WORLD SILVER SURVEY 1996

THE SILVER INSTITUTE

World Silver Survey 1996

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by Gold Fields Mineral Services Ltd, London

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THE SILVER INSTITUTE
1112 Sixteenth Street, N.W., Suite 240
Washington, D.C., 20036
Telephone: (202) 835-0185 Facsimile: (202) 835-0155

PREFACE

The World Silver Survey has been published annually by The Silver Institute since 1990. Copies of previous editions can be obtained by contacting The Silver Institute at the address and telephone number on the front inside cover.

Cover photographs courtesy of Handy & Harman. The background photo is high silver - copper alloy water purification electrodes. The inset shows silver cadmium oxide wire used to manufacture rivets for circuit breakers.

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The data on which this report is based has been obtained by The Silver Institute and Gold Fields Mineral Services from sources which are generally believed to be reliable. However, this does not guarantee complete accuracy in the information presented here. It is in the nature of the precious metals markets that estimates for a number of components must be made on the basis of incomplete information. The opinions expressed here represent those of the authors of the report at the time of writing.

Contents

This is the second survey of the world silver market to be produced for The Silver Institute by Gold Fields Mineral Services (GFMS), which is best known for its annual Gold Survey, now in its 29th year. As with the work on gold, the information contained here is based in part on the analysis of the GFMS database of international trade statistics , company report data and other public domain information. More importantly, it is also based on a series of interviews with the industry's main players which is carried out annually by the GFMS team of analysts and consultants and which provides the essential data to allow reliable estimates for supply and demand to be produced on a worldwide basis. GFMS is grateful to the many miners, refiners, bullion dealers, bankers and fabricators throughout the world who have contributed their time and information to ensuring that the picture of the industry described in this Survey is as complete and accurate as possible.

The vertical lines in the main tables of this Survey represent a break in the statistical series between the post-1989 data researched for the 1995 and 1996 editions and that available in pre-1995 editions for the years prior to 1990. For this reason, as explained in the text, the Summary Table shows as "Other" the estimates of unclassified Western plus estimated communist bloc demand derived from the earlier editions of the Survey.

Gold Fields Mineral Services **May 1996**

GFMS Staff

Stewart Murray	Chief Executive	India, Middle East and South Africa
Philip Klapwijk	Senior Analyst	Northern Europe, North and South America
Tony Sutton-Pratt	Senior Analyst	Mine supply world-wide
Paul Walker	Senior Analyst	Far East and Australia
Philip Newman	Analyst	Coin fabrication demand; Scandinavia
Alan Gibbons	Analyst	Technical aspects of industrial demand

Consultants

Timothy Green	Chief Consultant	Drafting of the text
Madhusudan Daga	Consultant	India
Irena Podleska	Consultant	Southern Europe and North Africa
Deborah Russell	Consultant	International trade flows; by-product analysis

Gold Fields Mineral Services Ltd
Greencoat House, Francis Street, London, SW1P 1DH
Tel: 0171-828 8040
Fax: 0171-233 5096

Units used:
supply and demand data are given
in units of million troy ounces (Moz)
1 Moz = 31.103 t (metric tonnes)
1 tonne = 32,151 troy ounces
1 tonne = 1,000,000 grams (g)

Terminology:

"-" = not available or not applicable
0.00 = zero or less than 0.005
"dollar" refers to the US dollar
unless otherwise stated

1. Summary and Outlook

The verdict on the silver market in 1995 is somewhat complex. The price briefly broke through the $6 barrier for the first time in six years, yet the average London spot price of $5.197 per ounce was marginally below that of the previous year. A five-year decline in mine production was halted with an increase of over 5%. US stocks of silver fell, but European stocks increased, although in Europe a considerable amount is now held on allocated account and is thus not immediately available to the market. Fabrication growth was more marginal at 1%, just reversing the slight decline of 1994, as all three main sectors (industrial and decorative, photography and jewelry and silverware) posted significant increases, offset by a sharp decline in coin fabrication. The best growth was seen in industrial and decorative applications, suggesting that the diverse uses of silver in this sector will be one of the cornerstones of silver demand going into the next millennium.

The resulting "gap" between fabrication and the supply of silver from new mine production and scrap, narrowed slightly compared to 1994, as shown in Figure 1 overleaf but was still the third largest ever. This gap was filled principally by de-stocking, in the form of the implied disinvestment of 123 Moz (3,829 t) shown in Table 1 and, to a lesser extent, by sales from government stocks. The debate on the level of stocks is now crucial to the future of the silver market, as some speculators have been building positions in recent years. The issue is going to be how long they are prepared to retain those positions and whether, if they do, it will drive the silver price towards the $8 price they are thought to have targeted.

The summary of world silver supply and demand shown below encompasses estimates for all significant producing and consuming countries from 1990 onwards. The dividing line between 1989 and 1990 in this table (and in all the other main tables in this Survey) reflects a break in the statistical series. This is because earlier editions of the World Silver Survey showed no estimates of scrap supply and fabrication demand for the majority of the countries

Table 1
World Silver Supply and Demand
(million ounces)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	**1995**
Supply										
Mine Production	420.9	438.9	454.1	468.9	520.1	508.0	482.7	459.4	443.7	**468.8**
Net Official Sector Sales	14.0	20.0	8.3	10.7	9.1	9.6	5.8	12.4	28.8	**26.2**
Old Silver Scrap	142.6	151.1	157.8	149.2	116.6	123.6	129.4	131.9	136.1	**140.8**
Hedging	-	-	-	-	15.2	19.0	1.3	26.7	-	**5.5**
Implied Disinvestment	-	-	-	1.4	40.1	40.5	101.4	138.0	158.6	**123.1**
Total Supply	577.5	610.0	620.2	630.2	701.2	700.7	720.5	768.4	767.2	**764.4**
Demand										
Fabrication										
Industrial & Decorative	140.3	150.0	159.7	173.9	268.5	274.7	267.0	261.6	279.8	**291.2**
Photography	157.8	172.1	185.1	185.9	220.6	216.1	211.6	211.7	215.0	**222.1**
Silverware/Jewelry	68.9	88.6	93.0	118.1	180.4	182.2	209.7	256.7	221.8	**228.2**
Official Coins	23.6	23.2	17.4	18.0	31.7	27.6	32.2	38.0	41.2	**22.9**
Other *	177.7	134.0	142.9	134.3	-	-	-	-	-	**-**
Total Fabrication	568.3	567.9	598.1	630.2	701.2	700.7	720.5	768.4	758.1	**764.4**
Hedging	-	-	-	-	-	-	-	-	9.1	**-**
Implied Investment	9.2	42.1	22.1	-	-	-	-	-	-	**-**
Total Demand	577.5	610.0	620.2	630.2	701.2	700.7	720.5	768.4	767.2	**764.4**
Silver Price (London US$/oz)	5.4645	7.0156	6.5324	5.4999	4.8316	4.0566	3.9464	4.3130	5.2851	**5.1971**

Note: The vertical lines in the main tables of this Survey represent a break in the statistical series between the post-1989 data researched for the 1995 and 1996 editions and that available in pre-1995 editions for the years prior to 1990. For this reason, as explained in the text, the Summary Table shows as "Other" the estimates of unclassified Western plus estimated communist bloc demand derived from the earlier editions of the Survey.

now covered. In particular, there were no estimates for the demand side in either the CIS or China. Thus, to achieve a global supply/demand balance for 1986-90 it has been necessary to estimate total supply in the former communist bloc and subtract known exports to the West, giving implied estimates for fabrication, which are included in the table as "Other" in the pre-1990 period.

Demand

The demand for silver is built on three main pillars which together represent more than 95% of demand: industrial and decorative; photography; and jewelry and silverware; each requiring considerably more than 200 Moz (6,220 t) annually. All three sectors showed some growth last year, while by contrast the small coin fabrication sector suffered a precipitous 49% decline. In fact, both the photographic and the industrial and decorative sectors achieved record levels of offtake last year. Photography, in particular, has recovered from its recession of the early 1990s, and exceeded the previous record offtake of 1990. Silver halide photography looks set for a new lease of life in the form of the Advanced Photo System (APS) launched in April 1996. Inventory building of new film for the APS was one reason for the rise in photographic consumption of silver in 1995. A long-term change is, however, taking place in jewelry and silverware, where the switch from heavy silver tableware to lighter, fashionable modern jewelry continues. This trend is one reason for the decline in recent years of fabrication in Italy, the second largest producer of jewelry and silverware.

India, meanwhile, confirmed its role as the predominant developing world market for silver, importing 81 Moz (2,524 t), of which 62.7 Moz (1,950 t) was used in jewelry and silverware. India's impact on the world market for silver in the 1990s has been remarkable. After a generation in which it was essentially a dishoarder of the metal, often in large quantities, it has imported 405 Moz (12,600 t) in the last six years. Annual demand, at least at present prices, is now well established at 75-100 Moz (2,400-3,200 t) annually. Only two other countries, the United States and Japan, use more silver. Indeed, it is really this sudden arrival of India as a major consumer that has opened up the supply-demand gap. Indian offtake in 1995 was not unduly disturbed by the weakness of the rupee causing a rise in the domestic price in the fourth quarter.

Similarly, demand in Japan continued to grow last year, albeit more slowly than in 1994, due to the general weakness of its economy, the aftermath of the Kobe earthquake, and the strong yen (making its industrial products and film less competitive abroad). Although its industrial demand for silver grew much less than that in the United States, Japan retained its place as the world's largest consumer of silver for industrial applications.

The evolving picture of silver in China and the CIS, is of expanding mine production and fabrication demand in the former, and declining output and demand in the latter. Through rises in mine production, China has achieved virtual self-sufficiency in silver. It will be interesting to see whether the rapid industrialization of its economy results in the country once again having to become a net importer of silver bullion.

The implications of the continued growth of industrial demand for silver and the absence of any significant impact on consumption of the higher price over the past two years point to the main characteristics of silver: its diversity and the uniquely useful range of properties which it offers to a wide range of industries. Thus, in many industries, performance is more important than cost, though this is not to say that demand would be totally resistant to much higher prices, especially in the jewelry and silverware sector. Silver's main asset is diversity of its uses. Thus, while for much of the twentieth century, the basic demand for it was photographic, now its applications are so much more varied, ranging from high technology to every-day consumer goods. It has, in a sense, found a new role, not so much as a precious metal, but as an indispensable one.

