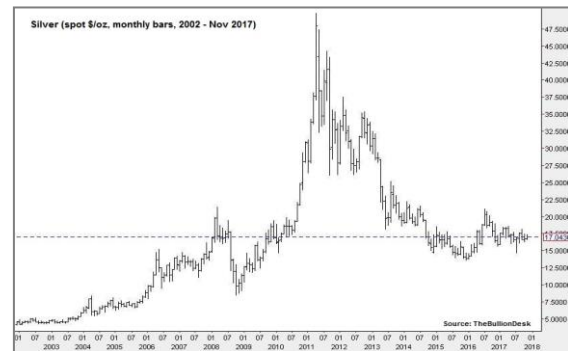


#### Executive Summary

- Silver prices seem content to trade in a broad range between \$15.60-18.65/oz, which suggests a fairly balanced market.
- The rallies of late have been driven by the escalation of geopolitical concerns over North Korea, which suggests safe-haven demand is acting as a swing factor.
- We expect a more broad-based recovery in fabrication demand in 2018, led by solar power but joined by a recovery in the electrical, electronics and jewellery industries.
- The opportunity cost of holding Silver has been high as equities around the globe have been setting record highs – when they correct, we would expect demand for safe-havens to pick up.

#### Introduction

Silver prices turned higher at the start of 2016 after the long-drawn-out correction from the 2011 high. Having peaked at \$21.13/oz in July 2016, prices corrected and have generally been oscillating sideways in 2017 within a \$15.60-18.65/oz range with dips finding support, while rallies have attracted

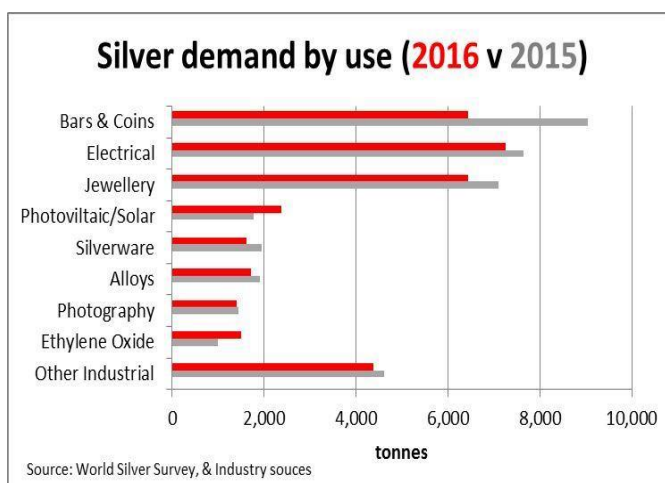


selling. The main driver on the upside this year was the safe-haven buying prompted by the stepping up in geopolitical concerns over North Korea. But, while that drove prices higher, the long liquidation once tensions eased also led to the sell-offs. Spot Silver's sideways trading range suggests a balanced market. The difficulty that base metals miners faced in 2012-2015 led to lower capital expenditure and that is having an impact on the amount of Silver mined as a by-product - we expect this will remain a negative factor in 2018, but there is likely to be a pick-up in some by-product Silver output when idle copper, lead and zinc mines are reactivated. Given the price gains seen since the 2015 lows, it is surprising that the idle capacity has not already been restarted. On the demand side of the equation, use of Silver in solar panels and in the production of ethylene oxide were the only area of growth in demand in 2016 and we expect these area to continue to show strong growth in the years ahead. In addition, we also expect the electrical and electronics industry to see stronger growth as the global economy is seeing more concerted growth – it should also start to benefit increasingly from the roll-out of the 'internet of things'. The likelihood of tighter monetary policy in the US with Europe liable to follow may prove a headwind for Silver prices, but equally, higher interest rates may start to cause concerns about how countries will pay back the vast amounts of debt that have built up over the past ten years and that could start to worry financial markets. In turn, this could lead to an increase in demand for safe-havens, so Silver may well benefit from that, as may Gold. Overall, we are not overly bullish for Silver prices; we expect there will be further instances when safe-haven demand lifts prices. For the most part, we expect supply above \$18.65/oz to cap the upside and would look for support around \$15.00/oz.

