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# THE CHINESE SILVER MARKET

COMMISSIONED BY

**THE SILVER INSTITUTE**

DECEMBER 2012

GFMS



THOMSON REUTERS

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# 1. INTRODUCTION AND EXECUTIVE SUMMARY

## INTRODUCTION

The last two decades have witnessed a number of significant changes in the Chinese silver market. Looking back to 1990, it is fair to say that the country was only a relatively small player in the global silver market. This year, however, following a period of robust growth, China is now the world's second largest silver fabricator and is likely to become the second largest producer, with its share of global demand and supply standing at 17% and 14% respectively. Moreover, taking into account China's large scale imports of silver in the form of base metals concentrates and, on the demand side, semi-manufactured products, it is clear that China has played an increasingly important role in the global silver market.

Against this backdrop, the Silver Institute has commissioned Thomson Reuters GFMS not only to provide a comprehensive review of the Chinese silver market, but also to examine the various factors (such as regulatory changes and the broader economic backdrop) that have influenced the rapid expansion in the country's silver market. In addition, this report addresses the outlook in terms of further developments that might occur within the country over the short to medium term.

It should be noted that, while we have been conducting research in China for around 20 years, analyzing silver supply and demand has generally proved to be challenging, partly because of what is a highly fragmented silver industry. Meanwhile, tax incentives (or, at times, disincentives) have also introduced some uncertainty in assessing market size. As a result, official statistics relating to silver supply should be viewed with caution, as there exists the potential for double-counting, as well as potential risks in identifying the source or type of silver supply, in other words whether it relates to mine production, scrap or silver recovered from imported base metals concentrates. When it comes to fabrication demand, the picture has also been complicated by the fact that a fair portion of silver used domestically has been sourced from imported intermediate silver products, which are therefore credited to the country of origin (using GFMS' methodology for assessing fabrication demand at the country level). In addition, a good part of these imported semi-fabricated products have low unit prices. Taking such data at face value can therefore lead to an erroneous picture of the market. As such, although we are confident as to the overall accuracy of our data, we would readily concede that there are aspects of this complex and diverse market that still defy precision.

## MARKET STRUCTURE

The structure of the silver industry in China, at the time of writing, is almost unrecognizable from the situation 20 years ago. From 1990 to 2001, the Chinese silver market witnessed a series of sizable underlying surpluses, as supply from local mine production and scrap comfortably exceeded fabrication demand. Since 2002, however, the picture changed dramatically, with a market deficit first appearing that year and then growing to 23.0 Moz (715 t) last year. Over the period, the gap was primarily filled by a hefty increase in imported silver bearing base metal concentrates along with modest volumes of silver bullion imports.

This shift since the early 2000s was initially driven by the liberalization of the Chinese silver market, which started in 2000 (a detailed discussion on silver market deregulation in China and its impact on the industry is provided in Chapter 2). Also of importance though has been a robust Chinese economy, with GDP growing at a staggering 10% per annum between 2000 and 2011. It should be stressed that the strength of the Chinese economy over the period has been particularly helped by a boom in the manufacturing sector along with heavy investment in infrastructure and building construction, both of which have boosted demand for industrial metals. Moreover, a sharp increase in domestic consumption and disposable incomes have also resulted in a major rise in demand for consumer products. This has certainly helped to sustain growth in the manufacturing sector in China, especially in recent years when the country's export sector has been hit by a global economic downturn.

Looking at silver supply and demand in China in more detail, Chinese silver mine production has been on a steadily increasing trend, more than doubling over the last decade or so. Crucial to this has been a rapid development in the country's base metals mining sector, which in turn has led to a sharp rise in silver produced as a by-product. In contrast, the growth in primary silver mines has been more restrained, with supply from this area only accounting for 6% of the country's mine production last year. Surprisingly, while domestic output expanded rapidly over the last decade, the single largest source of silver supply to the Chinese market since 2007 has come from silver recovered from imported base metal concentrates. As discussed above, this in essence reflects the Asian giant's growing appetite for raw materials. Elsewhere, scrap supply has also recorded a notable increase over the past decade, albeit from a relatively low base.

Turning to demand, Chinese industrial silver fabrication has enjoyed an almost uninterrupted period of growth over 2000-11, averaging 11% per annum, helped by a combination of factors such as a positive economic backdrop and the relocation of manufacturing capacities from mature economies to China where production cost are markedly lower. The country's rapid economic growth and associated rise in disposable incomes have also spurred consumer discretionary spending, with silver jewelry and silverware being a notable beneficiary.

China's investment market for silver has undergone considerable development, after silver trading first became available to the general public on the Shanghai Gold Exchange in 2006 (and on the Shanghai Futures Exchange this year). In 2009, another key change was made by the People's Bank of China (PBOC), which allowed private investors to buy silver bullion bars in China. These changes, along with silver's impressive price performance and a growing need for the public to diversify their assets amid growing inflationary pressures, have seen demand for both physical silver and paper products rise spectacularly in recent years.

## MARKET OUTLOOK

In spite of a rapid development in the Chinese silver market, both silver demand and supply are expected to achieve even further growth in coming years.

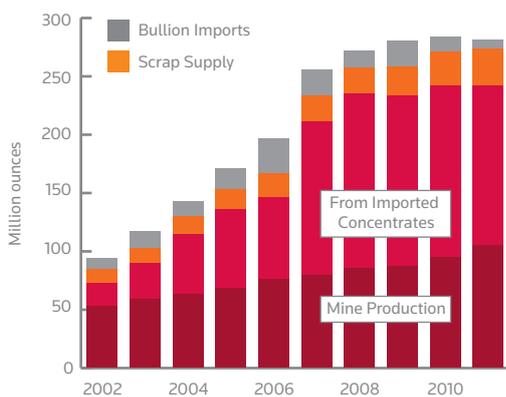
Starting with mine production, we foresee domestic silver output continue rising over the next couple of years. This growth is premised on a strong project pipeline from primary silver mines, coupled with ongoing gains in silver produced as a by-product of base metals and gold mining. Gains will be further augmented by a greater degree of commercialization and consolidation across the Chinese mining industry. It is of note that even though the base

metals sector will continue to expand in China, the ongoing modernization, and strong infrastructure construction in particular, will also keep Chinese imports of raw metals at elevated levels for a period of time. Silver recovered from imported concentrates therefore is likely to remain at notably high levels. Aside from growth in mine output, scrap supply is set to post healthy gains, largely thanks to favorable tax incentives, tighter environmental legislation and silver's strong price performance.

Turning to the demand side of the equation, silver fabrication is set to rise across most sectors in the coming years, with photographic demand the only area to post losses. The strength of industrial demand will remain the key driver behind this growth, chiefly the result of a stable domestic economy and a recovery in the export sector. While rising manufacturing costs may lead to a sharp slowdown in onshore relocations, this should be broadly offset by increasing efforts made by domestic silver semi-manufacturers to move into high value-added segments, which has been for long dominated by developed countries. Prominent examples of new growth areas have already been reflected in an increase in domestic production of silver powder in the last couple of years, as a result of significant improvements in technology. Meanwhile, given a stable economic backdrop, China is likely to retain its leading place in jewelry fabrication, aided by the growing popularity of 'white' jewelry among the youth demographic, increasing promotion of branded jewelry and an expansion of silver jewelry shops.

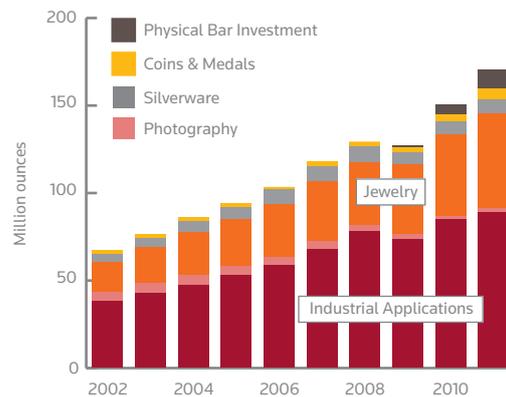
Lastly, China's retail investment demand for silver is also forecast to grow robustly over the short to medium term, as a wider population base gains access to silver bars and coins. Growth in paper trading of silver could turn out to be even more dramatic, as a renewed silver rally and its low acquisition cost compared to gold should provide a strong boost to investor interest.

### CHINESE SILVER SUPPLY



Source: Thomson Reuters GFMS

### CHINESE SILVER DEMAND



Source: Thomson Reuters GFMS

## 2. DEREGULATION AND HISTORICAL REVIEW OF THE CHINESE SILVER MARKET

### HISTORICAL BACKGROUND

China's association with silver is a long one, with the country's monetary system for centuries based on a silver standard (going off the standard in 1935). Following the revolution in 1949, silver took something of a back seat from the perspective of official policy. From 1949 to 1982, private individuals in the new People's Republic were forbidden to own gold and silver and the "Monopolistic Purchase and Management" system for gold and silver was implemented. The main aim of this system was to prohibit all outflows of gold and silver from the country and to encourage deposits of gold and silver for the new Renminbi currency at a set rate. Furthermore, private trading of gold and silver and private trading was forbidden; gold and silver ornaments could not be sold privately. Gold and silver mining did not feature in the economic planning process and investment in the industry was very limited.

### REFORMS 1979-1999

As the Chinese economy entered a new phase in 1979 with Deng Xiaoping's "Open Door Policy", this new policy also highlighted the problems of imbalances between the

supply and demand of both gold and silver. It is certainly true that, during the late 1970s and early 1980s, China was not a large producer of silver. This was a cause for considerable concern in the State Council at the time, which then decided that in order to support China's industrialization and to move towards self-sufficiency, local production needed to be expanded.

In June 1983, the State Council released the Regulations of the People's Republic of China on the control of gold and silver, which regulated the production, purchasing, distributing, manufacturing, using, recycling, import and export of gold and silver, with the PBOC given sole responsibility for setting prices and buying and selling silver. Favorable policies were also instituted to encourage exploration and development, and as a result many primary silver resources were identified and several new mines were developed.

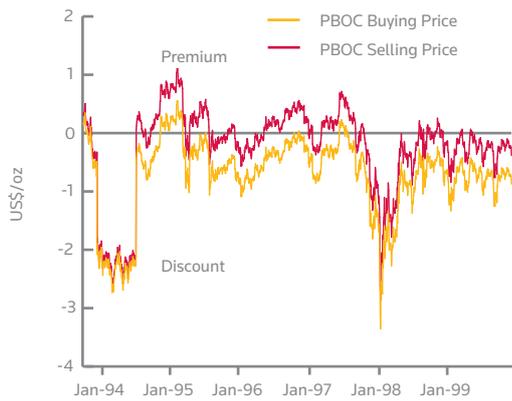
As a result of these measures, production increased rapidly through the 1980s. A number of large primary silver mines were brought on stream, silver rich base metals operations were developed and smelter and refining capacity was upgraded to facilitate efficient extraction. It is our view