Supply

The turnround in mine supply, after five years of decline was partly due to new gold-silver mines coming on-stream (notably Eskay Creek in Canada) and several primary silver mines either have already been or will be reopened because of the higher price. The increase in production in 1995 of 25.1 Moz (780 t) more than matched the growth in fabrication demand causing a modest narrowing of the supply-demand "gap".

Most silver is produced as a by-product of other mining and the long-term future of mine supply is

thus largely in the hands of other metal miners, whose decisions on future projects are rarely driven by the silver price, but by those of copper, lead, zinc or gold. The fact that silver remains overwhelmingly a by-product metal has important implications for investment. An investor who likes silver still has few primary silver mine shares to choose from, compared to the wide choice of internationally traded gold mining shares. Thus, an instinct that the silver price may rise still translates into purchases of the metal (even if this may be via futures or options contracts) thus contributing to the volatility of the price.

Silver producers are showing more awareness of the opportunity to profit from such rallies by hedging some of their output but the proportion of silver hedged as compared with gold remains small. So far, such hedging has had little impact in inhibiting price rallies, or in contributing significant amounts of accelerated supply to the market.

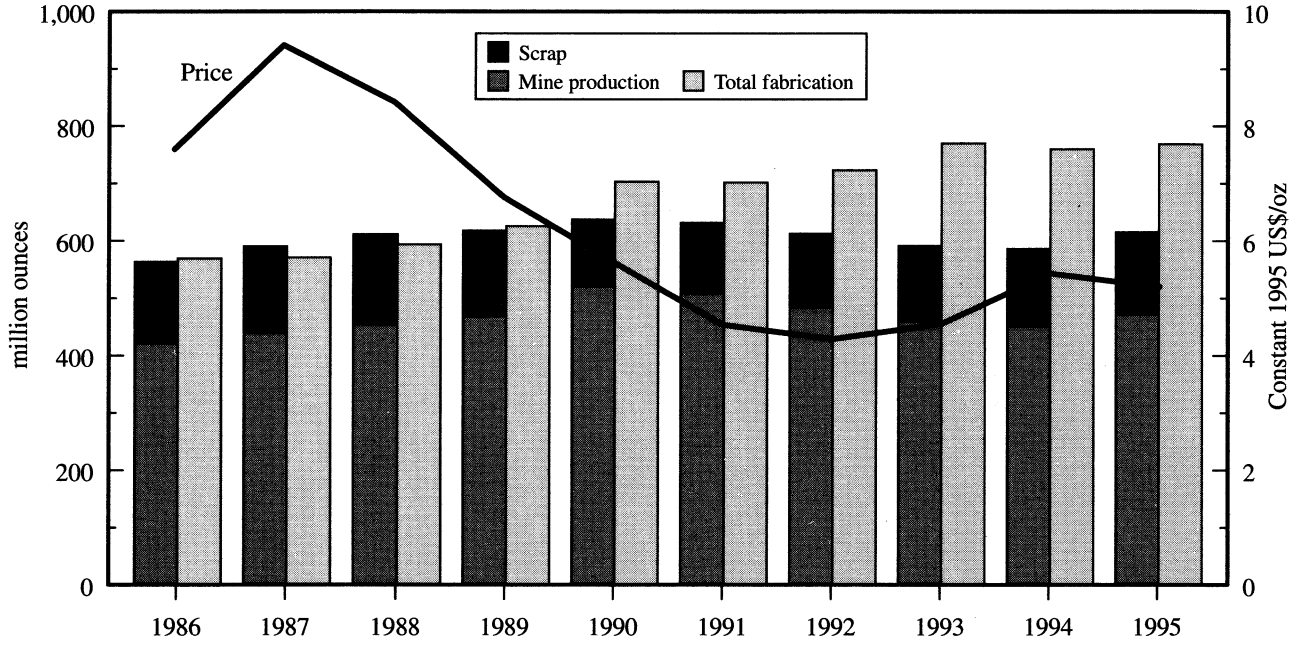
Scrap is an important component of supply, now almost meeting 20% of demand, the bulk of this coming from the efficient recycling of photographic waste. The higher price over the last two years has stimulated a modest rise in scrap levels, but the price would have to move well beyond $6 per ounce to cause any substantial extra recycling of either trade or consumer stocks of silver products.

Outlook

The one certainty in the silver market is that it is having to draw down its stocks each year to meet the supply-demand gap. Although bullion stocks did not decline quite so rapidly in 1995, the remaining stocks in North America and Europe, which are estimated at around 600 Moz (18,000 t) would be sufficient to meet the current supply-demand gap for only another four or five years. And since a part of this silver is held on allocated account, the question arises as to the price at which it might be released. However, there are also unquantifiable private stocks, often held as 100-ounce bars or coin bags by investors in North America, quite apart from metal which could become available on higher prices. There was even a little dishoarding within India last year on higher rupee prices. Thus, the issue is, to a large extent, the attitude of existing or potential investors towards stock levels.

The most important consideration for silver is that even if increasing mine production over the next few years matches any rise in fabrication, the supply-demand balance is likely to require a continuing drawdown of stocks. The silver will have to be found, if fabrication levels are maintained, and that may reveal what stocks are really available to the market as opposed to what can be counted in dealers' vaults.

Figure 1
World Silver Market



2. Silver Prices and Leasing Rates

In May last year, silver broke through the $6 barrier for the first time in six years (if only for a day) although its average spot price of $5.197 per ounce in 1995 was a few cents below the previous year's $5.285. The trading range was wider at $1.62 (against $1.11) reflecting a more active, volatile market in which leasing rates became an important element. The high of $6.0375 was reached on 5th May, just nine weeks after the low of $4.4160. Since then, the price has remained above $5, as did the annual average in 1994 and 1995, in marked contrast to the 1991-92 period when it languished in a range of $3.50-$4.50.
The silver price not only fluctuates throughout trading hours but different prices are quoted in different markets. There are three primary price references:
***London** spot price, based upon the daily London silver fix at 12.15pm, which is used for the price comparisons in this Survey;*
***Comex** spot settlement price in New York;*
***Handy & Harman** price, which has been a North American benchmark for over a century, is the daily silver cash quotation accepted by many commercial users.*

Silver Prices in 1995/96

The price performance during 1995 (see Figure 2) eventually proved much more positive than the early signs had suggested. Spot silver in London opened the year at $4.8415, having fallen by 14% in the last quarter of 1994, and by 2nd March had slipped further to $4.4160, the low for the year, before staging one of those spectacular rallies for which the metal is so famous, going easily through the $5 level on 31st March (a jump of $0.40 that day) to reach $6.0375, the year's high, on 5th May, a rise of over 36% in just nine weeks. Leasing rates also shot up to over 100 basis points in the early stages of the rally on initial fears of a squeeze.

While the price rise resembled superficially the surge in the second quarter of 1993, when all the precious metals showed similar trends, this one was very much a silver phenomenon. It was widely credited to the operations of a single New York operator, acting on behalf of a syndicate which had already been one of the driving forces in silver since late 1993. However, the rally swiftly burned out. The price had retreated to $5.3275 within ten days and by early July was threatening to go below $5 again, just holding above this level, at $5.0300, on 1st August.

Figure 2
London Silver Market: Spot Price, Daily
US$/oz; other currencies reindexed to 3rd January 1995 = 100

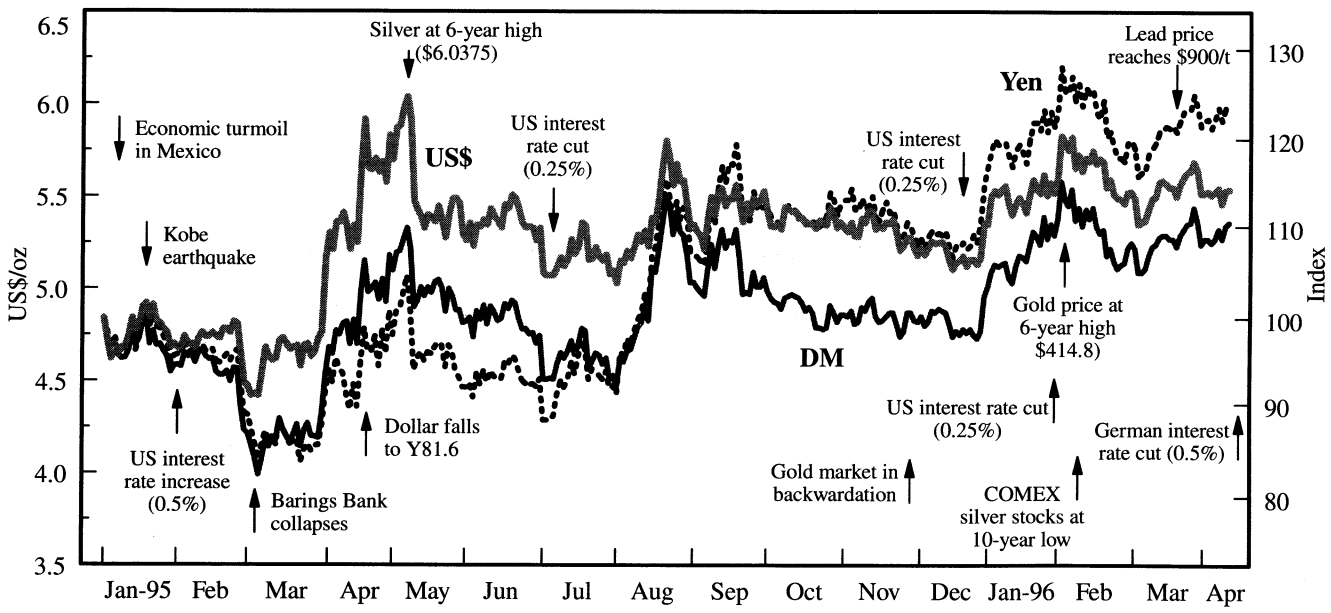
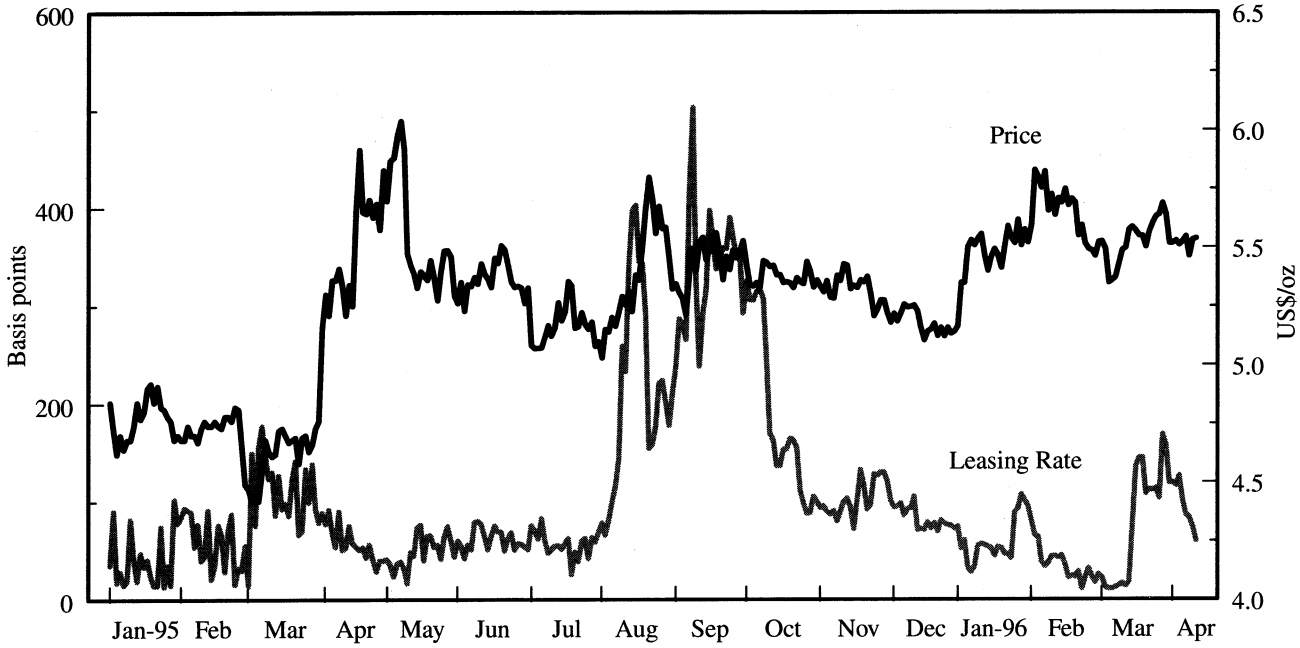