## DEMAND FOR SILVER

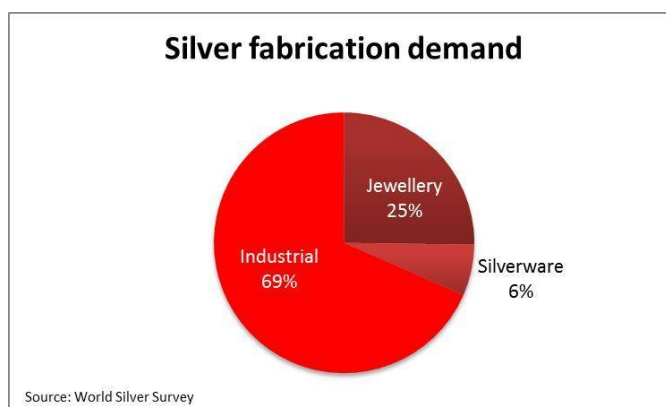
Silver's uses can be broken down into three main categories - industry, luxury goods (jewellery & silverware) and investments (bars, coins and ETFs). The ETF aspect of demand can be a major swing factor in Silver's supply and demand balance because when ETF redemptions outpace buying, ETFs become a factor of supply and not demand. In 2017, total demand for Silver is forecast to be 33,090 tonnes; taking into account ETF demand and de-hedging, this is down 5.2 percent compared with 2016. As the chart below shows, demand for bars and coins shrank considerably in 2016 and that trend has continued this year, with sales of 1oz American Eagles at 16,938,500oz in the January to October period, down 50.7% from 34,500,500oz in the same period in 2016. In 2016, Silver's use in electrical and electronic applications reasserted itself as the single biggest sector for fabrication demand.

Despite the global economy starting to recover in early 2016, as seen in the rebound in the global composite PMI to 53.4 in December 2016 from a low of 50.6 in February 2016, total physical Silver demand (excluding ETF purchases) did not recover in 2016. Indeed, the only area of growth was from the solar energy/photovoltaic industry. This suggests that it was the turn round in fund and investor interest that led to the rebound in prices. ETF investors bought 1,435 tonnes of Silver in 2016 and the net long fund position (NLFP) on Comex climbed to 58,911 contracts from 20,704 contracts at the end of 2015.



## FABRICATION DEMAND

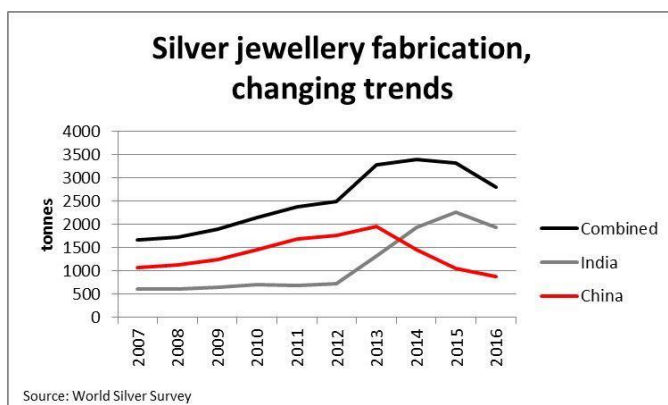
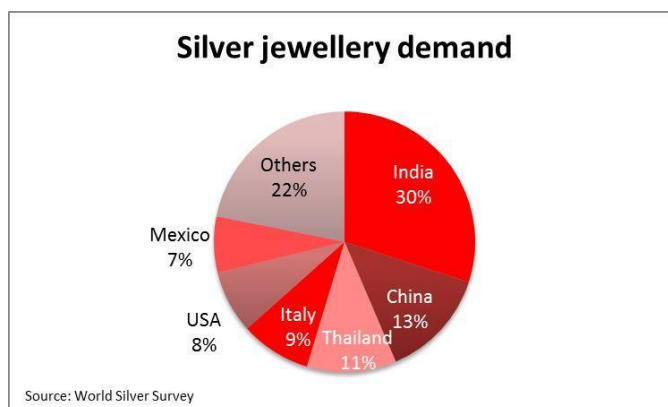
Fabrication demand covers Silver's use in industry (69% of fabrication demand), jewellery manufacturing (25%) and silverware (6%). In 2016, fabrication demand fell 4.6 percent to 25,537 tonnes according to data from the GFMS team at Thomson Reuters. In 2017, fabrication demand is expected to recover on the back of stronger and more concerted global economic growth that should lead in particular to a pick-up in industrial demand and a degree of restocking given the rebound in prices. Demand from the solar industry has also been stronger than expected, as after a robust year in 2016 the forecast was for a more subdued year in 2017.



Looking forward into 2018, the outlook remains upbeat as not only do we expect further concerted global growth, but we also expect the jewellery market to recover in India as consumers grow more comfortable with the new way of doing business after the disruptions caused by the demonetising of 500 and 1,000-rupee notes in late 2016 and the goods and service tax (GST).