### CHINESE SILVER SUPPLY AND DEMAND (MILLION OUNCES)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
<b>Supply</b>										
Mine Production	52.9	58.8	63.2	67.6	75.9	79.3	84.8	86.8	94.6	104.6
From Imported Concentrates	20.4	30.8	52.1	68.3	70.4	131.7	150.3	146.2	147.2	136.9
Old Silver Scrap	11.8	13.1	15.2	17.5	20.4	22.5	22.7	25.3	29.2	31.9
Bullion Imports	9.0	14.7	12.2	17.6	30.0	22.6	14.3	22.1	13.0	8.1
<b>Total Supply</b>	<b>94.2</b>	<b>117.3</b>	<b>142.8</b>	<b>171.0</b>	<b>196.7</b>	<b>256.1</b>	<b>272.1</b>	<b>280.4</b>	<b>284.1</b>	<b>281.5</b>
<b>Demand</b>										
<b>Fabrication</b>										
Industrial Applications	37.7	42.6	47.2	52.9	58.2	67.5	78.0	73.1	84.4	88.5
Photography	5.7	5.8	6.1	5.4	5.0	4.6	3.7	3.1	2.6	2.4
Jewelry	17.5	20.7	24.0	26.7	30.3	34.3	36.1	40.0	46.4	54.4
Silverware	4.3	5.1	6.3	7.2	8.4	9.1	8.7	6.9	7.6	8.3
Coins & Medals	2.1	2.3	2.3	1.8	1.6	2.6	2.8	3.0	3.7	5.8
Total Fabrication	67.1	76.4	85.9	94.0	103.6	118.1	129.2	126.1	144.8	159.5
Physical Bar investment	-	-	-	-	-	-	0.3	1.3	6.1	11.3
<b>Total Demand</b>	<b>67.1</b>	<b>76.4</b>	<b>85.9</b>	<b>94.0</b>	<b>103.6</b>	<b>118.1</b>	<b>129.5</b>	<b>127.3</b>	<b>150.9</b>	<b>170.7</b>
Bullion Exports	43.5	92.9	77.2	97.5	155.9	144.2	134.4	117.1	45.4	37.9
<b>Implied Stock Changes</b>	<b>(16.4)</b>	<b>(52.1)</b>	<b>(20.4)</b>	<b>(20.5)</b>	<b>(62.8)</b>	<b>(6.2)</b>	<b>8.2</b>	<b>36.0</b>	<b>87.9</b>	<b>72.9</b>

Source: Thomson Reuters GFMS

## PBOC PRICE'S PREMIUM/DISCOUNT TO INTERNATIONAL PRICE

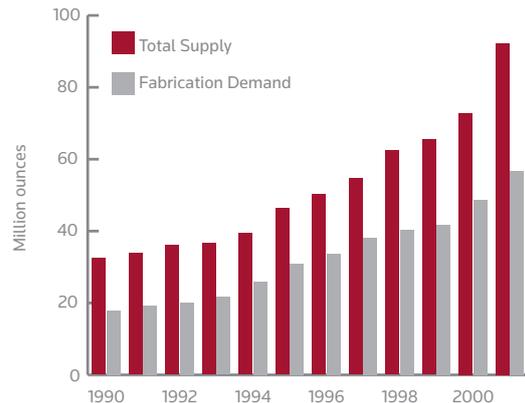


that China was almost certainly a surplus producer of silver by the end of the 1980s and then remained so in the 1990s.

By the mid-1990s and more than 15 years into reform, however, the Chinese economy was no longer a closed system, and official gold and silver policy led to increasing dilemmas for the authorities. For example, as the graph above shows, there were at times extremely large price disparities between the PBOC's buying/selling price and the international price and this was a powerful incentive to either sell directly into the local market, to export unofficially, or to build stocks until more favorable prices emerged. Unofficial flows between Hong Kong and mainland China over this period was just one of the myriad difficulties for the government and the complicated and opaque price and tax structure in particular seemed to have restricted growth in the silver industry.

Nevertheless, there was a degree of decision making paralysis, not least of all because the PBOC was constrained at that time by the State Council (which had delegated the task of management of both metals to the Central Bank). By 1997, the PBOC was aware that its stocks of silver were more than sufficient for China's own fabrication needs, and so began a period of "benign neglect", reflected in the fact that the official buying and selling price was left unchanged in spite of massive movements in the international price. In effect it turned out that silver was seen by the authorities as the metal through which to test the process of deregulation. As a direct result of the "soft" approach to silver market deregulation, public data and official commentary during this period was rare.

## TOTAL SUPPLY AND FABRICATION DEMAND



\*Including mine production, scrap and imported silver in the form of bullion and base metal concentrates

Source: Thomson Reuters GFMS

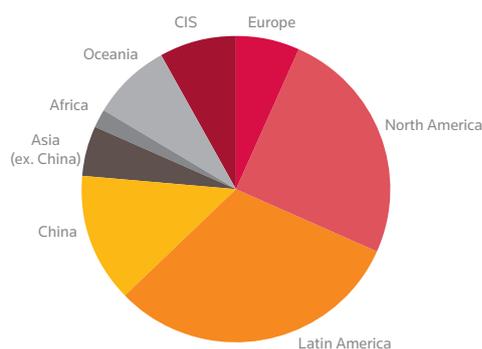
## LIBERALIZATION 2000-2012

In 2000, as part of various market reform measures, the silver market finally began to be liberalized. In an important development, China ended its 50-year state monopoly on silver trading at the start of 2000 and the Shanghai Huatong Nonferrous Metal Wholesale Marketplace (superseded by the Shanghai White Platinum and Silver Exchange in 2003) was designated by the State Economic and Trade Commission as the only official trading platform for silver in China. Initially, the exchange had 56 silver trading members, including nonferrous metals producers, processing firms and institutional consumers and wholesalers, with the number of members having since risen to more than 200. In addition, the previous license system on silver wholesale and retail product manufacturing (except coins) was abolished.

The deregulation of the Chinese state controlled monopoly for buying and selling of silver also resulted in a rapid expansion of silver exports in the first half of the 2000s. The supply of silver came from a mixture of rising mine production, growth in imported concentrates with a silver by-product credit and, finally, a flood of supply from (mostly government owned) above-ground stocks built up over previous decades. As can be seen in the chart above, China ran large silver surpluses throughout the 1990s, which resulted in a rapid accumulation of bullion stocks over the same period.

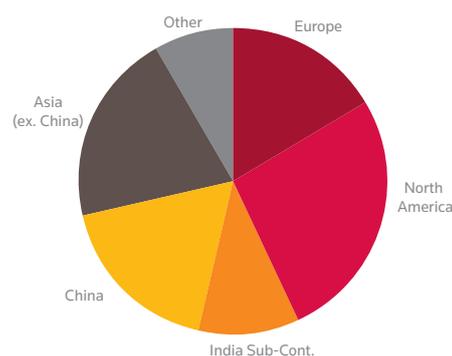
The growth in silver bullion exports was illustrated by the rise in the level of the annual export quotas issued by the Ministry of Commerce (MOFCOM). In 2000, for example, the quota totaled 13.5 Moz (420 t). By 2007, MOFCOM issued an export quota for 144.7 Moz (4,500 t) of silver.

## REGIONAL MINE PRODUCTION, 2011



Source: Thomson Reuters GFMS

## REGIONAL FABRICATION DEMAND, 2011



Source: Thomson Reuters GFMS

While it is worth stressing that exports over this period were considerably inflated by round-tripping of silver (see Chapter 6), there is no question that the vast quantity of silver suddenly entering the global market from China had an important impact on the metal's price, perhaps especially in the early part of the 2000s.

Ironically, given that silver was the first precious metal to be deregulated at the start of the 2000s, it is gold that has made much of the running on the exchange front over the last few years. The primary reason for this is tax related, in particular the Value Added Tax (VAT). At the time of the launch of the Shanghai Huatong Nonferrous Metal Wholesale Marketplace in 2000, the main unresolved problem centered on the treatment of VAT (of 17%) on trades conducted on the exchange. Members of the exchange argued for zero rating, but for various reasons a deal with the tax authorities was not struck. Consequently trading volumes did not take off and it appears as if most producers and users of silver opted to trade off the exchange, and usually with no VAT, or with a percentage of VAT being paid (it is not uncommon to find users paying an average of 5-6% "VAT". There is also a huge market in receipts which enables users to avoid VAT altogether). On the Shanghai Gold Exchange (SGE), by contrast, an agreement was reached on the treatment of VAT on gold conducted on the exchange, and gold trading volumes have risen steadily since its opening in 2003.

In addition, given silver's high price volatility, it seemed that the authorities had been extremely cautious when considering introducing silver paper instruments to the general public in China. Therefore, silver paper trading only became available to local investors on the SGE in October 2006, while physical purchases of silver bullion bars were only allowed since mid-2009 (almost four years

after gold investment bars were introduced in China). Furthermore, it was not until May this year that a silver contract was eventually launched on the Shanghai Futures Exchange (gold started to trade on the exchange in early 2008).

Notwithstanding these problems, it is remarkable how much progress has been made in the last years. For example, China's policy successes in the silver market are considerable:

- ***The PBOC has now stood back from its position as monopoly buyer and seller of silver.***
- ***Producers and users of silver can freely buy and sell the metal (often without paying VAT).***
- ***From a relatively small player two decades ago, China last year became the world's second largest consumer and third largest producer of the white metal.***
- ***There are currently three exchanges that offer silver paper trading for private/institutional investors and silver producers/manufacturers.***
- ***The general public is allowed to buy/sell investment bars and coins.***

When one thinks of the expropriation of all private gold and silver in the Cultural Revolution from 1966 to 1976, then the structural and ideological change over the past 30 years have been truly momentous.

## 3. SILVER SUPPLY IN CHINA

### INTRODUCTION

According to Thomson Reuters GFMS' analysis, total Chinese supply of silver has enjoyed a rapid growth over the last decade or so, with volumes rising from 94.2 Moz (2,930 t) to 281.5 Moz (8,756 t) between 2002 and 2011. This rapid expansion was due to a combination of, firstly, substantial economic growth during this period (GDP growth has averaged 10% over the last 10-years), igniting industrial development, and secondly, rising commodity prices which helped accelerate exploration, development and, in turn, mine output.

There are four main components of Chinese silver supply. Firstly, mine production, which last year recorded an increase for the ninth consecutive year to reach 104.6 Moz (3,253 t), contributing 37% of the total. Secondly, domestic scrap supply (chiefly industrial recycling) has been rising steadily as Chinese industrial fabrication has increased rapidly, lifting supply from this segment to 31.9 Moz (992 t) last year.

The third source of supply is imported silver bullion, as certain industrial users of silver, especially foreign operations with stringent quality requirements, tend to bring metal in despite this being more expensive than sourcing in the local market. After rising to a peak of over 30 Moz (930 t) in 2006, supply from this area has been on a steadily declining trend, reflecting major improvements in the quality of silver bullion produced in China (discussion on this area will be covered in Chapter 6).

The final contributor of Chinese supply, and the largest supply side factor in the domestic market at nearly a half

of the total in 2011, is silver recovered from imported base metals concentrates, mainly a by-product of copper, lead and zinc production. Thomson Reuters GFMS data shows that recovery of silver from imported concentrates has indeed grown rapidly since the liberalization of the Chinese silver industry. Prior to this significant development the PBOC controlled and set the domestic silver price (often significantly lower than the international price) removing the incentive for any organization to ship high silver containing concentrates to China. Since deregulation, however, a more transparent pricing structure and China's healthy appetite for lead, copper and zinc, coupled with the explosive industrial growth has seen recovery from this source peak in 2008 at 150.3 Moz (4,676 t). Thereafter, however, silver recovered from imported base metal concentrates has been following a declining trend, although its volumes has remained at exceptionally high levels.

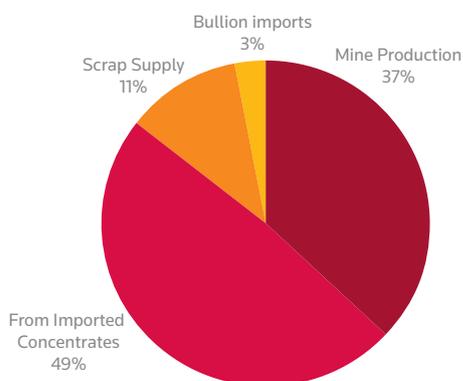
### MINE PRODUCTION

A decade ago, China was a solid 'mid-tier' producer of silver, with output in 2002 of 52.9 Moz (1,646 t). This placed it as the fourth largest behind the overwhelming dominance of Peru and Mexico, as well as Australia. Since then, rapid and almost uninterrupted production growth, at a compound annual growth rate of 8%, has seen its positioning shift to bridge the void and become one of three key players in the silver mining industry.