Figure 3
London Silver Price and Leasing Rates



Thereafter it took off once more to reach $5.7985 three weeks later, fueled by a squeeze in London, where stocks of readily available spot silver were becoming depleted, pushing leasing rates to record levels. In the previous decade, the 3-month leasing rate had averaged only 8 basis points and seldom exceeded 50, highlighting the exceptional nature of the levels reached in August and September, which averaged 216 and 338 basis points respectively. These rates prompted the shipment of much silver from the United States to London (77 Moz being exported in the second half of 1995). This did not ease the pressure as rapidly as might have been expected, because much of the metal shipped to London was held on allocated account. It was thus not available to the market and leasing rates maintained relatively high levels for the rest of the year, as shown in Figure 3. By December, the 3-month rate was on average only just below the 100 basis point level, which would have been considered an unimaginably high level just over a year earlier. Nevertheless the falling lease rate was accompanied by a modest decline in the spot price in the final months of the year. The reason seems to be that although dealers were aware of a substantial operator in the market playing a long-term strategy to lift the price, they did not follow suit by accumulating and maintaining their own large positions, but preferred instead to profit from the volatility. They argued that the carrying costs of silver were too great to hold the metal on balance sheet unless an upward move of at least $1 to $2 per ounce could be expected: if only 50 cents is in prospect, they prefer to buy volatility through options. The momentum of the rallies in 1995 as in 1993, could therefore not be maintained, as often happened in the 1980s when dealers were more willing to climb aboard, thus broadening and extending a price surge (as happened in 1987 on the run to $11 per ounce).

Thus the price drifted downwards in a range from $5.40 to $5.10 in the fourth quarter, ending the year at $5.1420. The attention, meanwhile, had switched to gold, where the leasing rate in turn had reached record levels in late November with its price starting to move up. Once into the New Year, silver followed in gold's wake (having been the leader for much of the two previous years), to peak at $5.8275 on 2nd February 1996. The gold rally, however, was short-lived and, although silver followed it back down, with the price falling to $5.3500 by 5th March, thereafter it was silver that again took on a life of its own, helped by disappointment with gold and increasing tightness of supply that once again sent lease rates surging and the price through $5.50.

The future course in 1996 is likely to depend in a large part on the interplay between the regular needs of the market for physical silver and the determination of the speculative syndicates to stay with their allocated holdings, especially if they perceive, as the year progresses, that silver may have difficulty in achieving a sustained break above the $6 level. In short, how long are they prepared to wait?

Price Volatility

The pattern of price volatility during 1995 and early 1996, as shown in Figure 4, reflects the renewed speculative activity in silver that has been apparent since 1993 after several years of a relatively quiescent market. While the most dramatic period was from 3rd March to 5th May when silver rose by $1.62 and then fell back $0.70 within ten days, short rallies of $0.80 have become quite common. This restlessness in the price is a magnet not only for short-term speculators, but for syndicates playing a longer game, who are constantly offered lows to consolidate their positions. Thus, the opportunities for accumulation provided by the higher volatility of the last three years is creating one of the most interesting scenarios in silver since the late 1970s. The question is whether, at the upper price levels, the temptation to take short-term profits neutralizes the impact of the longer-term plays.

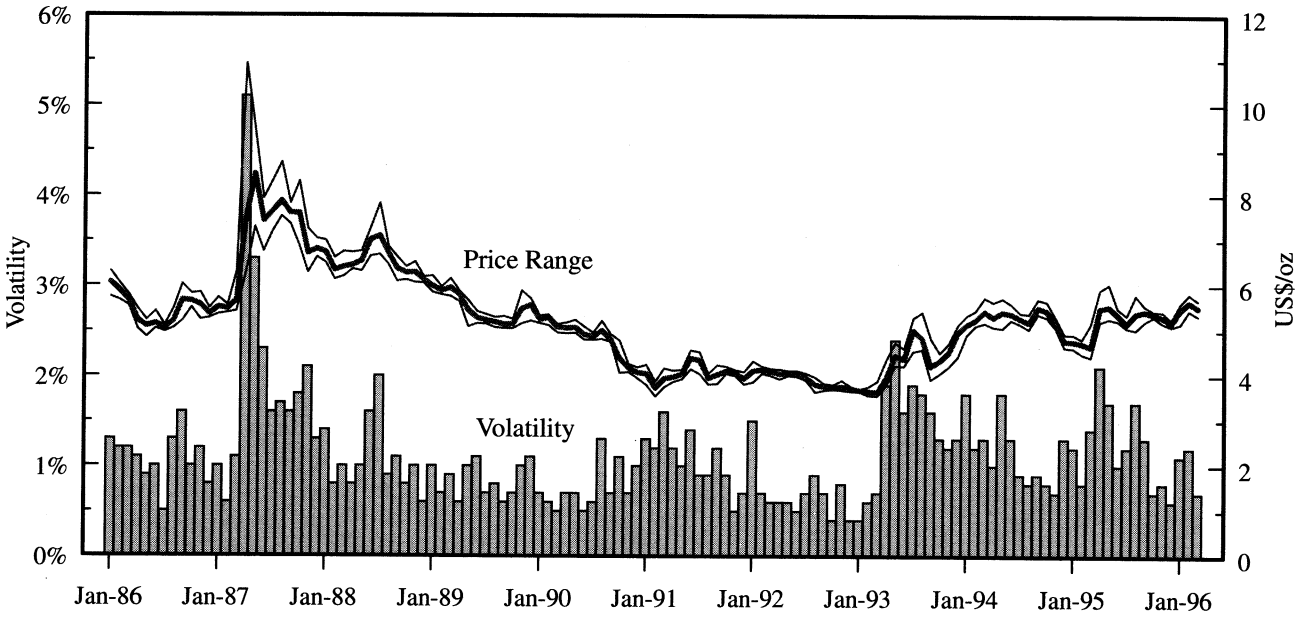
Leasing Rates

As mentioned earlier, leasing rates became an important factor in the silver market last year and an early warning signal of price movements. The most widely quoted leasing rate, and the one which is analyzed here, is for three months. Dealers also quote overnight and one month rates, but these are usually particular to each and may vary reflecting their own short-term positions. Last year, leasing rates were far more volatile than the price itself, with the three-month rate lifting off from its established 30 basis point level in December 1994 to reach 168 points on 7th March, just four days after the silver price began edging up from its low for the year, reflecting the beginning of the squeeze that took silver to its high of just over $6 in early May. Although the rates had eased somewhat by then, they remained at historically high levels through the summer, before soaring to 399 basis points on 15th August and 503 on 8th September, as the market reacted to suggestions that readily available stocks in London were depleted. The premium in London available over the price

Figure 4

Silver Price Volatility in US Dollars

(ratio of mean daily change to monthly average)



quoted in New York plus the attraction of high rates brought substantial exports of silver from the United States to Europe but did not really defuse the rates until late October, mainly because much of the silver moved to Europe was kept as allocated metal and was thus not available for lending. Certainly by early 1996, although stocks in European vaults were much higher than a year earlier (see Chapter 5), so much was allocated that dealers reported difficulty in obtaining the high quality metal demanded especially by the photographic industry. By mid-March 1996, the leasing rate for 3-month silver was back at 144 basis points.

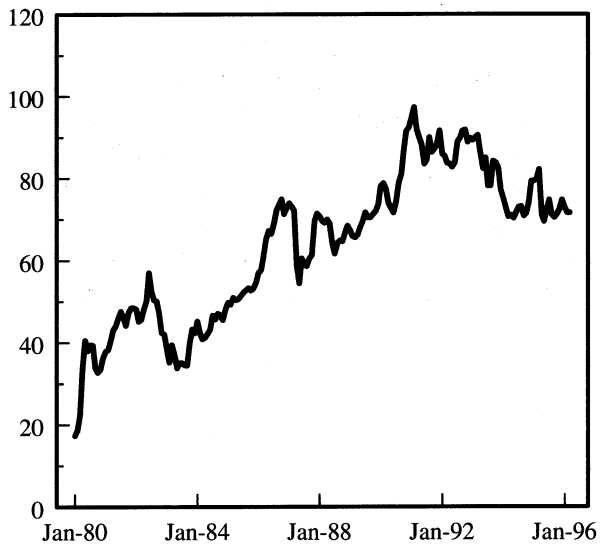
The dynamics which determine silver's leasing rate are different from gold, where central banks are the prime lenders and producer hedging is extensive, representing a substantial and growing demand for borrowed gold. Central banks do not (with rare exceptions) have silver in their reserves and silver mines hedge much less. The balance of supply and demand for borrowed silver is between the changing needs of speculators going long or short and, as is becoming apparent, the determination of some speculative syndicates to keep metal allocated and thus not available to the lending pool. Furthermore, the higher rates of the last year have encouraged many potential lenders to hold out for higher rates: expectations have been raised.