## Jewellery

Demand for Silver from the jewellery industry suffered heavily in 2016 after what had been a string of three record-setting years between 2013 and 2015 when falling Silver prices prompted strong buying. The price rebound in 2016 led to destocking and a squeeze of jewellery fabricators' margins; they responded by switching their focus to more costly jewellery pieces which could be sold with a higher margin rather than by weight. In 2016, Silver's use in jewellery fell 9.3% to 6,439 tonnes according to the GFMS team at Thomson Reuters, which was the lowest it had been since 2012. Around 78 percent of jewellery fabrication is concentrated in six countries: India (30%), China (13%), Thailand (11%), Italy (9%), USA (8%) and Mexico (7%). In recent years, China's jewellery fabrication has slowed markedly; it was 874 tonnes in 2016, from a peak of 1,956 tonnes in 2013. India's jewellery fabrication had been growing at a fast pace up until 2015 when it reached 2,255 tonnes, up from 725 tonnes in 2012, but it slowed to 1,931 tonnes in 2016.



The slump in China's Silver jewellery fabrication and the downward trend since 2013 does suggest a change in consumer habits. While poor economic performance and anti-corruption drives will no doubt have reduced spending on luxury goods, it does also look as though would-be jewellery buyers on the one hand have less disposable income as they look to get on the property ladder, while on the other hand, they have a greater choice of what to spend that disposable income on – whether it be new gadgets, holidays or other investments such as equities, silver coins and bars and possibly even bitcoin. In addition, the popularity of imported jewellery brands may be having a negative impact on domestic manufacturing. While Chinese jewellery fabrication has fallen 55% since 2013, global fabrication is only off 6.7% since 2013; as such, the fall-off in Chinese fabrication may not be as dire for the global Silver jewellery market as the headline data suggests.

India's demand for Silver for jewellery fabrication also fell sharply in 2016, dropping 14% to 1,931 tonnes, down from a record of 2,255 tonnes in 2015. India's jewellery market had a tough year in 2016, initially due to the 42-day strike by jewellers which happened into a rising price so would-be buyers missed the boat, and later as the market was disrupted by demonetisation. We expect demand to recover this year as the market puts last year's disruptions behind it and as Silver prices have pulled back from the highs above \$20 per oz seen in the summer months of 2016, while also appearing to have found support around the \$16 per oz level. The Silver Institute expects jewellery fabrication demand to recover one percent in 2017, but with a considerably stronger rebound in Gold jewellery demand in India this year (up 8.6% in the first three quarters compared with the same period in 2016) we would not be surprised to see a stronger rebound in Silver demand too, especially as there appears to be a trend for jewellery consumers to want higher purity Silver items.

Looking forward into 2018, we expect stronger concerted global economic growth to underpin a recovery in jewellery demand and after significant weakness seen in 2016, a second year of

improving economic growth may well see a pick-up in spending. That said, Silver jewellery will continue to face competition from a diverse range of other luxury items on consumers' wish lists.

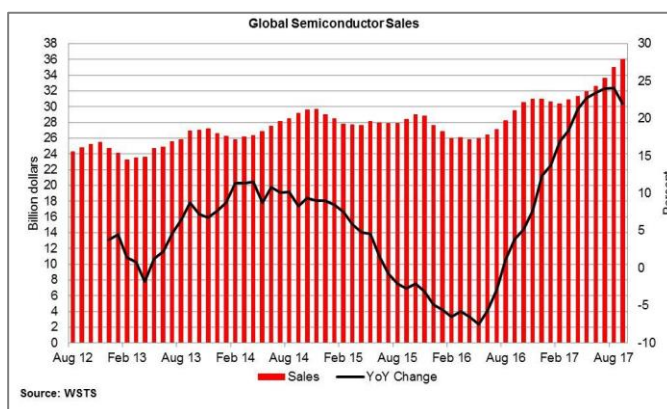
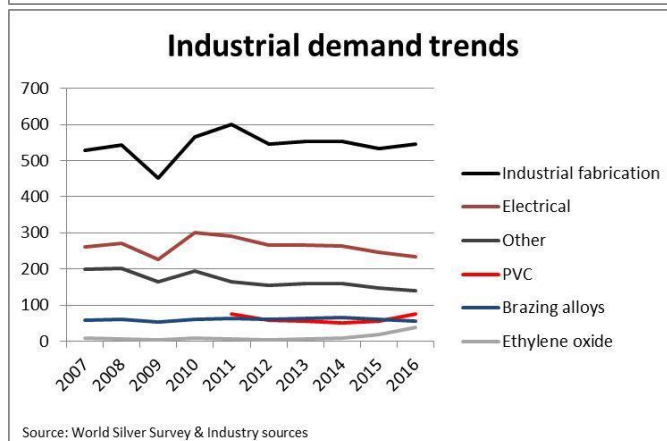
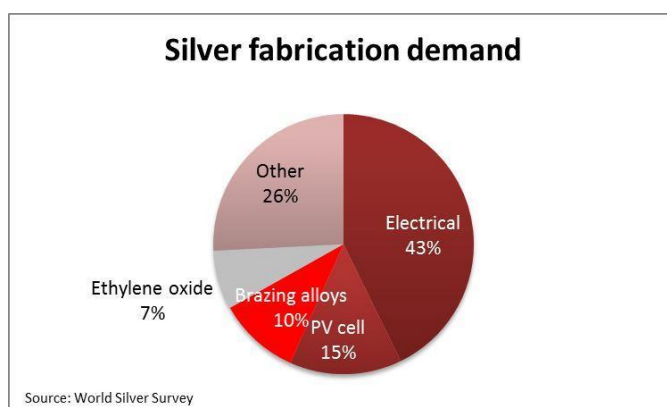
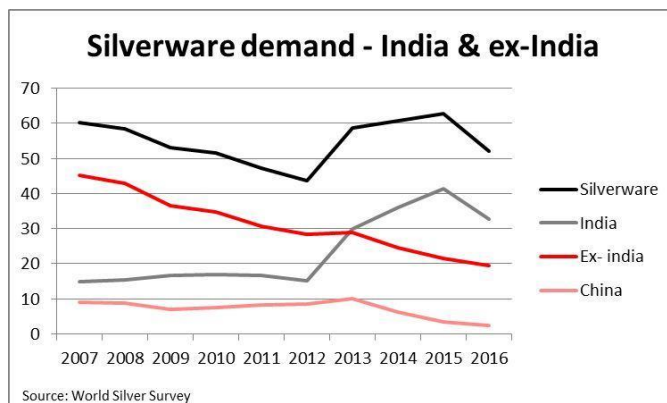
### Silverware