While the global proportion of silver produced as a by-product of other metal mining stands at 71%, in China this figure is substantially higher, with just under 95% of domestically mined silver originating as a by-product of other mined metal production. Much of this is sourced from lead-zinc deposits, which in 2011 accounted for an estimated 72% of Chinese domestic mine supply. Copper is estimated to have accounted for 18%, gold for 3%, and the balance of by-product production to metals such as tin, nickel and tungsten.

Over the past five years Chinese by-product silver production is estimated to have risen by 37%, or 29 Moz. While silver production growth has been supported by a growing domestic silver fabrication industry, it must be acknowledged that much of the growth in silver mine supply has been incidental to this trend. Rather, growth in silver output has been driven by the need to increase the production of base metals to supply domestic fabricators,

#### TOTAL CHINESE SILVER SUPPLY IN 2011



Total Supply: 281.5 Moz  
Source: Thomson Reuters GFMS

CHINESE SILVER MINE SUPPLY BY SOURCE METAL

(Moz)	2007	2008	2009	2010	2011
Primary Silver	4.0	4.4	5.0	6.3	6.1
Gold	2.2	2.3	2.5	2.7	2.9
Lead/Zinc	56.6	60.0	61.5	66.7	75.6
Copper	14.9	16.5	16.2	17.3	18.4
Other	1.6	1.6	1.6	1.6	1.6
Total	79.3	84.8	86.8	94.6	104.6

Source: Thomson Reuters GFMS

in an attempt to reduce Chinese reliance on imported concentrates. Over this same period Chinese production of copper, lead and zinc is estimated to have increased by 42%, 77%, and 51% respectively. An aside to the base metal story is the increase in silver recovered from the growing gold mining sector. Chinese gold production is estimated to have increased by 50% over the past five years, with an associated rise in the volumes of silver recovered.

There are a number of factors behind these increases in metal output. Continued investment in the Chinese mining industry by the larger, state-owned miners has continued to yield productivity and output expansions, both through the development of new mine sites, and the modernization of equipment and processes at existing sites. Merger and acquisition activity, consolidating smaller players among the larger industry participants, has also played a role. State-owned miners and the larger integrated producers generally have better access to credit from state banks, and are thus better able to weather price volatility and adverse market conditions, enabling them to consolidate smaller players, or take additional market share. More recently we have seen domestic miners looking overseas for resources through merger and acquisition activity to secure concentrate and metal supplies for import back to China. We also estimate that exploration spending in China

CHINESE DOMESTIC MINED METAL PRODUCTION

(thousand tons)	2007	2008	2009	2010	2011
Gold (tons)	280	292	324	351	371
Lead	1,402	1,403	1,604	1,981	2,358
Zinc	3,048	3,343	3,324	3,842	4,308
Copper	946	1,023	1,041	1,155	1,265

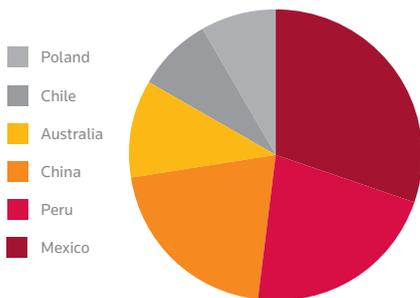
Source: Thomson Reuters GFMS, WBMS, ICSG

remains elevated, with the larger miners undertaking aggressive exploration programs in country.

The primary silver mining industry in China is limited in volume. For all silver mining it should be said that lead and zinc are common co- and by-products, and will very frequently be liberated together from a deposit. In China, the occurrence of mines that derive a majority portion of their revenue from silver (primary silver mines) are few in number with mines that produce silver effectively as a by-product to other metal mining much more usual.

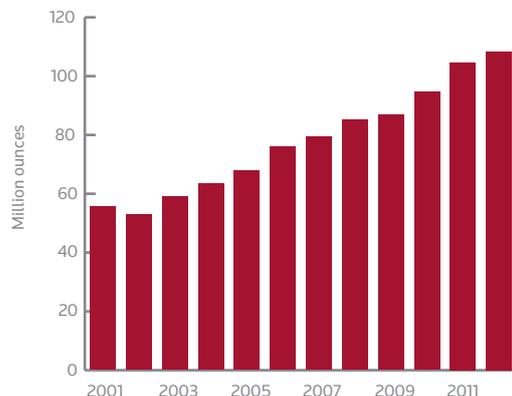
The principal producer that accounts for the majority of Chinese primary output is the Ying mining complex in Hunan Province, which comprises several underground mines accessed via adit and decline shafts, and a concentrator plant. Canadian-listed Silvercorp Metals has majority ownership of the properties, through two Sino-foreign joint ventures. Most of Silvercorp's production comes from these assets and specifically a single mining operation, the SGX unit, but the broader Ying operation also incorporates three other primary silver mines and a silver-rich lead mine. Concentrate production commenced in 2006, and is trucked as a lead-silver concentrate and a zinc concentrate for third party processing in Henan. In recent years payable silver production has been around 5 Moz (156 t) annually.

TOP SIX SILVER MINING COUNTRIES, 2011



Total Production: 505.3 Moz, 66% of Global Total  
Source: Thomson Reuters GFMS

CHINESE SILVER MINE PRODUCTION



Source: Thomson Reuters GFMS

## SILVER OCCURRENCES IN CHINA

The geology of China is certainly prospective for exploration success. Silver occurs in mineral assemblages in varied geological settings, and is usually found in conjunction with other elements such as lead (Pb), zinc (Zn), copper (Cu), tin (Sn), antimony (Sb), tungsten (W), gold (Au), bismuth (Bi) and mercury (Hg), which are extracted at the smelting and refining stages to form a valuable co-product. Some of the main occurrences include:

- *Marine volcanic sedimentary rocks hosting massive sulfide Pb-Zn-(Cu)-Ag ores and stratiform Ag-(Au) ores.*
- *Continental volcanic sedimentary rocks containing polymetallic silver veins and/or stockworks and Ag-(Au) veins in pyroclastic rocks.*
- *Rocks affected by metasomatic processes including W-Ag quartz veining, Pb-Zn-(Cu)-Ag skarns, Sn-polymetallic-Ag ores and Ag-(Au) veins in altered carbonate rocks.*
- *Metamorphic-intrusive rocks, principally Ag-(Au) veins in shear zones.*
- *Sedimentary rocks including stratiform Pb-Zn-Ag ores in carbonates, silver bearing manto deposits and Cu-(Ag) layers in red sandstones.*
- *Gossan type ores formed from weathering.*

These ore deposits were formed, as a generalisation, from either the process of orogenesis (mountain building) or from periods of intrusive and extrusive volcanism, resulting in the concentration of ore minerals from metal rich fluids within the crust. The varied nature and quantity of these deposits is testament to the long geological history of the Chinese terranes, giving ample time and opportunity for these concentration events to occur: rocks have been found in China dating approximately 3.8 billion years in age. It should also be borne in mind that China represents around 6% of the global landmass, and therefore there is a large area of prospective terrain for the Chinese Geological Brigades to explore.

The United States Geological Survey estimate that at end-2011 China had the fifth largest reserves of silver worldwide, at 1,382 Moz (43,000 t), behind Peru, Poland, Chile and Australia. It should be remembered that this is a dynamic figure, subject to statistical reassessment, additions through exploration success and reductions from depletion through mining. We would be skeptical of suggesting, however, that the Chinese silver reserve base has been facing net depletion over recent years, given ongoing exploration efforts in-country coupled with the strong price performance of silver over the past three years, which will certainly make the metal an increasingly attractive exploration target in its own right, as well as a more important co-product to base metal and gold exploration.

Domestically owned and run primary mines of any meaningful scale are few in number and our inquiries around primary silver mines and projects in have usually elicited modest opinions of this sector due to there being relatively little focus on such assets, indeed most being polymetallic lead/zinc dominant deposits that produce associated silver and/or gold. The chief exception we are aware of is the state-owned Hebei Fengning mine that is generally regarded as a primary silver mine. We estimate it has produced around 0.6 Moz (20 t) annually in recent years.

Primary silver production costs for mines within the Ying complex, the SGX and TLP units, feature in the lower quartile of the industry cost curve overleaf. Indeed, thanks to lead and zinc credits (by-product accounting) SGX has reported negative silver cash costs for several years. However, the XBG mine, a small operation also in Henan, is positioned less competitively at the upper end of the cost curve, in part, we believe owing to its comparatively smaller scale of mining and processing operations. Needless to say, given the limited population of Chinese primary mines and therefore those featured in the global analysis, caution should be exercised before attempting to generalize that 'typical' Chinese silver mining costs are especially low relative to the international peer group.

## MINING OUTLOOK

Production from primary sources in China is expected to increase strongly over the next few years as production is realized from new projects. Notably, the Ying operation completed a mill expansion in mid-2012, taking installed concentrating capacity from 2,500 metric tons per day (tpd) to 3,200 tpd of ore. Further out, there are a handful of possible development projects, including two advanced projects in Guangdong: Silvercorp is constructing the 1,600 tpd Gaocheng mine and mill and targeting first production in 2013. Minco Silver advanced its 90% owned Fuwan project to feasibility stage in 2009 and having raised finance, is currently at the permitting stage for a 3,000 tpd underground silver-lead-zinc mine and process plant, which is targeting a 2014 start. Steady state silver production could be 5.5 Moz (170 t) per year. Some primary silver deposits also occur in Inner Mongolia, where Silver Dragon Resources recently reported some high grade drill hits on exploration properties although these will likely be a long term proposition in our view.

With regard to China's gold industry, production in the first six months grew by an estimated 7%. For the full-year, and into 2013, we expect gold output volumes to continue to increase, premised on further consolidation

and modernisation of the country's domestic operations, against a backdrop of elevated gold prices, which will continue to incentivise this activity. We forecast silver recovered as a by-product of gold mining activity to continue to grow concurrently.

National data from for the first seven months of 2012 indicates mined copper output is up by over 12% year-on-year. This implies that annual production will reach over 1.5 million tons of mined copper, an increase of 16.5%. However, with few other major projects scheduled to deliver over the next two to three years, the rate of growth is subsequently expected to slow from current levels, towards 2-3% per annum. The extent to which growth can be maintained will be influenced in part by the copper price and any weakening could see supply from marginal operations become unprofitable, with a concurrent impact on silver sourced from domestic copper mines.

Significant volumes of lead and zinc capacity have continued to be added thus far in 2012, and we expect growth in lead and zinc production to amount to 27% and 20% respectively. Combined with our forecast for higher average prices in 2013, we expect output growth to remain in double digit territory over next year as well. Subsequent to this, elevated growth rates are forecast to be maintained over the following several years, as implied by China's 12th Five-Year Plan which provided guidance on economic policy for the period 2012-2015, as it pertains to the domestic non-ferrous metals industry.

Taking these outlooks together, we expect that, like primary silver, the levels of by-product silver recovered from the copper, lead/zinc and gold sectors will, as a group, increase in 2012 and 2013.