Caught up in all this excitement is the regular borrower of silver, the refiner or fabricator, who has found that the carrying costs of his inventory have risen. The new leasing rate levels affect everyone in the industry.

Gold/Silver Ratio

The gold/silver ratio remains a barometer of changing speculative attitudes to the two metals, even though there is no fundamental reason for the relationship (as there was when both were monetary metals and the ratio of 15:1 was maintained in Europe until the late 19th century). As shown in Figure 5, during the past 15 years, the ratio has moved over the whole gamut of its history, from near the lows of 18:1 in January 1980, as silver prices sky-rocketed, to the highs of 100:1 in February 1991, as the silver price reached the lowest level for nearly twenty years. During 1995, the ratio fluctuated considerably from 85:1 on 2nd March (the silver price low for the year), before declining to 66:1 a few weeks later, easing to 76:1 by July, tightening to 66:1 again by mid-August and thereafter tracking in a band close to 70:1. While the ratio's importance should not be over-emphasized, its recent decline is a reflection of the more consistent level of interest in silver by longer-term speculators.

Figure 5
Gold/Silver Price Ratio
(calculated from London monthly average prices)



3. Silver Bullion Trade in Regional Markets

The pattern of trade through the key regional markets of Dubai and Singapore is changing as more silver goes directly to India from Europe rather than via these centers. Dubai's imports in 1995 were 43 Moz (1,340 t), 44% below the 1993 level; Singapore's imports, at 29 Moz (890 t) were the lowest since 1991. But India's official imports were 75 Moz (2,340 t) much of which can now by-pass the regional markets. Hong Kong's official imports rose 32% to 6.4 Moz (200 t) but were partially offset by sharply lower unofficial imports from China. Japan's imports also increased, due to concerns about domestic smelter output.

Silver imports into **Dubai** declined for the second year in succession, falling to 43 Moz (1,340 t), well below the record level of 76.8 Moz (2,388 t) set in 1993. This reflects the radical change brought about in Dubai's business (and, to a lesser extent, in Singapore's) by the liberalization of the Indian market in 1993 and by a similar relaxation in Pakistan in 1995. Consequently, more silver has been shipped directly from Europe to India and, since early 1995, to Pakistan, although much of this may still be financed by Dubai traders. The change has been accelerated by the wider use of Special Import Licences (SILs) for Indian imports. In 1993, silver was hand-carried into India by Non-Resident Indians (NRIs) who could each take 100 kg (3,200 oz) with them and Dubai merchants provided an essential service by packing and delivering the silver to the airport for them. Under SILs large consignments of silver go direct to Bombay (and increasingly Ahmedabad) by air from London and Switzerland. Thus, the crucial link that Dubai has provided in the silver trade with India since the mid-1960s (on exports from India originally and imports in the 1990s) is gradually being substituted by more formal types of trade. But almost as a habit, traders in Europe still send containerloads of silver to Dubai even though, by the time they arrive, there may be little demand for them in India (as happened towards the end of 1995 when Indian prices were rising and demand was weak). Thus, Dubai finished the year with at least 2.5 Moz (80 t) in stocks. While India is still the main client, close to 3 Moz (100 t) went to Pakistan last year, and small amounts are shipped to other centers in the Middle East though this is small compensation for the decline in Dubai's traditional role as the entrepôt for India.

Indian Silver Price

Looking back at the development of the Indian silver market in the last few years, the first thing to remember is the extraordinary nature of the business in 1993 - the year that saw the market being supplied with a significant amount of official imports for the first time in a generation. The surge of imports that year represented somewhat of a glut in supply which contributed to the Indian price falling by almost 20% year-on-year. In 1994, although Indian silver prices showed little movement during the course of the year, the average price was more than 11% higher than the depressed level of 1993. By contrast, the average silver price in Bombay in 1995 was only 0.3% higher at 6,864 rupees per kilogram.

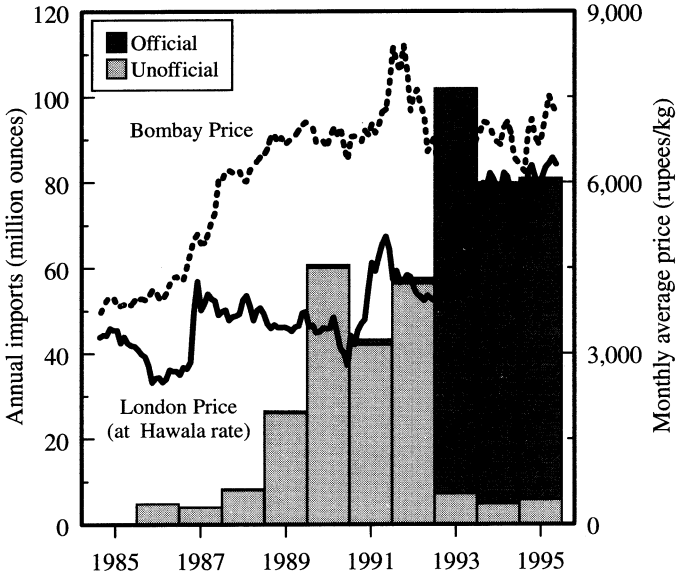
Annual Average Silver Prices in London and Bombay

Bombay Silver Price	**1991**	**1992**	**1993**	**1994**	**1995**
Average (rupees/kg)	6,993	7,580	6,163	6,846	6,864
Year-on-year change		8.4%	-18.7%	11.1%	0.3%
High	7,937	9,390	7,040	7,346	7,646
Low	6,480	6,250	5,463	6,350	6,030
London Silver Price					
Average (US$/oz)	4.06	3.95	4.31	5.29	5.20
Equivalent (rupees/kg)	3,729	4,171	4,790	5,910	5,981
Bombay: London	188%	182%	129%	116%	115%

This modest year-on-year rise, compared with the corresponding marginal fall of 1.7% in London, was entirely due to the weakening of the rupee against the dollar which occurred from August onwards. As the above table shows, the premium of the Bombay price over London (measured at the unofficial or *hawala* exchange rate) actually fell in 1995 to 15%. In fact, during the year, the premium reached the lowest level seen in the past decade - namely the March average of 11.6%. Nevertheless, during the course of 1995, the movement of the Indian price was much more dramatic than the figures suggest. Indeed, between the first and last months of the year, the price rose by 14%, in the process reaching 7,646 rupees in mid-October, the highest level since September, 1992. Part of the rise last year was simply a reflection of the international market where, although falling year-on-year, the price managed to rise by nearly 9% during the course of the year. In summary, the explanation for the disparate price trends between India and the

world market in 1994 and 1995 was that the price in India was held back in 1993 and 1994 by the increased supply of silver from official imports while in 1995, the greater rise in India in spite of the fall in London was due to the weakening of the rupee against the dollar. The combined effects of exchange rates and import liberalization on Indian silver prices can be illustrated by comparing the Bombay and London prices over the past four years with imports, both official and unofficial.

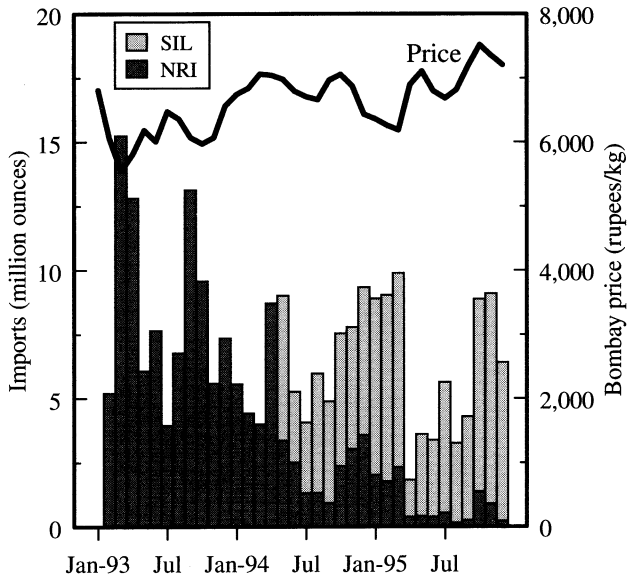
Figure 6
Indian Silver Prices and Imports



Moving into this year, with its renewed surge in the first 6 weeks of 1996, the price reached 8,436 rupees in early February before a rather spectacular collapse as world prices receded and the rupee strengthened again. However, to put this price into historical perspective, it needs to be adjusted for inflation, which remained stubbornly high in India, at around 10%, until mid-1995. Thus, in real terms, the February 1996 high was well below the average price of early 1994 and represented only 65% of the real price in 1989, which, in constant 1995 money, was 12,211 rupees per kilogram. Looking at the 1995 average price, the contrast is even starker - in real terms, the average price last year was the lowest since 1978. The main point of these comparisons is to indicate that in the past six years silver has looked increasingly cheap in India, especially as the process of economic reform has increased prosperity and spending power across the whole range of social and economic groups which constitute the demand side of the silver market.

The pattern of Indian imports has changed dramatically since the trade-liberalizing measures implemented under the Congress government from 1991 onwards. For silver, the first major development was the permission granted in February 1993 for returning Non-Resident Indians (NRIs) to import personally up to 100 kg (3,200 oz) of silver, at a duty of 500 rupees per kilogram. The following year, the authorities decided to bring in an additional official import facility to put silver imports onto an even more formal basis. Known as the Special Import Licence (SIL) scheme, this was introduced in May, 1994 and allowed the holders of these licenses to import a wide range of formerly prohibited goods, including precious metals. For silver, the most important aspect of the SILs is the market premium at which they trade, since this represents the main cost for importers using the scheme. For most of 1995, the overall cost of using NRIs was greater than for using the SIL scheme and, as a result, the proportion of NRI silver fell to only 14% of total official imports, as shown in Figure 7, with SIL imports by contrast surging to 63.6 Moz (1,978 t). This graph incidentally shows both the seasonal influence on the Indian market (the annual dip in imports in July as the marriage season ends with the onset of the monsoon) and the short-run price sensitivity of demand (eg the

Figure 7
Official Indian Imports (NRI and SIL)



fall in imports in April, 1995 with the sudden surge in the price).