The popularity of silverware is generally waning (see red line in chart opposite); the main exception is in India where it grew strongly between 2013 and 2015, rising to 1,285 tonnes from 472 tonnes in 2012, but dipping to 1,013 tonnes in 2016. Up until 2013, China's demand for silverware was on the rise, peaking at 311 tonnes in 2013, but it has since slumped to 75 tonnes – this we put down to the anti-corruption crackdown which began when China's President Xi Jinping took office in 2013. Although silverware fabrication demand in India fell in 2016, it seems this is more to do with destocking into the price rise rather than a drop off in the overall trend in demand. That said, disruptions in India in 2016, as mentioned above, will also no doubt have affected demand for silverware. Silverware is an important product in India's gift market and the prospects of an economic rebound

combined with a large and growing population bode well for silverware demand.

### Industrial demand

Industry's use of Silver covers a wide range of applications, the main ones (accounting for 45 percent of Silver's industrial use) being in the electrical and electronics industries. Silver's use in the solar panel industry, where it is used in photovoltaic cells (PV cells) and ethylene oxide (EO), are the only sectors that saw growth in 2016. Other applications have, if anything, been in decline in recent years – see chart. That said, we would view 2016's data as showing a degree of destocking by industry in their effort to delay the impact of rising Silver prices. However, the downward trends do not instil confidence. One reason for the falling demand is that miniaturisation in electronics and attempts to reduce the cost of production have led to reduced



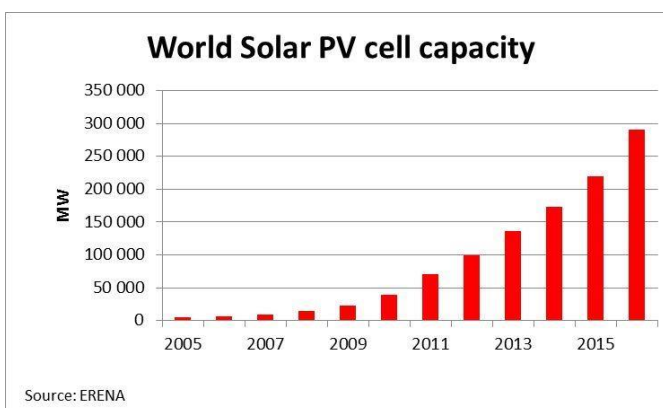
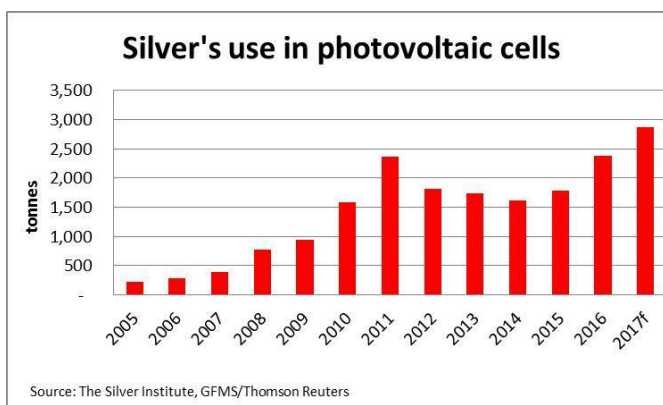


use of Silver per unit (referred to as 'thrifting').

