplats holding, a promising mine in development. This was in addition to Impala's previous handover of 36% of Zimplat's 141 million potential ounces of platinum-bearing property and numerous social investments.

5. **Rand/U.S. Dollar Exchange Rate**. Since 2009, the Rand had been on a generally-upward trend against the U.S. dollar, rising 17% between then and the end of 2011. Given that cost inputs such as labor and cement are in a rising rand and income is produced by selling platinum priced in dollars, the potential profitability of mines is further compromised. "The rand—in the eyes of several execs, the worst damper—continues to strengthen against the dollar and erode earnings that are translated from rand. Currency movements added $48 million to the operating costs of Lonmin, the third biggest (platinum) producer, in the fiscal year ended in September."[9] In recent months, the dollar has made significant gains against the rand, helping mining companies. Whether this trend will continue is unknown.

IV. FUTURE RHODIUM SUPPLY ISSUES—UNCERTAINTY AND UNDERINVESTMENT IN SOUTH AFRICAN PLATINUM MINES

Given the high costs and uncertainty, there is concern whether adequate investment is being made even for the care and expansion of current platinum mines, much less the building or completion of new ones. Part of the problem is that there is little to show for the industry's massive investments in the past decade. They have done little more than just replace platinum ounces rather than add new ones. Anglo American Platinum (Amplats) has probably been the worst offender. The company spent over eight billion dollars in the last decade on capital spending only to net a (possibly temporary) 300,000 ounce increase in production. "[Amplats] once reached 2.9 million ounces in production, but is now producing 2.3 million ounces of its own output . . . Amplats is not alone. Failed or restructured platinum projects in South Africa are almost an industry pastime."[10] Four platinum mines that were planned for development have been abandoned or mothballed by Eastern Platinum, Jubilee Platinum, and Impala Platinum. The CEO of Anglo American said recently that the "'shape and size of the platinum portfolio' required a reconfiguration. One can't imagine a reconfiguration can mean anything other than mothballing and restructuring."[11] In fact, Amplats had a one billion rand cut in its 2012 capital projects budget.

Analysts are especially concerned about underinvestment. They doubt that marginal producers (which includes just about everybody except Amplats and Impala) will be able to continue in business given that high costs and limited access to capital preclude adequate investment in new production. David Brown, outgoing CEO of Impala, has said that under-investment will haunt the market. Standard Bank's head of commodity research, de Wet, has said that "ultimately, if the PGM basket price (of platinum, palladium, and rhodium) doesn't rise, we're not going to see these brownfields projects (new mines) coming out of

the ground and we could head for sustainable output pressure on prices."[12] Even if demand increases and "prices were to rise into the mid-$2,000 range, it will take years to get the new mines online. In short, an increased platinum supply is going to be very difficult if not impossible to find."[13]

V. DEMAND

In the short term, demand for rhodium may not be all that good. World economic stagnation and European/Euro malaise in particular are not likely to lead to increased motor vehicle production. In the long term, however, things look much better for rhodium. China has passed the U.S. as the world's largest vehicle manufacturer. Many of the emerging markets are performing well. Millions are added to the world's middle class every month and most of them will want a car. Even emerging nations know the value of clean air. Ninety-five per cent of all new cars are equipped with catalytic converters. World vehicle production increased from 58 million units in 2000 to 78 million units in 2010. China produced over 18 million motor vehicles in 2011 and the vice president of the Chinese Association of Automobile Manufacturers forecast the production of over 25 million units in 2015. The intended increase of platinum group metals in Chinese catalytic converters in the same time period would increase demand by an even greater amount.

VI. WAYS FOR INDIVIDUALS TO INVEST IN RHODIUM

Until recently, it has been difficult for individuals to invest in rhodium. There are no options or futures on rhodium. It is almost impossible to make into coins or bullion bars because it is brittle and has an extremely high melting point (which is why its second biggest use is in the equipment used to manufacture glass). It is traded in sponge form—metal powder in sealed glass containers. Investing in rhodium became easier in 2011 when Deutsch Bank introduced a rhodium ETC—Exchange Traded (physical) Commodity (Fund) on the London Stock Exchange (symbol " xrho.L"). Each share of this ETC represents one tenth of an ounce of rhodium. Shares of an ETC are traded like a share in a company listed on the exchange. The ETC greatly increases the ease and reduces the transaction costs of investing in rhodium. A brokerage account that can trade international equities is needed, but most brokers offer such accounts. Unfortunately, the volume of trades of this ETC is low. More than a few exchange traded funds and commodities have been shuttered by the sponsoring asset manager, bank, or brokerage that brought out the funds when they proved to have little demand and trading activity. If that happens with this ETC then the other investment options are limited. Fortunately, the volume of trades of this ETC has been rising, increasing the chances that it will not be closed. Kitco, a major precious metals dealer, offers rhodium commodity accounts on its website that fairly accurately reflect

the price of rhodium but come with a $100 bid/ask spread on both the buy and sell sides. Given rhodium's current price around $1200 an ounce, that is obviously substantial. Such spreads emphasize the importance of a long-term investment horizon with rhodium.