The switch from NRI to SIL was already under way in mid-1994 but during the past year, the ratio between the two methods of import has moved steadily in favour of the SILs.

Indian Silver Bullion Imports (Moz)

	1991	1992	1993	1994	1995
NRI	0	0	93.4	43.6	10.7
SIL	0	0	0	30.4	63.6
Replenishment	1.2	1.4	1.5	1.1	0.9
Sub-total - official	1.2	1.4	94.9	75.1	75.2
Unofficial (incl. seizures)	39.0	53.1	7.7	5.0	5.9
Total	40.2	54.5	102.6	80.2	81.2

The explanation appears to be that with the narrowing of the Bombay premium (combined with the cost of carrying silver, via baggage, 100 kilograms at a time) the economics have increasingly favoured the more commercial shipments possible under SILs. The introduction of Special Import Licences opened up the Indian market to direct imports from a number of suppliers, principally from Switzerland. Direct European shipments to India (essentially zero in 1993) were 20 Moz (633 t) in 1994 and 36 Moz (1,129 t) in 1995. The 'replenishment' imports also shown refer to a longer-standing scheme for official imports of silver against exports of jewelry.

In January 1996 the list of goods that could be imported under SILs was considerably widened. These changes may have important implications for the future pattern of imports of silver.

However, imports were only part of the overall supply of silver to India last year. Another significant change was a sharply increased flow of domestic silver stocks into the local market. This took four forms:

(i) the sale by the Bombay customs (mostly in the second half of the year) of some 11 Moz (333 t) of metal previously seized from smugglers;

(ii) an increase in the recycling of old silver scrap, to around 6 Moz (180 t) concentrated in the second half of the year;

(iii) some dishoarding of silver bars purchased by investors in recent years; and

(iv) a further small sale of Mint silver stocks.

Together, these domestic sources added nearly 22 Moz (700 t) to domestic supply, easily the highest level during the past decade. Thus, although imports supplied an almost unchanged quantity of silver over the past two years, total supply absorbed by the market increased by 6% between 1994 and 1995.

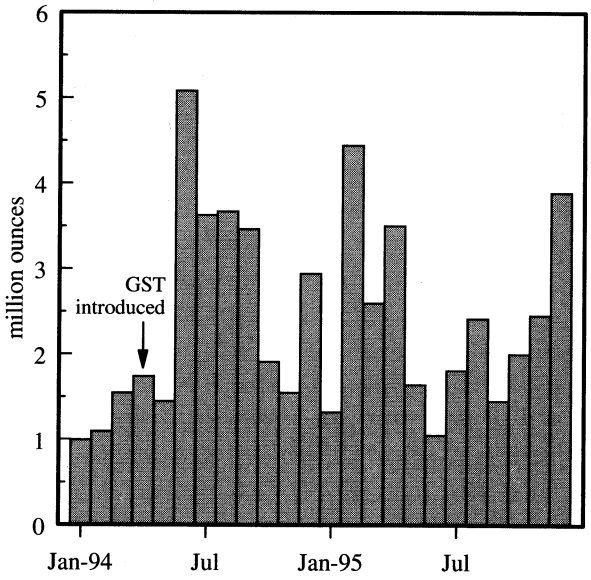
Other Regional Flows

The industry in **Thailand** was also helped in 1995 by further reduction of import duties (which began in 1994), so that bars and grain now attract a tariff of only 1% (compared with 15% on bars and 35% on grain prior to October 1994). The business is now more open and official, as in India after liberalization. More silver is being imported directly, especially from Australia, although most still comes in via Singapore.

As shown in Figure 8, imports of silver in to **Singapore** fell last year. The annual total, 28.6 Moz (890 t) was the lowest level since 1991.

Figure 8

Singapore Silver Bullion Imports



This reflects changes in India and Thailand, the two main countries which in the past were primarily supplied via unofficial channels originating in Singapore. There is very little fabrication in Singapore itself and re-exports to Malaysia and Indonesia are much more modest. Re-exports to India were at their peak in 1992/93 just before the liberalization of imports when Singapore was a

convenient entrepôt for unofficial supplies. Since India opened up in 1993, increasing amounts of silver have been sent there directly from Europe, especially since the Special Import Licence scheme was introduced. Similarly, with Thailand having reduced import duties on silver, less of its requirements are being met via Singapore. Even so, Thailand remains the prime destination for re-exports, but as its fabrication of silverware and jewelry has declined, so have its imports.

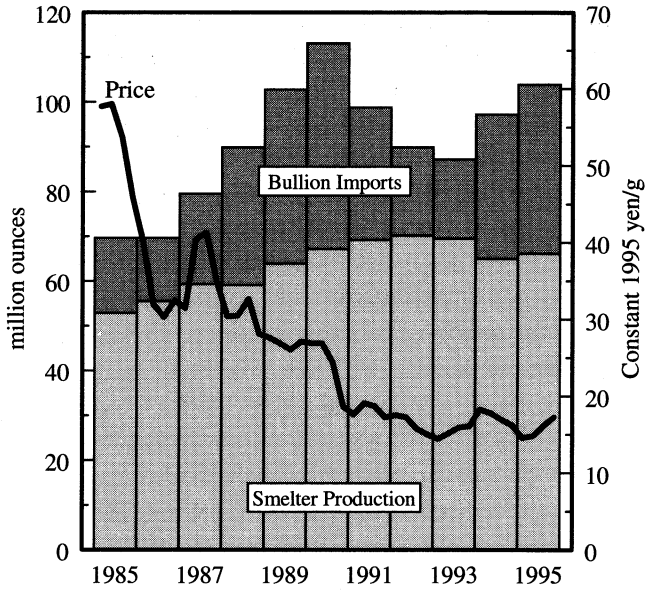
The overall fall in Singapore's silver trade (down from peak imports of 81.3 Moz (2,528 t) in 1993), coupled to the introduction of Goods and Services Tax (GST) resulted in some traders exiting the business, selling off their stocks in 1994 and early 1995. However, the final months of 1995 saw a net build-up in inventory, at least in part involuntary in nature as demand from the Indian sub-continent fell. The future of Singapore as a re-export center for silver will depend very much on the tariff policies of its neighbors.

Hong Kong retains its special role both as a user and as a regional distribution center of bar silver and specialized products. Although the 35% rise in official imports of bar silver and grain overstates the changes in the market in 1995 because they were offset in part by sharply lower unofficial flows out of China, re-exports to the region, including to joint ventures on the mainland, did pick up in 1995. Flows of bullion and specialized products into China are a reflection of the close working relationship that exists between the mainland and Hong Kong, with manufacture being undertaken in part or entirely in China on behalf of Hong Kong fabricators.

The official bullion imports include 0.5 Moz (16 t) from China and there may also have been some unrecorded shipments, although quantities are much less than in previous years, reflecting rising silver demand in China and the more realistic price now being paid to domestic suppliers on the mainland. Some of the silver from China is fabricated into silver potassium cyanide in Hong Kong and then sent back for use in plating, demonstrating the integration of much of the business. Silver is also re-exported in modest amounts to the Indian sub-continent, South Korea and Thailand.

Japan's imports of silver bullion increased for the second year in succession in 1995 due in part to uncertainty early in the year as to whether domestic smelters could maintain their former contribution to supply.

Figure 9
Japanese Silver Smelter Production and Bullion Imports



Total imports were 37.8 Moz (1,177 t), but nearly 40% of this came in during the first two months. In fact, Japan imported over 20 Moz (622 t) - much of it from the United States - in the three months December, 1994 - February, 1995 after concern about the smelter output first arose. This created a local premium, as it was feared that not enough high quality 999 fineness silver would be available to meet the requirements of photographic manufacturers (for whom the local smelters often produce close to "five nines" fineness silver).

In the event, smelter output of silver recovered last year, despite the closure of one lead smelter in 1994 and the difficulties faced by the local smelters, who rely on imported base metal concentrates for 60% of their feed, due to the strong yen. Silver output from imported ores actually rose slightly to 39.2 Moz (1,221 t) due to increased by-product silver from copper smelting, which more than off-set the decline from lead and zinc smelting.

Once the perceived threat vanished, imports slowed dramatically, falling to only 9.6 Moz (300 t) in the second half of the year. The more traditional pattern of imports merely supplementing the silver from smelters appears to have returned.

4. Mine Supply

World mine production rose, for the first time in five years, to 469 Moz (14,580 t). This improvement of 5.6% on 1994 was due mainly to growth in North America. Elsewhere silver output was relatively flat, with small increases in Asia and Latin America being offset by declines in Africa, Europe, the CIS and Australia. Supply remains dominated by by-product output which accounts for 84% of the total (slightly more than in 1994).

Silver mine production, encouraged by better prices, moved into a new phase in 1995, reversing the decline in output of the previous five years. This was the result of the opening of new mines, such as the gold-silver operation at Eskay Creek in Canada, as well as the re-opening of some primary mines which had been closed for several years. In Peru, for instance, output from primary mines now accounts for 28% of production, compared to the world average of 16%. Last year's expansion was most notable in Canada, where output rose by 15 Moz (466 t), an improvement of 63%. The prospect to the year 2000 is not only of other primary mines, such as the Coeur and Galena mines in the United States, coming back into production, but of new gold-silver mines in Indonesia and elsewhere helping the renaissance of production.

The table below reveals that among the top ten producing countries, eight recorded rises in 1995:

Top Ten Silver Producing Countries in 1995
Million ounces
(1994 figures in brackets)

1	(1)	Mexico	74.7	(71.2)
2	(2)	Peru	61.4	(56.0)
3	(4)	United States	49.8	(47.6)
4	(3)	CIS	45.2	(48.2)
5	(9)	Canada	38.8	(23.8)
6	(6)	Chile	33.5	(31.6)
7	(7)	Poland	31.6	(27.6)
8	(5)	Australia	29.6	(33.6)
9	(8)	China	27.0	(26.5)
10	(10)	Bolivia	11.9	(11.3)

The situation was even more positive among the top ten silver producing companies listed below: all, except MIM Holdings in Australia, increased output in 1995 (estimates have been made in a few instances where precise data is not available). What this top ten list also highlights is that silver mining is much less internationalised than gold. That is to say the silver production is mainly derived from the home countries of the producing companies.