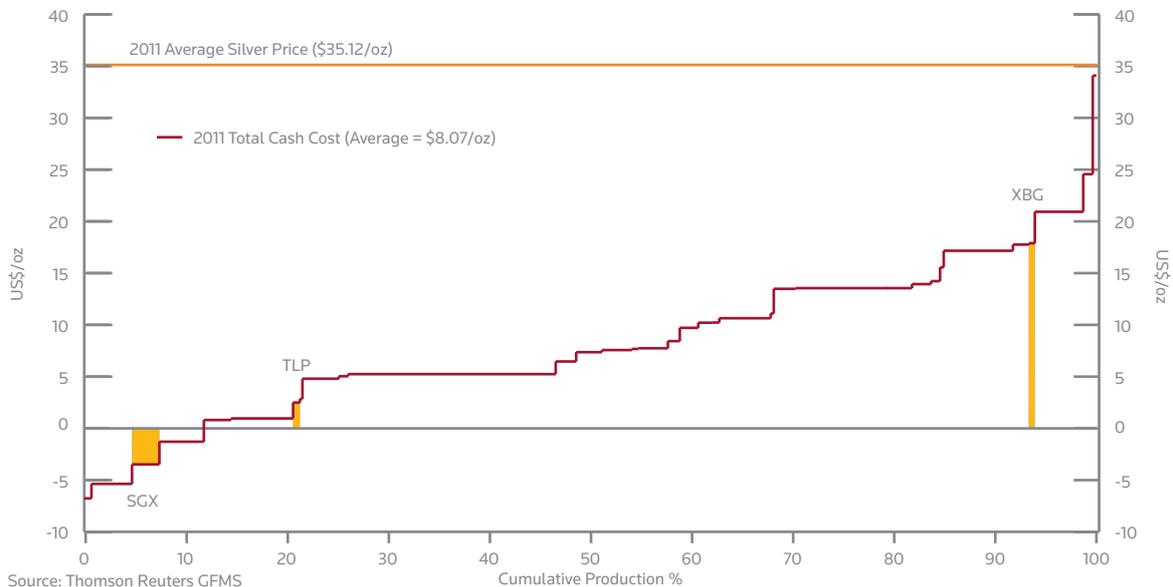
## PRODUCTION FROM CONCENTRATES AND RESIDUES

Turning to the silver smelting industry in China, given the large volumes of lead production in China, this centers mostly around the processing of both domestic and imported lead concentrates, and the reprocessing of precious metal bearing anode slimes from base metal smelters, which also use blends of domestic and imported feedstock.

In some instances, our contacts have informed us that most of the profit margin within the business of re-processing anode slimes and other residues has been from gains in silver prices and the recovery of 'minor' metals (which often may not be a payable metal in the refining contract), rather than from the recovery of residual base metals.

However, due to silver's impressive price performance in the last couple of years, a growing number of base metals smelters now tend to re-treat silver-bearing anode slimes themselves instead of selling them to third parties. This is clearly expressed by our contacts in Yongxing County (Hunan Province), which calls itself the silver capital in China, where annual silver output is reported to have totaled 67.5 Moz (2,100 t) in 2011 (though we believe the official number is inflated by significant double counting). Basis our information, the bulk of silver production in this area, for many years, comes from base metals slimes, lead in particular. While the expansion of the base metals sector has seen output from this region post robust gains over the last decade, smelters that we have spoken to in that region unanimously indicated the increasing difficulty of sourcing anode slimes and slags from major base metals producers. In addition, as the overwhelming majority of

### PRIMARY SILVER CASH COSTS (2011)



## TOP 10 SILVER PRODUCERS IN CHINA

(Moz)	2007	2008	2009	2010	2011
Henan Yuguang Gold and Lead Group	18.3	19.4	19.7	19.5	22.3
Jiangxi Copper Corporation	11.6	13.1	13.9	14.5	16.4
Yunnan Copper Co.	17.5	10.9	10.0	11.3	15.2
Hunan Chenzhou Jingui Silver Industry Co.	13.2	9.6	10.2	8.4	14.5
Henan Jiyuan Jinli Gold and Lead Co.	8.4	9.0	10.7	11.4	13.8
Tongling Non-Ferrous Metals Group	3.1	5.3	10.0	13.1	13.3
Hubei Daye Non-Ferrous Co.	8.1	8.4	8.7	10.9	11.3
Hunan Yuteng Non-Ferrous Metals. Co.	-	-	11.5	9.2	10.9
Henan Shuikoushan Non-Ferrous Co.	8.9	9.5	9.6	7.7	7.3
ShenZhen Zhongjin Lingnan Nonfermet Co.	6.0	4.2	4.1	5.1	7.3
Other	197.3	218.8	224.4	262.5	264.7
<b>Total Supply</b>	<b>292.3</b>	<b>308.2</b>	<b>332.7</b>	<b>373.5</b>	<b>397.0</b>

Note: Silver produced from both domestic and imported concentrates.

Source: Antaika

these local smelters are privately owned, tight credit limits from state banks and their exposure to volatile silver prices have resulted in a sharp decline in profit margins.

The industry also processes some silver bearing doré from gold mines. In this case, the smelting industry centers on the larger, state run integrated enterprises, which may toll-treat material on behalf of smaller producers in addition to their own mined output.

Furthermore, in the government's latest Five-Year plan, one of the aims was to continue to promote tighter regulation and standards in environmental controls. In particular it mentioned two targets: to reduce energy and carbon dioxide intensities by 16% and 17% respectively, and to cut the discharge of main pollutants by 8-10%. Within this framework of greater regulation of emissions and discharges, we expect this to place additional pressure on the Chinese smelting industry to further modernize.

In such a situation, we expect there to be continuing consolidation in the base metal smelting space in China, as smaller companies, which may lack the easy access to credit or cash to refurbish or retrofit their operations, are absorbed by larger companies, many of which additionally boast refining facilities, providing the advantage not only of scale, but of vertical integration. Larger, state owned companies may also have easier access to credit from domestic banks due to their quasi-government status, which has the additional benefit of providing some insulation to cash flow against sometimes volatile metal prices.

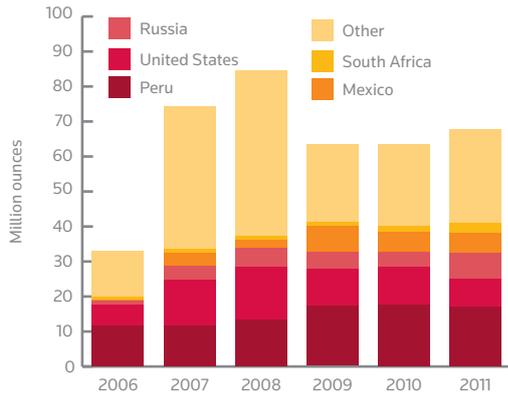
Total silver output in China was estimated by the China Nonferrous Industry Association to be 397.0 Moz (12,348 t) in 2011, an increase of just over 6% year-on-year. When looking at some of the reported production volumes from base metal smelters, this may not reflect the full scope of the situation. In our last report on the Chinese silver market, produced in 2005, we noted evidence exists of 'double counting' of statistics for silver production in China, and in some cases, under-reporting. We believe this is still the case, primarily as a result of discussions during on-the-ground field research. It is widely acknowledged that the figure of total refined production cited by government agencies leaves significant scope for interpretation. Specifically that there are likely to be instances of double counting of "total silver output" across the

mine, smelter and refinery levels. In addition, these figures can include the recycling of secondary materials such as electronic scrap, and potentially the upgrading of silver bars between one refinery and another.

Perhaps most importantly, this 'total output' measure appears to not differentiate between the various sources of refinery feedstock sourced at domestic mines from that sourced from imported silver-bearing mine products. This represents a fundamental difference with Thomson Reuters GFMS' methodology, used across our mining research, whereby mined production is attributed to the country of origin of ore, rather than the country in which material is smelted/refined. Refined production is evaluated separately as part of the balance of trade flows which feeds into our assessment of supply and demand at the country level.

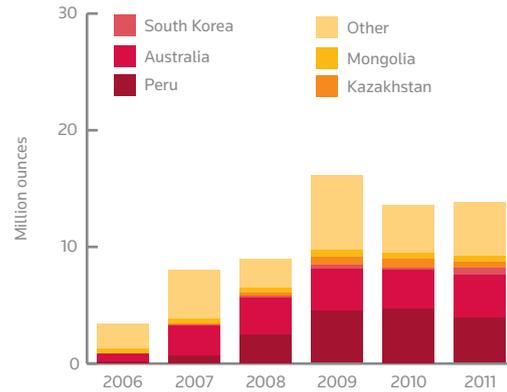
Clearly China is not alone in its role as a purchaser of feedstock from international sources. The concentrate trade is a well established global business and involves the shipping of substantial volumes of material for smelting at facilities across East Asia in general. Elsewhere, a few more specific examples of such flows include: concentrates sourced in Russia which are processed in Kazakhstan, Australian concentrates processed into silver metal in India, and Australian crude lead bullion shipped for refining in the United Kingdom. Furthermore silver bearing doré is routinely transported for refining in another country to that of the mine from which it originated. Due to the nature of the Chinese industry, being very fragmented and opaque in nature, deriving a bottom-up series for Chinese silver production is therefore very difficult. In order to sense-check a realistic estimate for Chinese domestically mined silver, we believe it is of the utmost importance to

SILVER FROM CHINESE LEAD CONCENTRATE IMPORTS



Source: Thomson Reuters GFMS

SILVER FROM CHINESE ZINC CONCENTRATE IMPORTS



Source: Thomson Reuters GFMS

make an assessment of the quantities of silver imported from foreign-sourced concentrate that is implicitly included in official production statistics of silver.

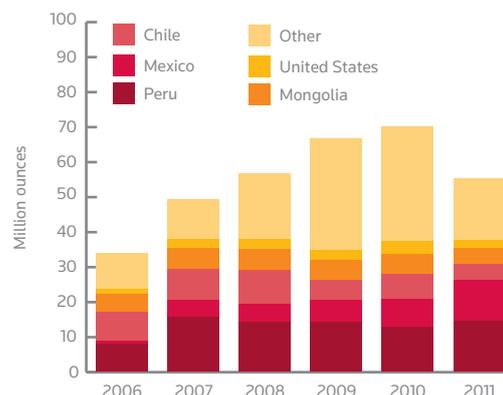
The Chinese market for imported concentrates is dominated by inflows of copper-bearing material. Looking at the trade of the major base metal concentrates relevant to the silver market (copper, zinc and lead), according to customs data, copper concentrate comprised 59% of the gross weight of these imports in 2011, followed by zinc (27%) and finally lead (13%). However, when considering silver flows within these shipments, silver grade (and to a lesser extent, process recovery) is pivotal, as outlined below.

Analytical services company Alex Stewart International provided Thomson Reuters GFMS with a range of silver content data from base metal concentrate assays across a range of leading countries that ship concentrates to China. Our methodology to estimate these flows of silver contained in concentrates to China was based on this assay information in conjunction with import data and proprietary estimates for 'typical' rates of process loss for downstream processing of silver associated with copper, lead and zinc. Grades of silver in many lead concentrates can be exceptionally high, ranging from a few hundred to several thousand grams per ton (g/t). By contrast, copper concentrates might grade from 100-1,000 g/t with zinc more typically from 50-300 g/t range. It is our opinion that many of the highest (silver) grade concentrates are not shipped to China owing to the VAT structure, discussed later. The data on concentrate grades indicates to us that total silver imported and yielded from lead concentrates has been broadly similar to that from copper, in some years representing the leading source of silver from concentrates imported to China, including last year, at around 68 Moz (2,100t), out of total recoverable imports of 136.9 Moz (under 4,259 t).

There are a number of reasons for this skew of silver contents being in favor of lead. It is usual for lead-zinc mines or polymetallic mines of meaningful scale to design the process flowsheet to produce two or more concentrate streams rather than a single "bulk" concentrate in which all payable metals are contained. By doing this, offtake can be negotiated with multiple smelters/refiners best suited to handle each respective stream, in the interests of achieving better pay levels against the contained metal. Physical recovery of silver through zinc processing presents more challenges than for recovery from lead smelting, and therefore affects rates of payment smelters are prepared to offer producers against contained silver. Upstream, at the concentrator stage, silver sulfide minerals (such as argentite,  $Ag_2S$ ) are chemically similar to, and will most commonly associate with, lead sulfides (such as galena,  $PbS$ ) over zinc sulfides, most notably sphalerite ( $(Zn, Fe)S$ ).