The semiconductor industry is seen as a good proxy for the electronics industry and as the chart above shows, global semiconductor sales have been growing strongly so far this year, with monthly growth averaging 20 percent on a year-on-year basis, according to World Semiconductor Trade Statistics. China, the US and Japan are the largest users of Silver in the electrical and electronics industries, accounting for around 66 percent of global use. Another growth market is that of ethylene oxide (EO) used in the production of liquids for the auto industry, such as anti-freeze, and for plastics, notably PET, used in packaging and fabrics. Silver is used as a catalyst in the production of EO and as the EO capacity grows it will consume more Silver. But, there is also replacement demand for Silver as the catalysts degrade and need replacing around every three years. With concerted global growth now underway, we do expect industrial demand to recover in 2017 and push forward in 2018. The longer-term outlook is also brighter as with more electrical appliances such as fridges, lights, thermostats and cookers likely to become part of the 'internet of things', we would expect a recovery in Silver demand within the electrical and electronics industry as more items need advanced electronics to link to WiFi.

In recent years we have monitored the PV cell industry's growth from a small user of Silver to where it is now, the second largest consumer of Silver in the industrial sector, with more Silver now used in PV cells than going into the making of Silver brazing alloys.

The solar power industry is seeing rapid organic growth and has many tailwinds as countries try to reduce their carbon footprint in energy generation. But it is not all about relying less on fossil-fuels; countries want more energy security as dependence on imported natural gas has exposed certain countries to risk in recent years, while some have wanted to veer away from nuclear power after the Fukushima disaster. The two charts opposite show Silver's use in PV cells and the growth in world electricity production capacity from PV cells. Note how Silver demand has recovered from the fall-off in use between 2012 and 2014, which was a result of the overcapacity built before 2012 and the aftermath destocking. The actual rollout of global PV capacity amounted to around 291 gigawatts (GW) in 2016 according to International Renewable Energy Agency (IREA) data, up from 220 GW in 2015 (an increase of 32 percent) but this covers less than two percent of global electricity demand.



Forecasts from IRENA are that this will rise to around 600GW by 2020 and to around 1,000GW in 2022. In 2016, 74GW of new capacity were installed, up from 51GW installed in 2015, and 85GW are expected to be installed in 2017, according to GTM Research. What is interesting is that after strong growth in 2016, PV cell installations were expected to slow down in 2017, but aggressive build-out by China has led to another strong year – given China's focus on cutting air pollution it seems renewable energy will remain a key area for investment in the years ahead. While the growth in PV installations looks set to rise rapidly, thrifting of the amount of Silver in each PV cell will mean less Silver is used in

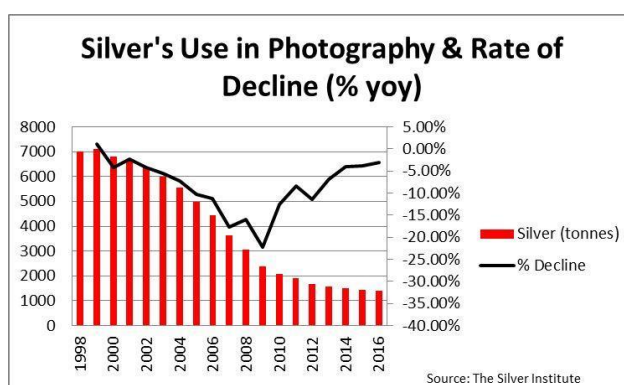
each unit. At present, using standard solar cell technology, around 120-150 milligrams of Silver are required in each cell and 100 milligrams for 'best in class' PV cells, but this is expected to fall to around 50 milligrams per cell in five years. That said, the use of new technology to enable each PV cell to produce more electricity may mean the use of Silver per cell increases again.

The long-term outlook for Silver's use in industry is exciting. There are numerous new applications for the metal that have the capacity to make a big difference to demand – in time. Many of these new applications are employing nano-technology in which tiny amounts of Silver are used per application, but they have the potential to be used extensively. In addition, because the amount of Silver per application is so small, demand is likely to remain price inelastic. In the years ahead, we expect Silver's industrial use to grow as a percentage of total demand, especially once the amount of Silver used in each item has been optimised. During the years of strong economic growth between 2004 and 2007, industrial demand was growing at an average of 7 percent per annum; we expect to see similar, if not higher, growth rates down the road.