Top Ten Silver Producing Companies in 1995
Million ounces

	Company	Country	1994	1995
1	KGHM	Poland	27.0	31.0
2	Peñoles	Mexico	27.0	29.7
3	Noranda	Canada	13.0	15.7
4	Centromin	Peru	14.0 (e)	14.7 (e)
5	Echo Bay	Canada	10.4	11.9
6	MIM Holdings	Australia	14.2	11.6
7	Frisco	Mexico	10.0 (e)	11.0 (e)
8	IMMSA	Mexico	10.7	10.8
9	Prime Resources*	Canada	0.0	10.0
10	Buenaventura	Peru	7.7	9.1

* Homestake owns 50.6% of Prime Resources

Figure 10 shows the production from the world's largest silver producing mines in 1995. The graph also indicates the amount of silver derived from each type of mine.

Any analysis of silver production requires, of course, an understanding of base metal mining, because so much of it is derived as a by-product of these operations.

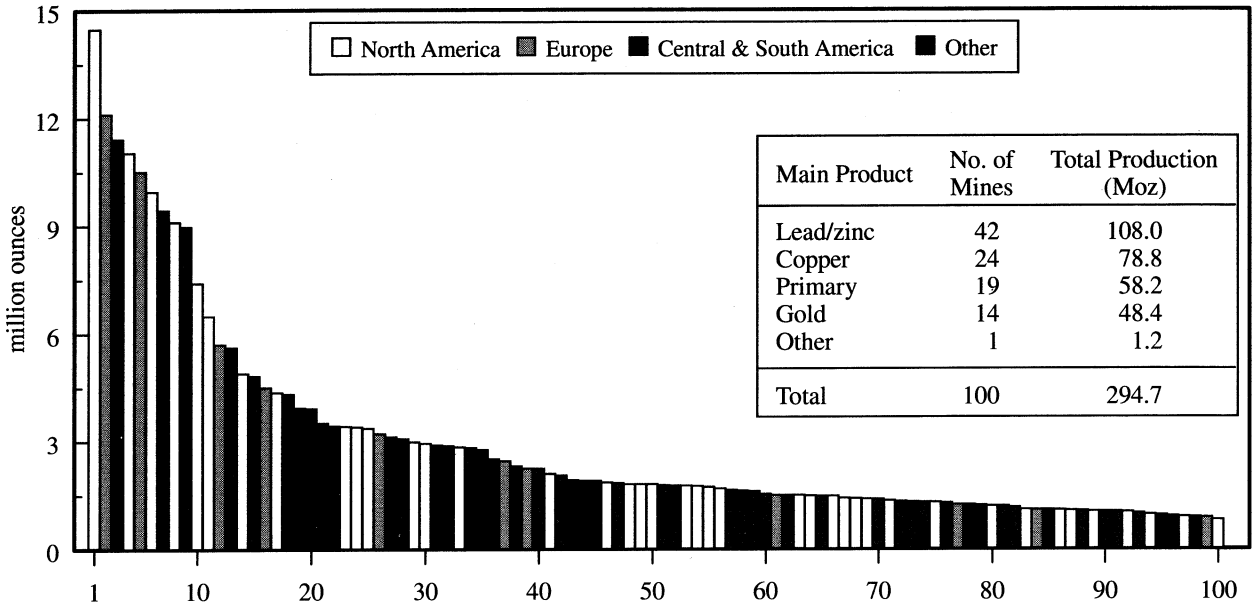
In last year's Survey the sources of by-product silver were examined in detail for the first time. This year the study has been repeated and widened to include several countries and operations for which there is no information in the public domain. The results of this analysis are described at the end of this chapter and are summarised below.

World Mine Production of Silver by Source
(million ounces)

	1991	1992	1993	1994	1995
Primary	96.5	75.4	71.6	76.0	75.1
By-product	411.5	407.3	387.8	367.7	393.7
Total	508.0	482.7	459.4	443.7	468.8

The main conclusions are that only 16% of silver came from primary mines in 1995, the rest being a by-product of other metal mining operations, with copper, lead and zinc mining providing no less than

Figure 10
The World's 100 largest Silver-producing Mines
(excluding CIS and China)



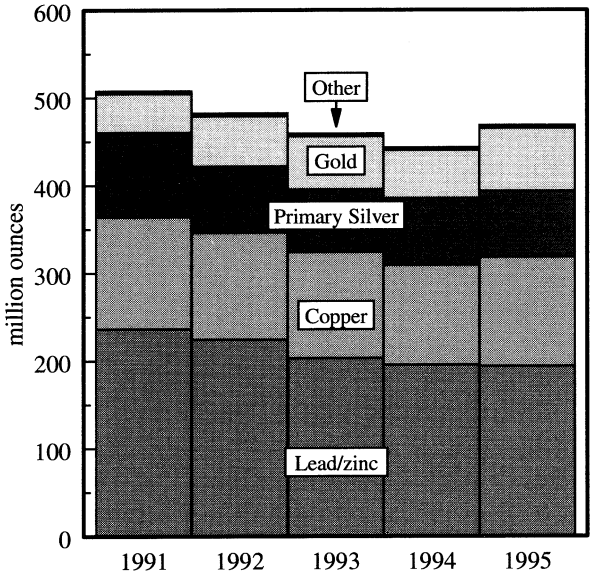
Main Product	No. of Mines	Total Production (Moz)
Lead/zinc	42	108.0
Copper	24	78.8
Primary	19	58.2
Gold	14	48.4
Other	1	1.2
Total	100	294.7

68% of silver mine production.

The same data are shown graphically in Figure 11 which emphasizes the importance of the copper and gold mining sectors to by-product silver in 1995.

The classification of the by-product source in the above is not necessarily as simple as might appear. For the most part, mines have been classified according to the metal which provides the principal source of revenue. However, in some cases adjustments have been made. The most obvious example is the Mount Isa complex of mines in Australia, where copper is the main source of revenue, but most of the silver is derived from the lead-zinc mines - hence the mine has been reclassified as a lead-zinc operation.

Figure 11
World Silver Mine Production



The most significant change between the figures for 1994 and 1995 is the increases in by-product from gold operations. This rise is almost entirely accounted for by the start-up of two new mines, Eskay Creek in Canada and Mount Muro in Indonesia which together produced about 13.5 Moz (420 t).

Although the rise in silver production from base metal operations was relatively modest last year, its significance lies in this being the first increase for several years. The recovery in base metal prices since 1993 has been one of the reasons behind this increase.

North America

A further revision to the historical series for **Mexican** mine production has been made this year. Despite the country being the world's largest producer, obtaining comprehensive and reliable statistics for the entire industry on a company-by-company or mine-by-mine basis remains difficult.

Table 2
World Silver Mine Production
Million ounces

	1986	1987	1988	1989	1990	1991	1992	1993	1994	**1995**
Europe										
Poland	26.65	26.72	34.18	34.00	26.75	28.90	25.66	29.42	27.63	**31.64**
Sweden	7.55	8.52	7.20	6.10	7.19	8.13	9.06	8.92	8.10	**8.04**
Spain	5.56	6.88	7.30	7.09	7.40	7.50	7.50	5.88	5.63	**5.14**
Romania	0.74	0.64	0.69	0.67	1.93	1.61	1.54	1.45	1.35	**1.43**
Bulgaria	2.32	2.48	2.73	3.05	3.40	1.90	2.70	3.10	1.80	**1.40**
Portugal	0.18	0.12	0.12	0.12	1.36	1.37	1.23	1.16	1.02	**1.24**
Serbia	5.70	4.86	4.47	4.28	3.39	2.96	2.57	0.81	0.90	**1.00**
Finland	1.19	1.42	1.00	1.00	0.93	0.96	0.87	0.94	0.84	**0.87**
Greece	1.73	1.67	1.98	1.67	2.01	2.26	1.96	1.90	1.44	**0.64**
UK & Ireland	0.26	0.23	0.18	0.23	0.37	0.36	0.42	0.42	0.56	**0.44**
Italy	0.58	0.45	0.51	0.51	0.45	0.44	0.39	0.16	0.44	**0.44**
Czech Republic	1.06	1.10	1.13	1.10	0.84	0.90	0.64	0.50	0.40	**0.30**
Norway	-	-	-	-	0.27	0.30	0.33	0.22	0.24	**0.17**
France	0.83	0.83	0.68	0.63	0.67	0.89	0.43	0.38	0.09	**0.11**
Germany	2.20	2.31	1.93	2.00	0.26	0.23	0.06	0.06	0.06	**0.06**
Denmark	0.39	0.40	0.46	0.47	0.31	0.00	0.00	0.00	0.00	**0.00**
Total Europe	56.93	58.62	64.54	62.90	57.52	58.70	55.35	55.31	50.50	**52.92**
North America										
Mexico	69.40	69.80	70.00	70.00	78.86	73.43	67.44	68.66	71.20	**74.73**
United States	34.22	39.80	53.40	60.80	68.32	59.42	58.00	52.89	47.58	**49.83**
Canada	34.98	38.10	44.10	41.30	44.41	40.55	37.58	28.27	23.80	**38.78**
Total North America	138.60	147.70	167.50	172.10	191.58	173.39	163.02	149.81	142.58	**163.34**
Latin America										
Peru	59.92	63.60	47.70	56.80	61.97	67.08	53.62	53.72	56.00	**61.35**
Chile	16.08	16.07	16.30	17.70	21.05	21.74	32.95	31.19	31.60	**33.49**
Bolivia	3.06	4.57	7.23	7.72	11.46	12.08	10.14	10.70	11.32	**11.94**
Argentina	2.13	1.90	1.61	1.55	2.66	2.25	1.46	1.37	1.22	**1.29**
Honduras	1.75	0.74	0.80	0.80	0.99	1.38	1.14	0.78	0.87	**0.80**
Dominican Republic	1.32	1.15	1.40	0.70	0.74	0.70	0.43	0.54	0.30	**0.67**
Brazil	1.91	1.97	2.25	2.06	1.10	1.00	0.68	0.67	0.58	**0.51**
Colombia	0.19	0.17	0.21	0.22	0.21	0.26	0.27	0.24	0.19	**0.16**
Ecuador	-	-	-	-	0.02	0.02	0.15	0.19	0.94	**0.02**
Other	0.05	0.05	0.04	0.04	0.07	0.09	0.12	0.13	0.13	**0.15**
Total Latin America	86.40	90.20	77.54	87.58	100.26	106.59	100.95	99.51	103.15	**110.38**
Asia										
Indonesia	1.37	1.53	1.99	2.01	2.12	2.51	3.22	2.89	3.11	**7.63**
Japan	11.31	9.03	8.10	5.01	4.82	5.49	5.50	4.40	4.29	**3.22**
Iran	-	-	-	-	1.22	1.53	1.93	1.61	2.09	**2.30**
Papua New Guinea	1.80	2.00	2.10	1.97	3.42	4.00	3.07	3.09	2.50	**2.12**
Turkey	0.29	0.28	0.51	0.51	0.90	1.30	2.51	2.31	2.15	**2.08**
India	1.14	1.22	1.32	1.29	1.13	1.11	0.85	1.66	1.62	**1.36**
Philippines	1.69	1.64	1.76	1.85	1.45	1.15	0.91	1.04	0.97	**1.05**
Saudi Arabia	-	-	-	-	0.48	0.46	0.49	0.53	0.53	**0.55**
Malaysia	0.45	0.50	0.64	0.64	0.40	0.43	0.49	0.45	0.43	**0.36**
Thailand	-	-	-	-	0.46	0.55	0.17	0.09	0.12	**0.23**
Arabian Gulf States	-	-	-	-	0.10	0.09	0.13	0.09	0.15	**0.14**
Burma, Laos & Cambodia	0.44	0.40	0.38	0.32	0.23	0.23	0.25	0.16	0.18	**0.14**
South Korea	2.58	2.82	1.57	2.76	0.53	0.10	0.15	0.09	0.06	**0.03**
Pakistan & Afghanistan	-	-	-	-	0.00	0.00	0.00	0.00	0.00	**0.01**
Taiwan	0.41	0.37	0.27	0.27	0.13	0.00	0.00	0.00	0.00	**0.00**
Total Asia	21.47	19.80	18.63	16.62	17.39	18.94	19.65	18.41	18.19	**21.21**