Consequently, it is normal for silver sulfide minerals to readily report to a lead concentrate stream in the flotation process as a matter of course. But given that more favorable silver payment terms invariably exist for lead/

SILVER FROM CHINESE COPPER CONCENTRATE IMPORTS



Source: Thomson Reuters GFMS

silver concentrates than for zinc/silver, flotation plant processes will be further optimized to ensure the maximum proportion of silver reports to a lead stream with silver reporting to a zinc stream to be minimized.

It should be reiterated though that while this is recorded as Chinese production by the domestic statistics agencies, the Thomson Reuters GFMS methodology is to attribute this production to the mine site and country of origin of ore. Interestingly, the growth of this major source of silver to China has ceased over the past (four) years, following a period of exceptional growth from the liberalization of the market in the 1980s through 2008. Indeed, since then, by our estimation, component of Chinese silver has contracted by 9% since 2008.

One important factor that has restricted growth in imported base metals concentrates in recent years relates the tax issue and price differences between local and international markets. As mentioned earlier in this report, since the liberalization of the Chinese silver market, all silver transactions are subject to 17% VAT in China. In other words, local smelters need to pay 17% tax on silver contained in imported concentrates (typically based on international prices). However, as domestic prices (excluding tax) have been trading consistently lower than the international price, it is not surprising that local smelters tend to prefer low silver content in imported concentrates. It is worth stressing here that silver prices quoted on commodity exchanges in China have already included a 17% VAT. As such, while the published silver price in China may seem to hold a small premium over the international price, it is wrong to conclude that local companies could benefit from silver recovered from imported concentrates.

Back to the mid-2000s, despite the lower domestic price, losses were avoided as local silver producers and traders could get a 13% VAT rebate on the value of the silver exported. Moreover, this incentive was exploited by certain entities that engaged in round tripping of silver between mainland China and Hong Kong, which subsequently generated considerable profits. This, along with the rapid expansion of the base metals sector, led to a sharp rise in concentrate imports to China over the same period. However, as the silver tax rebate was reduced to 5% in 2007 and then removed in the following year, the incentive to bring silver rich concentrates has reduced considerably.

## SCRAP

Analyzing Chinese scrap supply has always been a difficult task not least because of the fragmented nature of the business. Obtaining reliable data has been challenging given the geographical size of China and often remoteness of the industrial centers which are spread far and wide across the country.

Thomson Reuters GFMS' estimates of silver scrap reveal a rapid acceleration in supply over the last decade. In essence this has chiefly been the result of the uninterrupted surge in economic growth (China GDP growth has averaged 10% over the last 10 years) which has stimulated industrial expansion, with the healthy rise in recovery the benefit of massive investment in infrastructure and industrial output.

In 2001, Chinese silver scrap supply was less than 10 Moz (310 t). Since this point scrap has risen more than three-fold as industrial fabrication has rapidly increased reaching 31.9 Moz (992 t) in 2011. Silver recovery over this time has mainly originated from used film, scrap capacitors and used computer and contact materials. Moreover, in the last few years there has also been a notable rise in supply from spent ethylene oxide (EO) catalysts used in the production of detergents, solvents, plastics, and various organic chemicals such as ethylene glycol.

In addition to domestic supply there has previously also been a contribution from imports which primarily took the form of electronic scrap (E-scrap) from the industrialized world. After liberalization of the silver market in 2000 this opened the door for a surge in imports as foreign companies looked to capitalize on the cheaper processing costs. Chinese authorities moved to stop this practice in 2002, effectively banning imports of electrical items such as television sets, computers, photocopying machines, video cameras and telephones due the high level of hazardous waste. Added complications concerning imported scrap, especially of electronics origin, are firstly, whether the material is actually re-used or genuinely scrapped, and secondly, just how much high grade material is actually shipped in. While there has been measure introduced to reduce this trade it appears they some E-waste from foreign countries is still entering China, some through official channels and some reportedly via unofficial means.

Looking briefly at recent scrap levels reveals supply has risen at average of 12% over the last three years. This followed a flat result in 2008 as industrial fabrication

volumes that year were affected by weaker export demand as western markets felt the first affects of the financial slowdown. Since then, however, silver scrap has risen steadily, with domestic consumption gains helping to offset losses in the export trade. Indeed, the rapid growth of China's middle classes and urbanization of the country's interior has stimulated demand for electrical and electronic products on the home front, further boosting recycling volumes. In addition, last year the State Administration of Taxation and Ministry of Finance introduced new legislation that will reduce or eliminate value-added tax (VAT) burdens on enterprises that recycle wasted resources during production in a bid to further promote the country's circular economy that makes industrial manufacturing more environmentally friendly. In terms of silver recovery, the 50% VAT rebate on electrical and electronic household appliances should provide the platform for a greater recycling of these products.

Looking ahead, we expect ongoing industrial scrap growth to offset the decline expected in recycling from the photographic industry. Indeed, the migration to digital cameras and other associated technology has already had a significant impact on silver halide recovered from consumer film and photographic paper and is likely to see further falls in future years. While both of these areas of supply are not generally price sensitive and, in the case of industrial recovery, linked closer to economic growth, supply from recycling of jewelry and silverware is far more price elastic. If, as expected, silver prices move higher in 2013 then we would expect a rise in supply from this segment as silver assets are teased out to generate profits. Longer term we would expect China's silver scrap supply to increase in line with economic growth. While slowing slightly this year China is set to still deliver healthy GDP growth and with expectation of further economic advancement in coming years supply from this source should continue to rise.

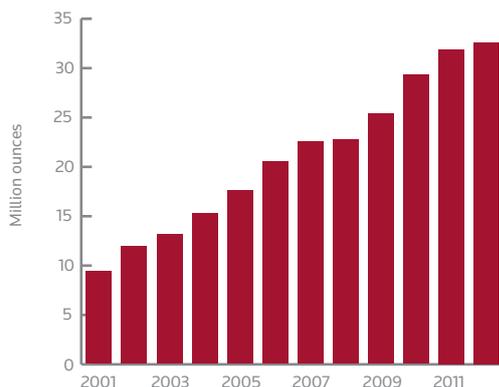
## GOVERNMENT STOCK SALES

As we stressed in Chapter 2, prior to the liberalization of the silver market in China which started in 2000, all silver produced was officially required to be sold to the People's Bank of China (PBOC). Despite a sizeable volume being sold unofficially by producers and subsequently exported, it is believed that much of the excess supply was simply stockpiled.

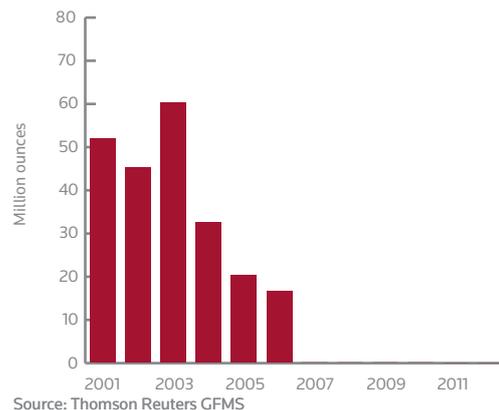
The first signs of this changing occurred in the mid-1990s when it was indicated to us by the PBOC that they no longer wished to purchase any more silver because of what they perceived to be sufficient, if not excessive, stocks. The first exploratory sales from these official stocks started in 1998 and then rose sharply in the following years, as the Chinese silver market started to liberalize. At the same time, flows from what we have termed "quasi-official" stocks (typically held by smelters and miners because there was little opportunity cost to them of holding idle stocks) began to pick up.

After carefully analyzing the key elements of the Chinese silver supply/demand equation, our estimate shows that net government stock sales from China total almost 350 Moz (10,880 t) from 1998 to 2006, accounting for more than 4% of the global silver supply over the same period. From 2007 onwards, however, we are confident that the PBOC has stopped delivering any material sales to the market. In essence, this is due to the fact that, following several years of heavy sales, the country's silver stocks have already been reduced significantly from "excessive" levels, and remains stocks will play some part in diversifying its reserve portfolio away from US dollars.

### CHINESE SCRAP SUPPLY



### CHINESE NET GOVERNMENT STOCKS SALES



## 4. SILVER FABRICATION DEMAND IN CHINA

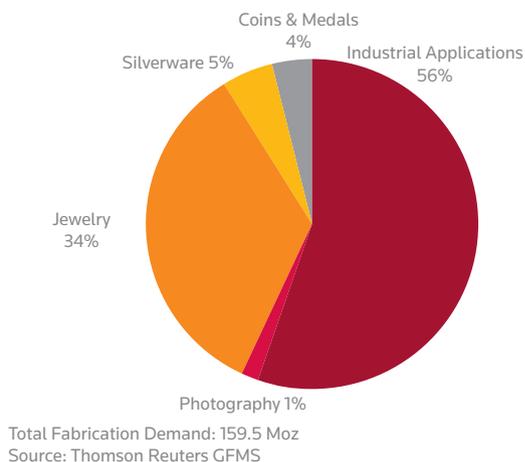
### INTRODUCTION

Since the liberalization of the Chinese silver market at the start of 2000, silver fabrication demand has grown at an average annual rate of 12% through to 2011, with offtake rising from 48.7 Moz (1,514 t) to 159.5 Moz (4,960 t) last year. This is in stark contrast to the rest of world where silver fabrication in fact posted a double-digit fall over the same period.

Chinese fabrication demand for silver comes from a number of areas, the most important being industrial applications which have grown significantly over the past two decades and last year accounted for 56% of total Chinese silver fabrication. The second largest source of demand is silver jewelry followed by silverware, both of which have also posted successive record highs in recent years, chiefly due to strong growth in domestic consumption and export demand. Another area that has enjoyed healthy gains is coins & medals (the trend in this segment will be discussed in detail in Chapter 5). In contrast, the use of silver in photography has experienced a declining trend since 2005.

Before reviewing each component, it is worth stressing that it has at times been challenging to separate out domestically fabricated silver products from those imported. For example, the significant increase in the assembly business in China has traditionally been fed from imported intermediate products, though this has evolved in recent years, with an increasing volume of components for China's assembly industry now being produced domestically from silver bullion. This has tended to cloud the statistical picture and has therefore added to the uncertainty of establishing reliable growth estimates for silver demand.

#### CHINESE SILVER FABRICATION DEMAND IN 2011



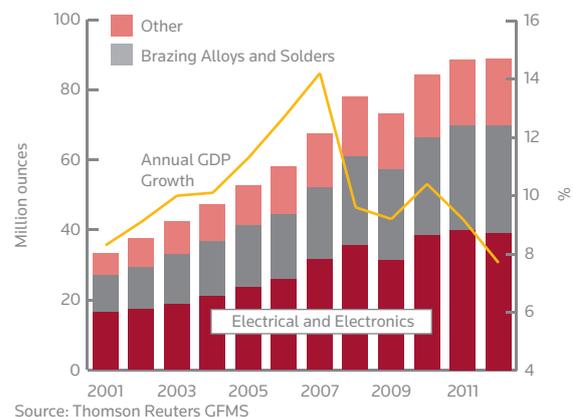
### INDUSTRIAL APPLICATIONS

Chinese industrial fabrication has posted near uninterrupted growth (with the exception of a dip in 2009) for more than 20 years, climbing from 12.9 Moz (401 t) in 1990 to 88.5 Moz (2,754 t) last year. This raised its share of global silver industrial fabrication from a mere 5% to 18% over the same period, elevating China's position to the world's second largest industrial fabricator after the United States.

The main drivers of this outstanding performance have been increasing infrastructure expenditure in China and a massive rise in industry output, which have boosted consumption of industrial metals. Meanwhile China has also been able to capitalize on its large and low wage workforce, which has therefore benefited from onshore relocations from higher-cost centers. In addition, increasing per capita incomes have lifted domestic consumption of consumer durables and electronics products.