VII. CONCLUSION

In 2008, rhodium climbed as high as $10,010 an ounce on a supply deficit of less than 4%. With supply likely to contract, with demand growing from both an increase in motor vehicles manufactured and the probable increased amount of PGMs used in emerging market catalytic converters, a rhodium supply deficit of not just 4%, but multiples of 4% is not difficult to imagine. Therefore, with supply likely to contract, demand growing, and with years required to bring on new mines, the old high of $10,010 may fall, even if that is a considerable distance from today's approximate $1,200 an ounce price. For the long-term investor, an investment in rhodium is a risky investment with the potential for greatly outsized returns.

VIII. NUMBERS AND RHODIUM

0 = The number of rhodium mines in the world. Rhodium is produced as the by-product of other minerals, especially platinum and palladium. This means that rhodium is not able to adjust to demand, producing wild swings in the price of rhodium.

23.5 tons, 188 tons, and 2300 tons = The amount of rhodium, platinum, and gold (respectively) mined in the world in 2010.

84.64% = The percentage of the world's mined output of rhodium produced by South Africa in 2010.

97.14% = The percentage of the world's mined output of rhodium mined by South Africa, Zimbabwe, and Russia in 2010.

$765 = The average price of an ounce of rhodium in 2003.

3.8% = The amount that rhodium demand exceeded supply in June 2008.

$10,010 = The price of rhodium in June 2008.

$760 = The price of an ounce of rhodium 6 months later in December 2008.

95% = The percentage of new automobiles manufactured in the world that have catalytic converters.

Nearly 100% = The percentage of catalytic converters that contain rhodium.

N2O = Nitrous oxide. It is a major pollutant, the single biggest threat to ozone depletion. Rhodium is used in catalytic converters (CC) to strip one nitrogen molecule away from N2O and convert it into harmless separate nitrogen and oxygen atoms. Rhodium does this in both gas engine CCs that are primarily made of palladium and diesel engine CCs that are primarily made of platinum. Platinum and palladium are used to treat other pollutants but rhodium is the exclusive PGM used against N2O.

80% = The percentage of rhodium's supply that is used in catalytic converters. The rest is primarily used in glass making and the chemical industry.

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[1] Michael Filighera. "Platinum: Once in a Lifetime Opportunity for Strong Gains." Seeking Alpha.com. January 19, 2012.
[2] David Green. "Experts Say Beijing's New Auto Emissions Standards to Ripple through China." WardsAuto.com. February 21, 2013.
[3] ---. "Experts Say Beijing's New Auto Emissions Standards to Ripple through China." WardsAuto.com. February 21, 2013.
[4] ---. "Experts Say Beijing's New Auto Emissions Standards to Ripple through China." WardsAuto.com. February 21, 2013.
[5] Katcham. "Time to Trade Your Gold for Platinum." Seeking Alpha.com. February 9, 2012.
[6] Geoff Candy. "Platinum: Mainly a Long-term Play." Mineweb.com. January 25, 2012.
[7] William McNamara. "Platinum Sector Squeezed by Falling Prices and Rising Costs" financialtimes.com. February 8, 2012.
[8] Debbie Carlson. "Supply Problems Support Platinum, Palladium—BNP Paribas." Kitco.com. February 9, 2012.
[9] William McNamara. "Platinum Sector Squeezed by Falling Prices and Rising Costs." financialtimes.com. February 8, 2012.
[10] David McKay. "How SA Platinum Lost Its Way." Miningmx.com. April 16, 2012.
[11] David McKay. "Platinum Market May Swing into Deficit." Miningmx.com. February 29, 2012.
[12] Geoff Candy. "Platinum: Mainly a Long-term Play." Mineweb.com. January 25, 2012.
[13] Avery Goodman. "Why Gold Buyers Should Consider Platinum." Seeking Alpha.com. August 10, 2011.