Table 2
World Silver Mine Production
Million ounces

	1986	1987	1988	1989	1990	1991	1992	1993	1994	**1995**
Africa										
Morocco	1.57	4.30	7.27	8.30	5.92	6.62	4.69	7.59	8.33	**7.07**
South Africa	6.88	6.47	6.21	5.83	5.07	5.43	5.77	6.18	6.11	**5.66**
Namibia	3.98	3.33	3.47	4.44	2.99	2.96	2.88	2.31	2.07	**2.23**
Zimbabwe	0.84	0.82	0.90	0.77	0.68	0.62	0.54	0.39	0.35	**0.37**
Zambia	0.84	0.96	0.94	0.89	0.60	0.46	0.59	0.58	0.35	**0.25**
Zaire	1.50	1.40	1.40	1.50	2.70	1.89	0.95	0.35	0.03	**0.03**
Other	0.17	0.18	0.18	0.18	0.30	0.36	0.34	0.34	0.35	**0.36**
Total Africa	15.78	17.45	20.36	21.90	18.25	18.33	15.76	17.72	17.58	**15.97**
Oceania										
Australia	32.89	35.91	35.82	37.30	37.71	37.94	39.16	37.04	33.59	**29.57**
New Zealand	0.04	-	0.06	0.16	0.28	0.36	0.73	0.84	0.76	**0.95**
Fiji	0.02	-	-	0.03	0.03	0.02	0.03	0.04	0.05	**0.06**
Total Oceania	32.94	35.91	35.87	37.48	38.01	38.31	39.91	37.91	34.39	**30.58**
Western World Total	352.12	369.69	384.46	398.61	423.02	414.29	394.66	378.69	366.43	**394.42**
Other Countries										
Soviet Union/CIS	64.00	64.40	64.50	64.70	71.99	66.81	60.94	53.15	48.19	**45.16**
China	3.21	3.21	3.50	4.00	22.64	24.63	24.63	24.91	26.52	**26.95**
North Korea	1.60	1.60	1.60	1.60	1.60	1.60	1.70	1.80	1.70	**1.70**
Mongolia	-	-	-	-	0.90	0.67	0.76	0.84	0.88	**0.61**
Total Other	68.81	69.21	69.60	70.30	97.12	93.70	88.02	80.69	77.29	**74.42**
World Total	420.93	438.90	454.06	468.91	520.14	507.99	482.68	459.38	443.72	**468.84**

The situation is further clouded by a certain amount of cross-treatment of material among the major mining groups. Nevertheless, the new series more accurately reflects both the level and trend in Mexican silver production over the past six years and shows that after falling in the early 1990s, the country's silver production started rising again in 1993. Last year saw a continuation of this trend with silver output increasing by 5% to 74.7 Moz (2,323 t).

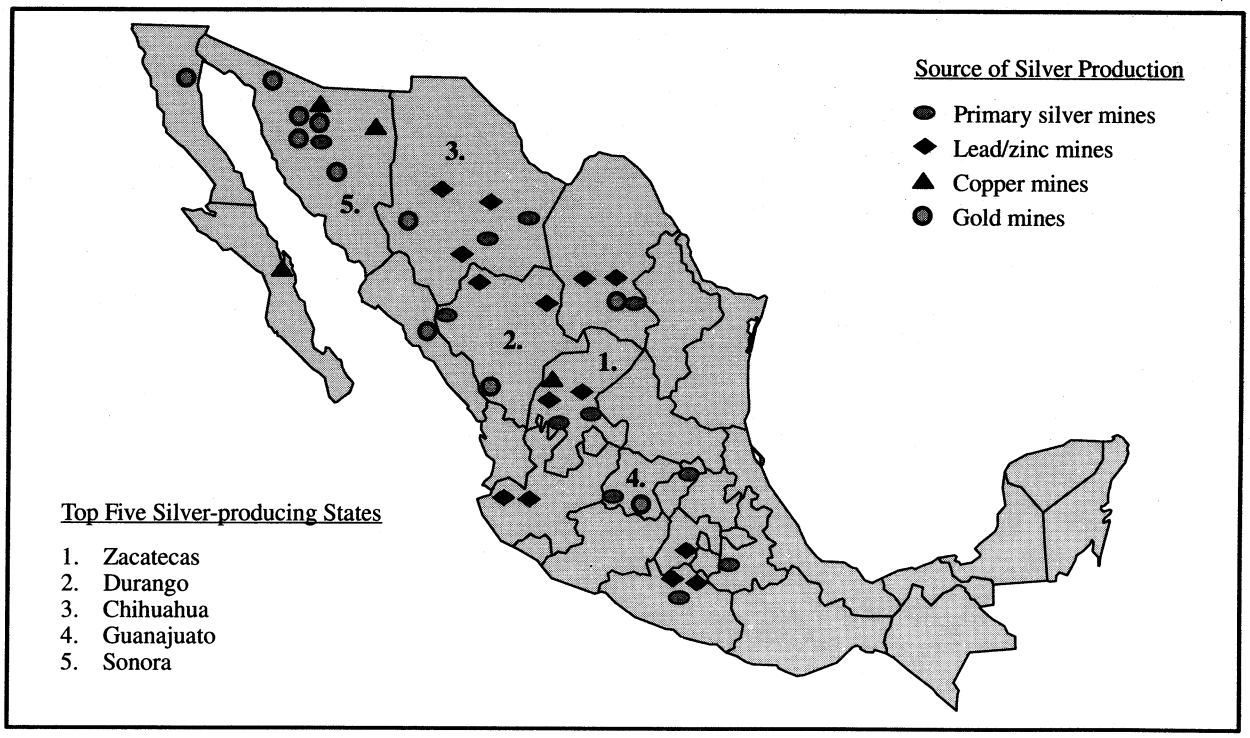
There are a number of reasons for the higher production. In the first instance, the improved base metal prices (as well as silver prices) of the past two years have led to an increase in output from the base metal and to some extent the primary silver sectors following some rationalization in the early 1990s. The Real de Angeles mine, for example, a major producer of both lead and silver, was forced to close in 1993 due to low metal prices, but re-opened a few months later following some modifications to the treatment plant.

Secondly, some new base metal operations have come on-stream over the past two years. For instance, the lead-zinc-silver Tizapa mine situated south-west of Mexico city, a joint venture between Peñoles, Dowa Mining and Sumitomo, which opened in late 1994 and produced nearly 1.5 Moz (46.6 t) of silver last year.

Thirdly, there has been considerable activity in the gold sector, with both local and foreign companies developing new mines, principally in the northern parts of the country. Although, in most cases, the silver by-product from these new gold operations is relatively modest, some mines do produce significant amounts of silver. For example, Frisco's San Felipe mine in Baja California and Luismin's Guitarra operation each produced around 0.5 Moz (16 t) in 1995.

Finally, the much improved local silver price resulting from the substantial devaluation of the peso has led to slightly higher output from the small mining sector. However, the lack of finance for most of the small operators has meant that total production

Figure 12
Major Silver Mining Areas in Mexico



from this sector remains far below the levels of a few years ago.

Figure 12 shows the principal areas in which silver is mined in Mexico. Zacatecas remains by far the largest producing state, mainly as result of Peñoles's Fresnillo mine, which currently accounts for over 19% of the country's silver output.

After four years' decline, silver mine production in the **United States** increased by nearly 5% in 1995 to 49.8 Moz (1,549 t). Marginally higher silver output was recorded from the primary, and all by-product sectors.

In Nevada, the largest producing mine in the country, Echo Bay's McCoy/Cove mine saw output increase by 1.5 Moz to nearly 12 Moz (373 t). However, reserves at the mine are rapidly being depleted and mining operations are expected to cease in 1999, although after this the company will treat stockpiled ore for another three years. Silver production reached record levels at Coeur d'Alene's Rochester mine, rising 9% to 6.5 Moz (202 t), while the third of the large silver producers in Nevada, Kinross's Candelaria mine, saw output slip back marginally to just below 3 Moz (933 t).

Silver production also rose in Idaho due to higher levels from the two primary silver mines, DeLamar and Lucky Friday. The state's output was further boosted by the first full year's production from Hecla and Great Lake Mineral's Grouse Creek mine which yielded some 0.7 Moz (22 t). However, the deposit has not lived up to expectations and the companies are currently reassessing the ore reserves and drawing up a new mine plan.