Looking ahead, despite the economic growth in China over the last two decades, its urbanization, which is closely linked to modernization and industrialization, is still at a relatively low level. As a percentage of the total, the urban population only exceeded 50% in China for the first time last year, compared with 80% in OECD members. In line with this, Chinese per capita consumer spending still remains low in comparison to many mature economies. The outlook for silver used in industrial applications in China therefore continues to be quite promising, as domestic demand for silver-bearing products, such as automobiles, personal electronic products and white goods is forecast to maintain strong growth.

#### CHINESE INDUSTRIAL FABRICATION



Besides this, the ongoing infrastructure investment by the government means that silver used in the construction sector will rise further, although growth is likely to ease in coming years compared with the previous decade, in line with the high base and ongoing efforts by the government to curb speculative real estate projects. Finally, given a rapid increase in labor costs, relocations from developed countries to China is likely to slow considerably over the next few years, although this will be partially offset by the continued flow of businesses into China in order to benefit from direct access to the local market.

In terms of the specific data series, Thomson Reuters GFMS have traditionally broken down Chinese industrial demand into three main key categories covering, electrical and electronics, brazing alloys and solders and other (including batteries, and chemicals). Each is discussed below in more detail, but to understand their relative importance the table below shows our estimates for each category over the past decade.

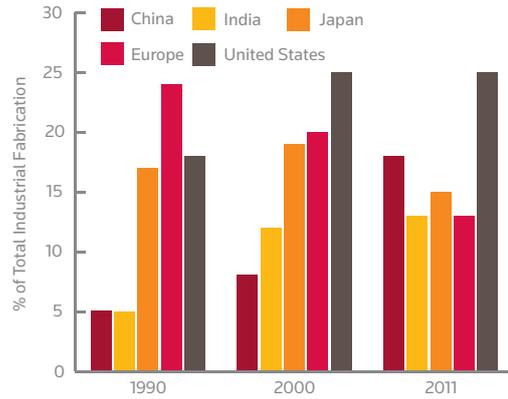
**ELECTRICAL AND ELECTRONICS**

The broad electrical and electronics sector not only accounts for the largest slice of demand in the industrial field in China, but has enjoyed robust growth over the past decade, rising from 17.1 Moz (532 t) in 2002 to 40.0 Moz (1,243 t) last year.

Key to this impressive performance has been a rapid expansion in the country’s semi-conductor sector which posted an average annual growth of well above 20% from 2001 to 2011, compared with 5% registered by the global semiconductor industry over the same period. The massive outperformance was primarily a function of strong gains in domestic consumption coupled with rising export demand (notwithstanding a setback during the global economic downturn in 2009).

Looking at the individual sectors in more detail reveals a similar pattern of growth across a range of applications. In

**LEADING MANUFACTURERS’ SHARE OF INDUSTRIAL FABRICATION**



Source: Thomson Reuters GFMS

particular, a surge in cell phone and computer production lifted Chinese output to account last year to above 70% and 90% respectively of the global total. This was in addition to a significant rise in demand for other personal electronic goods, with the greatest area of growth witnessed in notebooks, tablet computers, and LED production for use in LED-backlit LCD televisions. Unlike some western markets which are reaching saturation point in terms of the consumption of electronic products, China is only now beginning to access these more affordable product ranges. Furthermore, in many instances, electronic items have a limited shelf life, or more importantly, a short “fashion” life, with many consumers continually upgrading their products as newer models become available.

Growth in the demand for electrical contacts within the automotive sector has also led to a significant increase in offtake. Chinese vehicle production has grown at a staggering rate in the last decade from almost 3 million light duty vehicles in 2002 to 17.3 million last year, with prospects for further strong increases going forward. Over the last few years, engine efficiency, safety and comfort standards of cars have been upgraded significantly, and with these upgrades there is a growing need for vehicles

**CHINESE SILVER FABRICATION**

(million ounces)	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Electrical and Electronics	17.1	18.8	21.0	23.5	25.8	31.5	35.5	31.3	38.4	40.0
Brazing Alloys and Solders	12.2	14.4	15.8	17.8	18.8	20.7	25.4	25.9	28.0	29.9
Other	8.4	9.4	10.4	11.6	13.6	15.3	17.1	15.8	18.0	18.7
<b>Total</b>	<b>37.7</b>	<b>42.6</b>	<b>47.2</b>	<b>52.9</b>	<b>58.2</b>	<b>67.5</b>	<b>78.0</b>	<b>73.1</b>	<b>84.4</b>	<b>88.5</b>

Source: Thomson Reuters GFMS

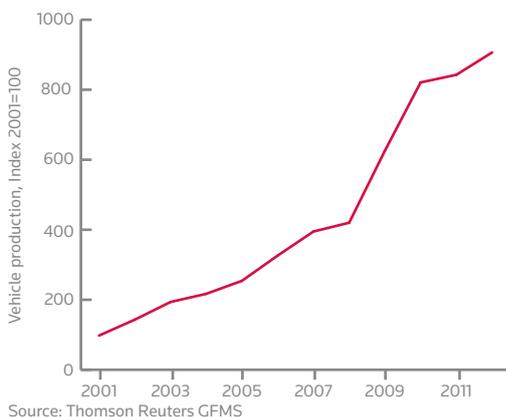
with electrical and electronic components to control, for example, chassis movements, steering, communications, comfort and safety devices. Most importantly, though, consumers are increasingly demanding vehicles with the highest specification levels for sound, climate control and functional automation (such as electric mirrors and heated seats). A number of these modules use silver-containing components, such as thick film ink tracks or switches/contacts. This remains a segment that has delivered solid growth (in term of silver offtake) in the last decade and should continue to expand as the domestic economy advances.

Another sector that is worth highlighting is the notable rise in China's photovoltaic (PV) production capacity, which has resulted in a surge in demand for silver paste. Interesting, although global solar-cell production is now heavily concentrated in China, the domestic PV industry has, for many years, relied on imported silver powder (principally from the United States and Japan), due to stringent quality requirements. While this continues to be the case, more recently we have seen the domestic production of silver powder for the local PV industry rise. In our view, this suggests that Chinese silver fabrication for the PV industry will start to rise appreciably, as oppose dot the current situation, where the use of imported silver paste contributes to Chinese silver industrial consumption, rather than its fabrication demand.

**BRAZING ALLOYS AND SOLDERS**

Chinese demand for brazing alloys & solders has also posted a noteworthy increase over the last 10 years. From 12.2 Moz (380 t) in 2002, Chinese offtake more than doubled over the 2000s, hitting a new record high of 29.9 Moz (929 t) last year, with its contribution to the global total rising from 29% to 48% over the same period.

**CHINESE LIGHT VEHICLE PRODUCTION**

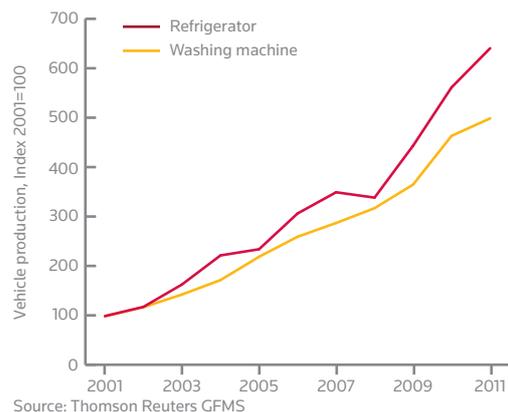


Crucial to this has been strong domestic GDP growth and low labor costs, which together have contributed towards China becoming the global manufacturing hub for a vast number of products, such as white goods. Meanwhile, rising income levels and rapid urbanization mean that a growing share of the population (albeit still comparatively small) are purchasing white goods and other home appliances. To illustrate the scale of the white goods market, production of household refrigerators and washing machines jumped by more than 440%, and 320% respectively between 2002 and 2011.

While export demand has suffered in recent years due to poor economic conditions in key western countries, production of white goods in China has managed to maintain healthy growth, thanks to a series of favorable economic policies announced by the State Council in late 2008. Specifically, the "household appliances trade-in" and "home appliance going to the countryside" programs, both in place between 2009 to 2011, helped to boost demand, especially in rural areas. Despite these stimulus programs officially finishing at the end of last year, the home-appliances-subsidy system has been extended in some provinces, which has so far helped to keep production at similar levels to last year. However, while Chinese demand from this sector is set to continue over the long term, the ongoing weakness in many key export markets, along with a rise more recently in trade stocks, do pose a temporary downside risk to the sector in the near future.

Elsewhere, infrastructure construction, such as grid expansion and railway investment, has also contributed to growing silver demand. Within the domestic Chinese market, grid construction has undoubtedly lagged economic growth. In general, a significant amount of power is generated in coal-rich regions of the country, rather than areas that are close to high load centers. The transmission system originally created was planned to

**CHINESE WHITE GOODS PRODUCTION**



convey electricity over moderate distances. However, as economic growth accelerated investment in the national grid failed to keep pace. As a result, there remains considerable scope for growth in silver demand in this area.

Demand for brazing alloys and solders also received a boost following the rapid development in housing construction in the second half of the 2000s. Nevertheless, as real estate prices surged in recent years, this prompted fears of a possible property market bubble. This in turn has resulted in government efforts to cool the sector, including higher mortgage down-payments and restrictions on lending to developers, which has imparted a restraining influence on private sector investment. Positively, this has been offset, in part, by strong government spending on social housing. This is one of a number of development objectives detailed under the new Five Year Plan and, as a result, is expected to continue to support the construction sector over the coming years.

#### OTHER APPLICATIONS

In terms of demand for silver used in other industrial application, this has grown over the last 10 years, with demand rising from 8.4 Moz (260 t) in 2002 to 18.7 (582 t) in 2011.

Similar to the trend seen in demand for electrical & electronics and brazing alloys & solders, growth in other industrial areas was underpinned by the strength of the manufacturing sector in China, itself a result of booming domestic consumption and surging export demand. In particular, it is of note that silver used as a catalyst in the production of ethylene oxide (EO), used primarily to produce mono ethylene glycol, has improved recently. That said, while China sees an expansion in ethylene glycol plants, the silver oxide required for these sites will continue to be delivered from overseas suppliers, and as such will typically count against Chinese silver industrial consumption rather than its fabrication demand.

#### PHOTOGRAPHY

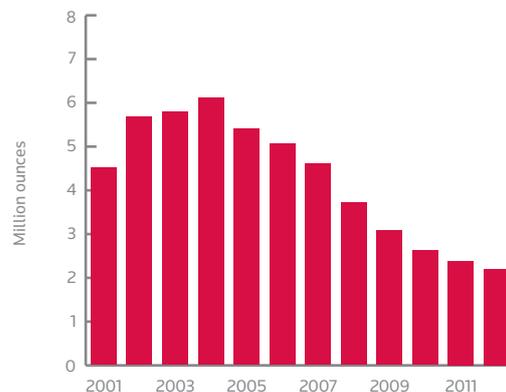
In keeping with trends in photographic demand elsewhere, Chinese offtake in this area has weakened noticeably over the past decade or so. Last year, the use of silver in photography is estimated to have fallen to just 2.4 Moz (74 t) after peaking in 2004 at 6.1 Moz (190 t). In terms of the principal areas of silver-related demand, despite the growing popularity of photo books, we expect to see a further decline in demand for consumer paper due to the growing dominance of both internet-based photo-sharing

and home ink jet color printing. However, one area where the traditional silver-based technology is still used is in the medical sector. In fact, the industry was given a boost with the introduction of China's 2009 healthcare reform plan, which targeted improvements in lower-end rural primary care. Part of these reforms included updating equipment at healthcare facilities and, as a result, there was notable growth in the demand for conventional x-ray technologies in rural areas. However, larger cities have continued to favor digital equipment, where we continue to see a shift away from silver halide-based systems.

While the use of silver-bearing film in consumer applications is on a declining trend, the demand for film in the commercial sector appears to have risen modestly in recent years. Moreover, lithographic applications, used widely in graphic arts and printing operations, remain an area of development with many businesses continuing to adopt silver halide technologies (in sharp contrast to western markets) as the migration to digital is in general regarded as being too costly.