### Photographic demand

Silver's use in the photographic industry has all but leveled out after seventeen years of retrenchment - the fall being due to the technological change that saw a rapid switch to digital cameras from film-based cameras. In 2016, the photographic industry consumed 1,405 tonnes of Silver, three percent less than in 2015 and a fifth of that at its peak in 1999. As a percentage of total Silver consumption, this represents a fall from 24 percent to four percent. Silver's main use in photography today is for x-rays. Most medical

establishments are using digital x-rays where possible, but they are prohibitively expensive so, as medical care expands in the developing world, establishments there are often opting initially to install second-hand conventional x-ray machines, and this is keeping photographic demand for Silver alive. The rate of fall in Silver's use in this industry has been decelerating since 2010 with demand falling three percent in 2016, compared with an average 13 percent drop in each of the ten years to 2013. Overall, we would expect photographic demand for Silver to flatten out now.



### New applications

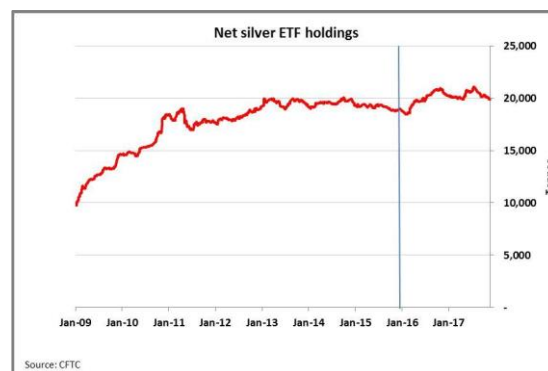
Silver's new applications are diverse and numerous and are being used in health, electronics and transport/packaging. Many of these new applications, including smart tags (RFIDs) and Silver antibacterial applications, employ nano-technology with each unit using a tiny amount of Silver. Until these applications have widespread use their impact on Silver demand is unlikely to be felt. That said, it was not too long ago that Silver PV cells were in this 'new applications' category and now they are the second largest consumer in the industrial sector. Use of RFID tags has grown rapidly, but it is likely to grow even faster as the 'internet of things' gathers momentum and more companies want more of their assets tracked by data centres. In addition, the joining of two technologies, RFID and 3D printing of RFIDs using nano-particle Silver ink, could see Silver gain market share from other metals such as copper and aluminium that are also used in the RFIDs antennas. Silver's antibacterial properties mean the metal is finding its way into a wider range of products including: consumer products (like socks, towels and sheets), medical products (equipment, bandages and ointments) and office, public and household equipment (like telephones, photocopier buttons, hand rails, door handles and kitchen utensils).

## INVESTMENT DEMAND

Investors' interest in Silver switched to ETFs from bars and coins in 2016, with ETF holdings rising 1,435 tonnes to 20,210 tonnes, while demand for coins, bars and medals fell 2,610 tonnes to 6,432 tonnes. Collectively, that meant investment interest fell 7.8% to 7,832 tonnes in 2016, which accounted for some 23 percent of total Silver demand. The aftermath of record levels of buying of coins and bars in 2015, the disruptions seen in the Indian markets and the pick-up in equity markets all combined to lead to the drop off in physical demand for Silver investments in 2016. So far in 2017, demand for coins and bars has suffered further, mainly as the opportunity cost of holding precious metals is high; many equity markets around the world are booming and setting record highs and concerns about countries' financial systems are not in focus as they were during the economic hardship of a few years ago. Sales of US Silver Eagles are down 50.7 percent in the first ten months of the year.

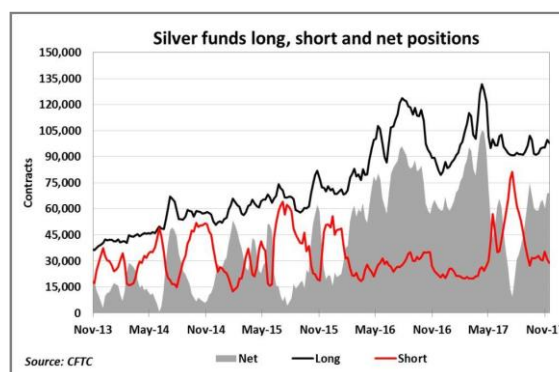
While safe-haven demand for Silver in the form of coins and bars may have diminished, 2016 did see investor interest in ETFs return. After a long-drawn-out period when ETF holdings drifted lower, the start of 2016 did see holdings climb. Holdings ended 2015 at 18,775 tonnes and climbed to a peak of 20,976 tonnes in October 2016. After the US election, the correction in bullion prices led to redemptions as equity markets rallied. ETF holding dropped to a low of 19,866 tonnes in April 2017, with buying only resuming when safe-haven demand stepped up a

gear on the back of geopolitical concerns over North Korea. Having set a fresh record holding of 20,976 tonnes in October 2016 another record was set at 21,072 tonnes in July 2017, but as tensions eased over North Korea, holdings have started to drift lower again and at the time of writing stood at 19,953 tonnes. Given the relatively flat level of holdings, as shown in the chart above, it does appear that the ETF investor is much more focused on the long-term potential of Silver and, with holdings staying higher, it suggests investor sentiment remains strong overall.



## Funds – Long liquidation, not fresh shorting

Fund buying of Silver returned in force in 2016; the net long fund position (NLFP) climbed to 96,077 contracts in July 2016, from a low of 4,245 contracts in 2015. It dipped after the US election, in line with the price correction, before rising again to a peak of 105,515 contracts in April 2017 as geopolitical tensions escalated between the US and North Korea. As tensions died down, long liquidation and short selling took hold, which led to a significant unwinding of the NLFP; it dropped to 9,376 contracts in July. The volatility in the NLFP and price have gone hand-in-hand and show the Futures market is attracting a very different type of investor than the ETFs are. That said, it is interesting that the volatility has, to a great extent, been caused by those shorting the Silver market. The gross long position has also been choppy, but the overall gross long position has held within an upward trend, while the gross short position spiked higher in July only to correct again and was relatively low at 31,356 contracts the time of writing.



## SUPPLY

Total Silver supply was 31,900 tonnes in 2016, which was 1.7 percent lower than in 2015, according to our interpretation of the data from the GFMS team at Thomson Reuters, adjusted for changes in ETF holdings and net hedging. This was the second year of lower supply, with mine output falling for the first time in fourteen years, while a lack of net ETF redemptions and the absence of net producer hedging meant these potential areas of supply were not net suppliers of metal to the market in 2016. The impact of lower capital expenditure by producers is now having an impact and that is likely to last for a few years.

The bulk of supply comes from mine production, but mainly as a by-product of mining other metals, with supply from scrap accounting for most of the rest. Mine production has become more important in recent years as low prices have led to less supply from scrap. In 2016, Silver supply from mine production accounted for 87 percent and scrap accounted for 13 percent, with no supply from ETFs or as a result of hedging. By comparison, in 2011 when prices were high, mine supply accounted for 73 percent, scrap accounted for 25 percent and two percent came from hedging and net government sales. Supply from producer hedging, ETF redemptions and government sales are swing factors.

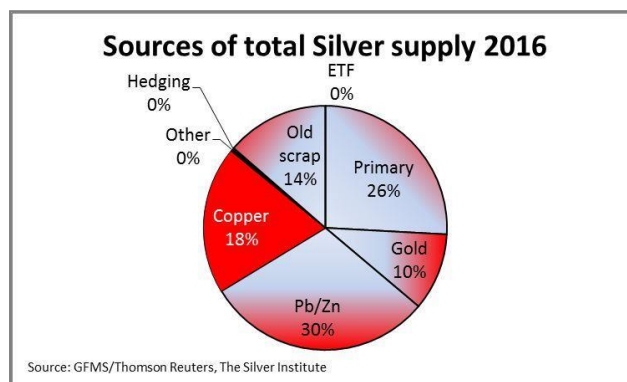
Mine output fell 0.5 percent in 2016 to 27,552 tonnes, after a 2.9 percent rise in 2015 that took output to a new record of 27,708 tonnes, according to the GFMS team at Thomson Reuters. With the metals industry suffering lower capital expenditure in recent years, mine output is expected to fall further in 2017.

To analyse the outlook for mine production it is useful to break it down into primary production and by-product production – see chart opposite. Primary output grew one

percent in 2016 to 8,245 tonnes, so accounted for 30 percent of total mine output and 26 percent of total supply. Silver as a by-product of mining other metals totalled 19,428 tonnes, which was down 0.5 percent on 2015. Of the by-product, supply from lead/zinc mining accounted for 30 percent of total supply, 18 percent came from copper, 10 percent from Gold and less than one percent from other products. With metals prices at or near multi-year lows around the end of 2015 and with production cuts announced in copper, lead and zinc, it was inevitable that Silver mine output as a by-product of these other metals would fall in 2016 and remain below potential in 2017 as there is still considerable idle mine capacity that was cut in 2015 and has yet to be reactivated. Given the price gains seen since the 2015 lows, we expect idle production to be restarted in 2018 – indeed we are surprised it has not already done so – and for that to boost by-product Silver mine output. At the time of writing, zinc, lead and copper prices are up from the 2015/16 lows by 123%, 60% and 62% respectively.