Finally, the Chinese motion picture industry has experienced a period of rapid growth since the government began easing regulations in 2001. In part, the sector has benefited from the expansion in the number of theaters. By the end of last year the number of screens in cities nationwide had exceeded 9,200, while the number of cinemas reached 2,800, due to the expansion in new urban centers across the country. While the vast majority of these new installations boast digital technologies, it is estimated that the more traditional silver halide film was introduced into around 10% of this total.

#### CHINESE PHOTOGRAPHY DEMAND



Source: Thomson Reuters GFMS

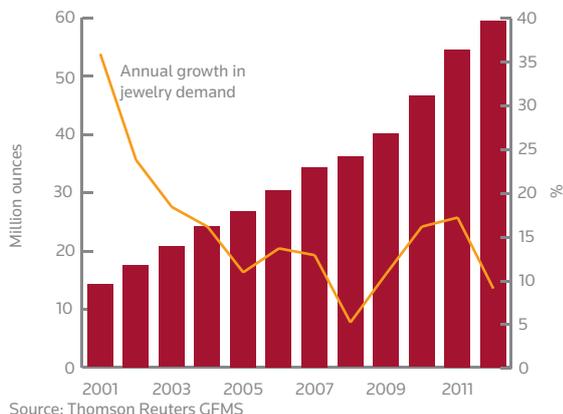
## JEWELRY

Chinese silver jewelry fabrication has undergone a significant metamorphosis over the last decade which has eventually led to the Asian giant becoming the world's largest fabricator. Led by a surging economy, which has delivered average annual GDP growth of over 10% over this period, domestic consumption of silver jewelry has risen sharply. In addition, Chinese fabricators have also invested heavily in technology to build a healthy export trade, dominating the low cost segment, as lower production costs have provided financial advantage over many traditional rivals.

It should be noted that Thomson Reuters GFMS' Chinese estimates for both jewelry and silverware in 2011, and indeed for the back series, have been raised since the publication of *World Silver Survey 2012*. The commissioning of this project has allowed greater focus on the Chinese market and new information unearthed during field research visits this year has necessitated a thorough review of our estimates and calculations. The following analysis is based on these revised numbers.

In 2001, Chinese silver jewelry fabrication totaled 14.1 Moz (438 t). Consumption was dominated by large bulky traditional items that were often basic in design and largely reserved for key celebrations like a births or weddings. Outside rural regions, silver was initially not highly regarded. While silver jewelry (and silverware) has a long tradition in China, it has mainly been in the poorer rural areas of the country that silver has been purchased. Urban Chinese (especially in first and second tier cities) were reluctant to choose silver, preferring gold and platinum jewelry over silver designs.

### CHINESE SILVER JEWELRY FABRICATION



In the period 2001- 2005, annual Chinese silver jewelry fabrication growth averaged a staggering 21%. The fabrication center of Panyu in Guangzhou province as a result grew rapidly as many fabricators (many from Hong Kong) moved their operations to this centralized manufacturing hub. Consumption was growing rapidly, although it was the explosion in exports that was the main contributor to the rise. For instance, exports of silver jewelry to the United States (the largest consuming market) more than doubled during this five year period, while in contrast, shipments to that country from Italy slipped by almost a third.

Chinese fabrication demand during 2006-2011 continued to build as a result of further export gains and stellar growth within the domestic market, with annual growth over the period averaging a healthy 13%. In addition, Chinese offtake continued to benefit from factory relocations from industrialized countries and increasingly from southeast Asian neighbors, attracted by the lower labor and property costs. By 2006, exports to the United States had peaked (after more than 15 years of uninterrupted growth) but they then slipped almost 30% from this point to last year's level, having battled with surging silver prices, competition from other low cost producers, and perhaps more importantly, a US recession, which saw consumer spending fall dramatically. However, while export demand was taking a hit, consumption in China was advancing rapidly as consumers (especially the youth demographic) were attracted by the low entry point compared to the rising cost of both gold and platinum.

Acceptance of silver jewelry as an alternative to its more expensive cousins was initially limited to first and second tier Chinese cities where promotion was greatest. Younger generations have looked to silver (mainly rhodium plated designs) as it provided the "look" of white gold or platinum at a far lower price point. In the last few years, silver jewelry has enjoyed greater exposure across the country's interior boosting the customer base and exposing consumers to the low cost alternative. Chinese fabricators are duplicating popular designs normally found in 18-carat white gold in the more affordable white metal to attract new buyers.

The unparalleled Chinese economic growth that has stimulated urbanization in the last few years is another key reason why silver jewelry demand has continued to soar at such a strong rate. Indeed, rising incomes levels and a rapid expansion of retail outlets across the country help explain the near 17% annual growth witnessed in

both 2010 and 2011 as greater exposure to the metal significantly boosted consumption.

Looking ahead, we expect to see further growth in jewelry fabrication volumes in coming years. Ongoing urbanization should fuel the expansion of retail outlets and lift the exposure of silver as a fashion jewelry alternative. Increased marketing is likely to build awareness and we expect to see greater emphasis placed upon branded products especially in the larger cities where the youth demographic are more brand conscious. Elsewhere, where taste is not as refined, demand for low priced fashion jewelry should continue to drive fabrication volumes higher. Finally, export orders are also likely to pickup with the eventual recovery of western economies which in turn should deliver further gains in Chinese jewelry fabrication for some time yet.

## SILVERWARE

Chinese silverware fabrication has also expanded at a robust rate over the last decade. At just 3.5 Moz (108 t) in 2001, demand has grown at an annual average rate of 11% in the last 10 years, thereby more than doubling to an estimated 8.3 Moz (259 t) last year. This places China as the second largest silverware fabricator globally behind India.

This growth has come at time when silverware demand globally has suffered from a period of long term structural changes, with global consumption of 48.5 Moz (1,510 t) last year almost 60% below the 1997 peak. This secular change has largely been a function of societal changes in India and an underlying shift in purchasing habits in western markets. In China, however, fabrication has benefitted from rising domestic consumption and its lower

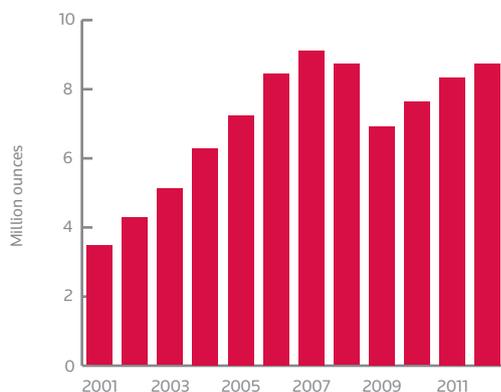
manufacturing and labor costs which have encouraged foreign fabricators in high labor cost regions (mainly in the industrialized world) to relocate to China to gain this advantage. These foreign partnerships boosted exports and introduced new technologies which have seen the quality of finish for Chinese products rise significantly.

In the last few years, demand in key western markets has recorded particularly sharp declines as higher and volatile silver prices have combined with the recessionary economic conditions to curtail discretionary spending. Added to this has been a continuation of societal trends, such as consumers there moving away from formal entertaining and gift giving of silverware as a traditional wedding present. Chinese exports of silverware have been a casualty of these weaker markets with direct shipments from China and via Hong Kong (as the conduit mostly used to ship to international markets) declining as a result.

Nevertheless, and despite the ongoing European economic crisis, Chinese silverware fabrication has managed to rebound strongly in the last few years after losing ground in 2008 and 2009 to record a healthy gain in 2010 and again last year, averaging 10% growth for these years. This positive outcome was in stark contrast to global demand, which retreated 13% and 9% respectively for this period. While exports have picked up from earlier lows it has been the domestic market that has delivered these vigorous gains and is likely to provide the platform for future growth.

Domestic silverware consumption was once primarily driven by demand from regional China where heavy plain traditional items with cultural motives were often given at important occasions (at a birth, for example). These days, however, consumption is being augmented by a rising middle class (a function of the rapidly advancing economy) which in turn has led to greater demand for tableware in urban households and for silver giftware which has grown substantially as the cost of gold items has risen sharply. This giftware segment of the industry has seen rapid expansion in the last two years and is expected, in our view, to continue, delivering further gains in 2012 and beyond. Indeed, Thomson Reuters GFMS forecast that Chinese silverware fabrication will register healthy gains for several years as a robust economic environment stimulates domestic sales among a greater proportion of the population.

### CHINESE SILVERWARE FABRICATION



Source: Thomson Reuters GFMS

## 5. SILVER INVESTMENT DEMAND IN CHINA

Investment demand for silver has posted a spectacular increase in China in recent years. From a marginal player just a few years ago, China has already become the world's leading market for both physical investment and paper trading of silver futures and other similar contracts.

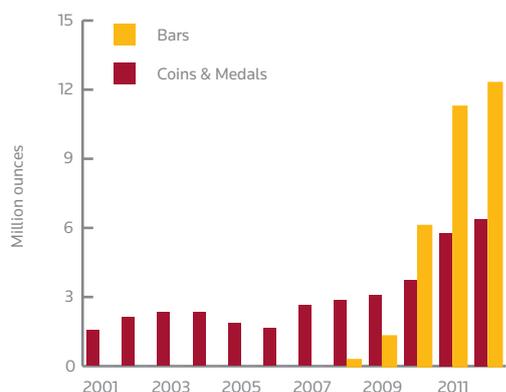
### RETAIL INVESTMENT

The Chinese retail investment market has been traditionally dominated by direct purchases and sales of silver coins, with investment in physical bars only becoming available in July 2009, when restrictions were lifted by the government. Given that silver coins sold in China are generally commemorative in nature and therefore attract a high premium, investment demand, although on a rising trend, has been relatively modest over much of the 2000s. As mentioned above, in July 2009, the country introduced its first ever investment opportunities for silver bullion bars. Since then, bars were introduced in a variety of sizes, ranging from 200g, 500g, 1kg, 2kg through to 5kg, each with a purity of three or four 9s, and all subject to 17% VAT.

The first full year after liberalization of the investment market, net demand for silver bars and coins more than doubled, totaling 9.8 Moz (305 t), equivalent to almost \$200 million. By 2011, these had figures soared to 17.0 Moz (530 t) and some \$600 million respectively. To put this into a wider perspective, Chinese investors last year accounted for 8% of global net purchases of silver bars and coins. Moreover, expectations are that further growth is in the pipeline for the years to come as local savers put their trust in precious metals as a store of value and inflation hedge.

Market liberalization was also accompanied by a massive

#### RETAIL INVESTMENT IN CHINA



Source: Thomson Reuters GFMS

'supply side' expansion in the Chinese precious metals market, gold in particular, with silver being a major beneficiary. The number of local banks active in the domestic market climbed from just four in 2005 to a current total of more than 20. And, each of these banks has increased the number of branches that offer bullion products to the public. In addition, jewelry retailers have also devoted an increasing amount of counter space to so-called 'gift bars' that are sold at higher premium and in some cases have also begun to sell low-margin investment bars to their customers.

Not surprisingly, growth in Chinese silver investment in recent years can only partly be explained by the 'supply side' factors. Critically, these have been supplemented by a major push from the 'demand side'. In short, macroeconomic conditions in China and abroad have encouraged an explosion in local purchases of precious metals. First, China's high household savings rate means that domestic investors have a great deal of cash that urgently needs to find a home. Second, investment options are still rather limited, in part because of still immature domestic financial markets but also in no small measure due to strict foreign exchange controls. Third, more recently two of the most favored destinations for local savings have become less attractive: The property market has been volatile and controls have been implemented to restrain speculation and the stock market has seen heavy losses. Fourth, following the massive liquidity injections in 2009, the last two years saw inflation rise to a worryingly high level even on the official measure that some believe was too conservative. Fifth, interest rates for savers have remained low and, in fact, are close to zero in real terms. And, finally, one should not underestimate the stimulus to investment demand given by a rising trend in the international dollar price of silver, which has only slightly been reduced by the yuan's gains in recent years against the American currency. Meanwhile, silver's impressive price gains and its cheap unit price compared with gold provided a further boost to investor confidence.

Looking ahead, it is probable that physical silver investment demand will continue to flourish in China, at least while the conditions described above remain in place, with this supported by further expansion on the 'supply side' that will improve the availability of bullion products for local investors.

## COMMODITY EXCHANGES

Along with growing physical investment demand, interest in paper products traded on domestic exchanges has also expanded rapidly in recent years. At the moment, there are three exchanges that offer silver trading in China.

### SHANGHAI WHITE PLATINUM AND SILVER EXCHANGE

Following the liberalization of the silver market in China, the Huatong Nonferrous Metal Wholesale Market was given exclusive rights to trade and manage the physical silver market in 2000. In 2003, the Huatong exchange was superseded by the Shanghai White Platinum and Silver Exchange (WPSE), with the latter then becoming the only officially designated silver transaction market in China.

To date, the daily fix price offered by the WPSE has already become a key benchmark for buyers and sellers of silver bullion in China. Although private investors can trade on the WPSE via the exchange's members, our information suggests that the overwhelming majority of turnover on the exchange has been related to commercial activities. This largely explains the relatively modest growth in turnover on the WPSE in recent years, particularly compared with the Shanghai Gold Exchange (SGE) and the Shanghai Futures Exchange (SHFE) where growing investor interest has led to a surge in silver trading volumes.

### SHANGHAI GOLD EXCHANGE

On October 30th 2006, the SGE launched two silver contracts, namely Ag999 physical silver and Ag(T+D) deferred contracts (effectively a futures contract). As can be seen in the chart below, trading on the SGE remained subdued until mid-2010 when silver prices started to climb materially higher. Furthermore, widespread media coverage of precious metals on state run television, rising awareness of silver as an investment tool among

the general public and an increase in the number of commercial banks offering brokerage services were also important to the positive outcome. In particular, silver's greater volatility than gold, but its still close correlation, recommended it to those who regarded silver as a more leveraged alternative to gold.

As a result, daily average turnover jumped tenfold from 2.1 Moz (66 t) in 2009 to 22.5 Moz (700t) in the final quarter of 2010. As prices continued to strengthen, this served to reinforce price expectations, which was reflected in a further lift in SGE trading in the first five months of 2011. By May last year, daily silver futures turnover had, for the first time, exceeded 60 Moz (1,890 t). Despite a major fall in trading volume thereafter, investor interest has remained heightened year-to-date by historical standards. Moreover, as the silver price started to recover from late August onwards, the last few weeks have seen a rapid pick up in silver trading volume on the SGE. Moving forward, as the silver price is expected to post significant gains over the next 12 months or so, this may well stimulate another wave of investor interest on the SGE.

### SHANGHAI FUTURE EXCHANGE

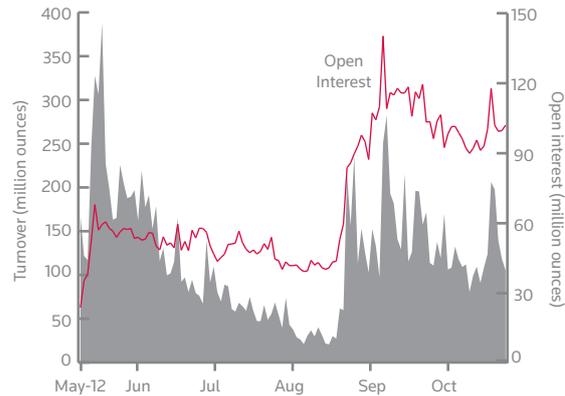
The SHFE launched a silver contract on May 10th of this year, with a standard trading unit of 15 kilograms/lot, a daily price limit of 5% either side of the previous day's settlement price and a minimum margin requirement of 7%. The first five months of operation have proved very successful, as highlighted by total trading volumes of 17,436 Moz (542,306 t) through to end-November. Furthermore, with an average daily turnover of 123.7 Moz (3,846 t), the SHFE has already become an important commodity exchange for silver futures trading on a global basis, only after Comex. Looking ahead, the prospect of further growth in trading volumes on the SHFE remains promising, particularly if the exchange decides to introduce a night trading session.

#### SGE TURNOVER AND OPEN INTEREST



Source: SGE

#### SHFE TURNOVER AND OPEN INTEREST



Source: SHFE

## 6. SILVER IMPORTS AND EXPORTS

As silver recovered from imported concentrates is discussed in detail in Chapter 3 of this report, this chapter will only address Chinese silver imports and exports in the form of bullion and semi manufactured products.

### BULLION IMPORTS AND EXPORTS

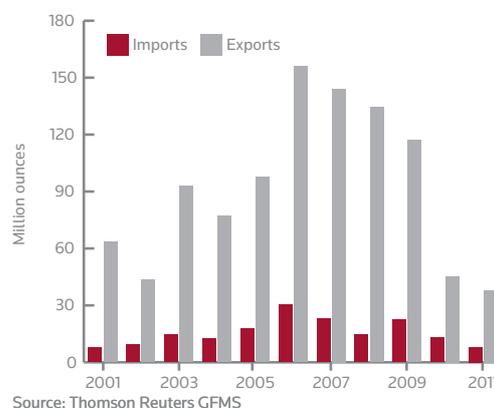
Analyzing China's silver bullion flows in the last decade has been made far easier since the liberalization of the Chinese silver market at the beginning of the 2000s when the government ended its 50-year monopoly on sales and purchases of silver. This change delivered a transparency that previously did not exist, with bullion flows (both imports and exports) often previously opaque due to a lack of reliable data. For instance, in the late 1990s, official metal flows were often accompanied by significant flows of "unofficial" shipments, which made obtaining a clear picture of true demand a difficult assignment. There remains a degree of unofficial flows today, though these have diminished over time.

As illustrated in the chart opposite, Chinese silver bullion shipments have been dominated by exports for more than a decade. The bulk of these exports were recorded as going to Hong Kong, although most of this was destined for re-export purposes, primarily to India and other countries in East Asia such as Thailand, Indonesia and Taiwan. Basis our calculation, official bullion exports rose from below 64 Moz (2,000 t) in 2001 to a peak of over 155 Moz (4,800 t) in 2006. Despite a substantial fall thereafter, bullion exports remained comfortably above 35 Moz (1,100 t) last year.

Interestingly, while China was one of the most important silver bullion exporters to the international market throughout the 2000s, official imports of silver remained an ongoing feature of the market over the same period, albeit of a limited magnitude. This rather curious state of affairs was primarily related to quality issues. In many cases, certain industrial users of silver, especially foreign operations with stringent quality requirements, had to bring metal in despite this being more expensive than sourcing locally in the country.

Looking at the drivers behind the surge in exports from 2002 to 2006, this was initially driven by the liberalization of the Chinese silver market, as a growing number of domestic companies were given the license to export silver bullion, though total volumes were still constrained by an export quota issued by the Ministry of Commerce that was

### CHINESE BULLION IMPORTS AND EXPORTS



reviewed on an annual basis. In 2000, for example, only four exporters were granted export quotas totaling 13.5 Moz (420 t). By 2005, this had grown to 128.6 Moz (4,000 t) via more than 40 exporters.

Furthermore, there is one important allowance to make when assessing the large volume of Chinese silver exports in the middle part of the 2000s. Chinese silver producers and traders holding official export quotas at times enjoyed a 13% VAT rebate based on the value of the silver exported as per the shipping documentation. This incentive was exploited by entities that shipped silver to Hong Kong in order to claim the VAT refund, only for the silver to then be smuggled back to the mainland. This loophole significantly inflated the true export figure for a number of years in the mid-2000s. For instance, Thomson Reuters GFMS estimate that as much as 150-160 Moz (4,670 – 4,980 t) was involved in this activity which thus resulted in an overstating of the true size of Chinese silver exports from 2003 to 2008.

After the VAT rebate was reduced from 13% to 5% in July 2007 and then was eliminated in August 2008, bullion flows from China to Hong Kong dropped dramatically as the incentive to round trip the metal was largely removed. Bullion exports, thereafter, fell considerably, as our estimate shows that volumes totaled 37.9 Moz (1,178 t) last year. Importantly, the demise of the VAT scheme is not the sole driver for the decline in exports witnessed in recent years. Perhaps a greater factor has been domestic prices' persistent premium over international prices, which has reduced the incentive for industry to export. Furthermore,

a rapidly expanding domestic market (for jewelry, silverware, investment and industrial demand) has limited bullion flows out of the country.

Turning to this year, Chinese bullion exports have remained at low levels year-to-date, as weaker silver prices, particularly compared with record highs in 2011, have seen many local silver producers reluctant to sell their silver bullion. To end-October (latest data available) gross exports were down by over 30% year-on-year and are likely to be well below 33 Moz (1,000 t) for the full year.

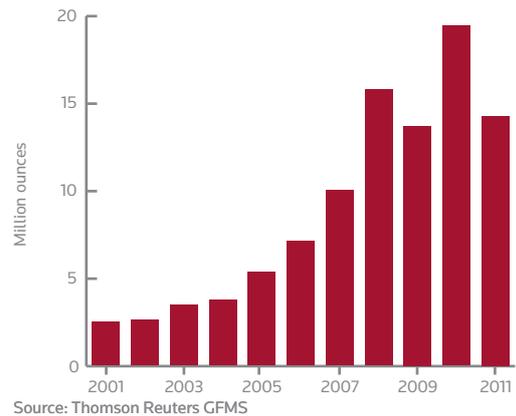
### SEMI-MANUFACTURED AND INDUSTRIAL SILVER SHIPMENTS.

Chinese imports of semi manufactured silver have been increasing over the last ten years as industrial output has continued to expand. Demand for silver used particularly in the area of photovoltaics has seen tremendous growth with a large proportion of the silver powder and pastes used in this burgeoning industry being imported from the US, Japan and Taiwan. Reviewing the Chinese import data confirms this expansion, with silver powder imports a decade ago still comfortably below 2.6 Moz (80 t) (on a calculated basis), gradually increasing in the mid 2000s, and then ballooning to over 19.3 Moz (600 t) in 2010 as fabricators ramped up production aggressively in anticipation of strong demand in 2011.

However, fabrication demand eased back slightly last year (imports of powder slipped to 14.2 Moz (433 t) after the global supply chain was overloaded with excess inventory. The oversupply in the market caused a sharp drop in module prices, which led to several high profile casualties, primarily Western companies that were unable to compete on costs set by Chinese manufacturers. Moreover, despite some attrition domestically Chinese output accounted for almost 60% of global solar cell production last year.

Looking to this year, silver demand for photovoltaic fabrication remains somewhat moribund, largely due to the economic climate in the Eurozone, with demand for finished modules remaining soft. Domestically, demand has remained robust though the decline in exports has been telling, with imports of silver powder from United States (a good proxy for the strength of the industry) weaker by 38% to end-October (the latest available data).

### CHINESE IMPORTS OF SILVER POWDER



Looking briefly at semi manufactured exports of silver (which can take the form of wires, granules, silver plate and semi finished chain among a myriad of other applications), these have also increased substantially over the last decade. Chiefly due to the expansion of the industrial and jewelry trade (both a function of the advancing economy and the massive investment in these sectors) exports of related goods under this tariff have risen in silver content terms from small levels in 2001 to over 6.4 Moz (200 t) at their peak in 2006 according to available trade flow data. Since the peak, exports have tailed off, with the global economic slowdown and associated reduction in demand, impacting on fabrication output. Exports last year slipped below 1.9 Moz (60 t) on a calculated basis after holding steady around 3.2 Moz (100 t) since 2008.

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