So far in 2017, ETF investors have added 862 tonnes and have cut 1,162 tonnes, so are showing net redemptions of some 300 tonnes, which will have added to supply. However, with Silver prices where they are at around \$15.80/oz (which is in the lower part of the \$13.65 - \$21.13 range seen since the 2015 low) we do not expect any mass exodus from ETFs. We therefore expect supply to be minimal from ETFs in 2017 and would not be surprised to see investors buying more Silver in 2018 as a correction in equity markets looks overdue and any such correction would reduce the opportunity cost of holding precious metals.

In 2018, we expect mine output to grow slightly as high base metals prices encourage a producer supply response, but given the reduced amount of capital expenditure in recent years the supply response is likely to be limited.





### Supply from Scrap

Scrap supply has been falling since 2011 for a number of reasons; firstly, because high prices between 2010 and 2012 had already seen a lot of old scrap cashed in and secondly, because demand for jewellery has been weak, which will have reduced the amount of old jewellery being exchanged for new jewellery. The rate of decline in scrap supply has slowed in recent years and with economic activity picking up and more recycling of electronics waste being seen, we would not be surprised to see scrap supply start to increase in 2018. A recovery in jewellery demand in India, following the disruptions the market has had to endure in recent years, could also boost the amount of old jewellery returning to the market in 2018.

Swings in scrap supply can have a big impact on the supply/demand balance - for example, 4,345 tonnes of scrap entered the market in 2016, compared with 8,133 tonnes in 2011.

### Producer hedging / de-hedging

Two-way producer activity i.e. hedging and de-hedging, led to a 572-tonne cut in hedges in 2016, taking the hedge book to 640 tonnes, according to GFMS/Thomson Reuters. So hedging activity in 2016 became a factor of demand, not supply. We would expect producer hedging to pick up with moves above \$20/oz and as such we would expect prices to struggle to move up through that area, but overall with prices above the lows but not looking that attractive, we expect hedging in 2018 will be subdued and will therefore not have any large impact on total supply.



### Technical

This long-term chart of Silver showing monthly bars indicates how prices found support in late 2015 along the support line. Prices built a base before starting to rally in February 2016. By July 2016, spot prices had rallied 55 percent, some \$7.5/oz, to a high of \$21.13/oz - prices have since spent the past

sixteen months oscillating sideways-to-lower. The sharp drop in prices in July 2017 did find support along the support line, which suggests there is underlying support. More recently, prices have fallen from their sideways range either side of \$17/oz, to test the December 2016 low at \$16.53/oz that has so far held. Resistance is evident between \$17.35/oz and \$17.50/oz, and the down trend line is at \$17.80/oz. Prices now seem to be trading comfortably in the range in which they traded in the latter part of the super-cycle, before quantitative easing got going after the financial crisis - this may be a more natural area for Silver prices to remain in.

### **Conclusion and Forecast**

The key driver in the Silver market in 2017 seems to have been the markets' need for safe-haven products, which drove prices higher from around April to July, when geopolitical tensions over North Korea were high. All the rhetoric helped boost safe-haven demand, but lack of aggressive action and the pursuit of diplomatic and economic means to curb North Korea's ambitions calmed investors' fears. Long liquidation and short-selling then took advantage of the higher prices that safe-haven buying had brought and that then prompted the price correction. For the price rallies and sell-offs to be mainly driven by investment and speculative action suggests that outside safe-haven demand, physical supply and demand are fairly well-balanced. Silver prices have also been following the path set by Gold prices although with the Gold/Silver ratio at 79, Silver prices are relatively weak compared to Gold prices.

Demand from India has been disrupted in numerous ways in recent years to the extent that official imports dropped 65 percent to 2,793 tonnes in 2016 and were the lowest since 2012. We expect that as the market grows accustomed to the new regulations, demand and imports will recover and there may indeed be considerable pent-up demand that could give the market a boost.

Looking ahead, we remain bullish on global growth for 2018 and we think broader, concerted global growth will be a powerful force in driving industrial demand. More widespread economic growth should lead to a pick-up in household spending on luxury items, which could give the jewellery market a much-needed boost after being in the doldrums in recent years. We also expect growth in solar power to remain strong, especially as more electricity will be needed to fuel the growing market for electric vehicles.

For 2018, we forecast a relatively balanced market with both supply and demand increasing slightly. The risks on the upside for Silver prices would be a stronger revival in India's jewellery demand and a pick-up in safe-haven buying either from another escalation in tensions over North Korea, or should the long drawn out equity market rally correct, prompting some rotation out of equities into safe-havens. We would expect support around the \$15.00/oz level and supply above \$18.80/oz during 2018.

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