Elsewhere in Idaho, the improvement in the silver price since the low point in 1992 has enabled the Sunshine mine to announce a return to full production, having curtailed operations in the early 1990s. This should add another 1-1.5 Moz to annual silver output.

A major development early in 1996 was the announcement that Silver Valley Resources, a company jointly held by Coeur d'Alene and Asarco, would reopen the Coeur and Galena mines. These primary silver mines have been on standby for the past few years as a result of low silver prices. Annual production from these operations is forecast to be 3 Moz (93 t) per annum, although higher silver prices could lead to an increase in output, together with the development of the adjoining Caladay property.

Another reopening prompted by higher prices, in this case of both silver and zinc, is the Green's Creek mine in Alaska, a joint venture between Kennecott and Hecla. The mine has been idle since 1993 but production is scheduled to recommence in early 1997 and is expected to yield around 10 Moz (311 t) per

annum which, with the decline in output from the McCoy/Cove mine, will make the operation the largest producer in the United States.

Silver production in **Canada** jumped sharply higher in 1995, rising 63% to 38.8 Moz (1,207 t). All the by-product categories of silver mine production in Canada recorded increases last year, the greatest increase being in silver derived from gold mines. In fact, the only group to record a decline in output was the primary sector, as a result of the closure of Canada's only remaining primary operation, the Equity Silver mine, in January, 1994.

The most startling development was the nearly nine-fold increase in silver from gold mining operations. This was mainly, but not entirely, due to the first year's output from the Eskay Creek gold-silver mine which produced almost 10 Moz (311 t) in 1995, making it the sixth largest producer in the world.

Elsewhere in Canada, the rises in silver output from the other by-product categories were more modest and reflected higher base metal production last year. This trend could well continue over the next couple of years as the improvement in base metal prices has led to a number of companies considering the possibility of re-opening mothballed operations.

Central & South America

After relatively modest increases over the past few years, **Peru**'s silver production increased by almost 10% in 1995 to 61.4 Moz (1,910 t). The improved economic and political situation in the country is the main reason for this strong performance. Although GDP growth slowed somewhat last year, following the near 13% increase in 1994, economic conditions are still very favorable and local companies have taken a more positive attitude towards the future and are thus willing to commit funds to refurbish existing operations or develop new deposits.

Looking at the figures in more detail reveals that the primary silver producers have been the main contributors to the rise in production, particularly the mines managed by Buenaventura and the Hochschild group. Primary silver mines now account for around 28% of the country's output, up from around 22-23% in 1992 and 1993. Higher silver by-product has also stemmed from increased production of copper, lead and zinc in Peru last year.

Chilean silver production rose 6% last year to 33.5 Moz (1,042 t). Copper production increased by about 9% with the corresponding silver by-product being around 12% higher. Although the biggest producer of silver in the country, the silver-gold La Coipa mine recorded a fall in output, silver by-product from the gold mining sector was in fact up marginally on levels of a year ago, partly helped by the start-up of the Fachinal gold-silver mine in the fourth quarter.

Elsewhere in the region, production showed little change on 1994 levels.

Asia

The sources of **Chinese** silver production have changed significantly over the past decade, with a growing proportion of output coming from primary silver mines and a much reduced proportion coming from copper by-product. This has not, however, prevented silver output from being constrained by lower by-product production in 1995.

China had a target for increasing silver production by around 4.5% in 1995, but it appears as if growth of less than 2% or 0.4 Moz has been achieved, bringing total production to 27.0 Moz (838 t). Output growth was affected by a variety of factors, the most important being the drop in base metal mine production and the decline in smelter output of base metals (from both domestic and imported concentrates).

In 1995, lead and zinc mine production fell (by around 14% and 25% respectively) while copper increased only marginally. The fall in lead and zinc production and hence silver by-product production was compounded by the fact that the silver content of copper concentrates has been falling (for instance, the huge Diaxing open-pit copper operation has produced lower silver content concentrates in recent years). The decline in smelter output of silver was further compounded by a reduction in the import of concentrates for both copper and zinc, although lead smelter production did increase to offset these changes to some extent.

Rises in silver production from primary sources and as by-product from gold mining (which together account for around 25-30% of silver production) more than compensated for the shortfall in base metal by-product production. Primary production and purchases of both silver and gold (and consequently silver by-product) have risen since August 1994 when

the People's Bank of China raised its official buying prices. The buying price for silver was raised by 80% to 1,330 yuan per kilogram (approximately $4.91) in an attempt to prevent unofficial flows out of the country, primarily to Hong Kong. The price increase succeeded in increasing official purchases at the expense of unofficial flows and had the added effect of stimulating both primary and by-product silver production

In 1995, in response to the appreciation of the yuan against the US dollar, the official purchasing price was reduced by 4.5% in the fourth quarter to bring prices back in line with the US dollar prices. It is unclear at this stage if the price reduction has had much of an impact on the purchases of the People's Bank. However, any impact is likely to be short-lived as the pool of silver that the People's Bank can buy from increases as new silver and lead, zinc and gold deposits with silver by-product come on-stream.

Indonesian silver production more than doubled in 1995 to reach 7.6 Moz (263 t). This remarkable performance was in part due to higher by-product output from Freeport's giant copper-gold Grasberg/ Ertsberg mine, but the more important factor was the start-up of Aurora Gold's Mount Muro mine. This gold-silver operation, which opened at the end of 1994, produced nearly 3.5 Moz (109 t) of silver in 1995, far exceeding earlier forecasts. The outlook for Indonesian silver production looks very promising as, apart from further increases from the Freeport mine, there are a number of other deposits such as Way Linggo, Rawas and Batu Hijau which are expected to be developed in the near future. Furthermore, the country is currently favored by mining companies following a spectacular gold discovery in Kalimantan last year. Consequently, foreign mining companies are committing a considerable amount of exploration expenditure towards many areas of Indonesia.

Silver production from **Papua New Guinea** fell for the second consecutive year, dropping to 2.1 Moz (65 t) in 1995, due to the continued decline at the Misima mine.

An estimate of 0.6 Moz (19 t) has been made for silver production in **Mongolia** in 1995. Silver is derived principally as a by-product from the Erdenet Russian-Mongolian joint venture which mines the copper-molybdenum deposits in the north of the country.

Among the other medium size producers in the region, the **Philippines** was the only country to show higher levels of silver production. Elsewhere, there were declines in **Japan**, **India** and **Turkey**.

Africa

Silver production in Africa declined by 9% in 1995 to 16.0 Moz (504 t).

Morocco, remains the largest producer, despite the 15% fall in silver output due to lower copper production. **South Africa** also suffered a decline, reflecting both the 10% fall in the country's gold production, as well as a drop in silver by-product from the Black Mountain lead-zinc-copper mine. Silver production in the rest of the continent remains at very low levels reflecting the lack of development in the region.

Europe

European production has been relatively flat over the past six years, with 1995 output 4.8% higher at 52.9 Moz (1,646 t).

The region's output is dominated by **Poland,** where silver production rose nearly 15% to 31.6 Moz (984 t). KGHM Polska Miedz, which is the largest producer of silver in the world, operates four large underground copper mines, Lubin, Polkowice, Rudna and Sieroszowice which work the rich copper-silver deposits in the south-west of the country. The material is then treated in three of the company's four copper smelters: Legnica, Glogów I and Glogów II, the fourth smelter treats scrap and secondary materials.

Swedish silver mine production continued the trend of the past two years with a slight decline to 8.0 Moz (249 t).

Oceania

Australia's production fell 12% in 1995 to 29.6 Moz (921 t), the lowest level for more than a decade. Much of this decline resulted from the 2.5 Moz (78 t) drop in output from the country's largest producer, MIM's Mt Isa mine in Queensland. This fall was due to production problems at the lead-zinc mines together with a lengthy industrial dispute, which eventually culminated in the mine having to close for a short period in May, 1995. The dispute at the mine has now been settled and most of the production issues addressed. Consequently, silver output has risen somewhat, but is still well below the

levels of a few years ago. Reserves at the mine, as well as at MIM's Hilton mine, are being rapidly depleted, although the decline in the company's silver production has been mitigated by the opening of the McArthur River lead-zinc-silver mine in the Northern Territory. When full production is reached, the mine is expected to yield around 1.6 Moz (50 t) per annum. In addition, some replacement silver production could be provided from the George Fisher zinc-lead-silver deposit, situated to the north of the Hilton mine, where a feasibility study is currently being undertaken.

There are a number of other deposits which might come on-stream in the near future including CRA's Century zinc deposit and East Coast Mineral's Elizabeth Hill project in Western Australia, which is one of the few primary deposits in the country. However, as mentioned in last year's Survey, the real boost to Australian silver production will come from the Cannington deposit in Queensland. BHP are the sole owners of this project, after MIM relinquished its option to purchase a one-third stake in the venture. This lead-zinc-silver deposit is being developed as an underground mine with production scheduled to commence in late 1997. At the proposed treatment rate, the company is forecasting about 24 Moz (747 t) of silver per annum which would make it the largest silver producing operation in the world.

CIS

The CIS remains as one of the most difficult regions for which to estimate silver output. While fairly reliable figures are now published for the Russian gold industry, no such numbers are released for silver. However, our evidence points to a continued fall of around 6% in the region's silver output to 45.2 Moz (1,406 t).

The major part of this fall in silver output is accounted for by the drop in **Russia**'s production. Financial problems continue to plague what used to be the country's largest single producer, the Dukat silver mine in Magadan. Reports suggest that mining and milling activities dropped to very low levels in 1995. An attempt to privatize the mine earlier in the year ran into difficulties and events were further hampered towards the year-end by a strike in protest over both the privatization plans and wage arrears. Although production from the operation is currently minimal, there appears to be no doubt that the deposit is both rich and still contains substantial silver reserves (perhaps representing as much as two-thirds of the Russian total reserves).

Elsewhere in Russia, silver is derived from the lead-zinc and copper mining industries whose production is also believed to have fallen in 1995. Silver is also obtained as a by-product of the Noril'sk copper-nickel mine in northern Siberia where production appears to have stabilized, with a slight rise in output reported in 1995, following a period of several years' decline.

Kazakhstan's silver output is estimated to have fallen marginally in 1995, reflecting the slightly lower levels of lead and zinc production.

Production Costs

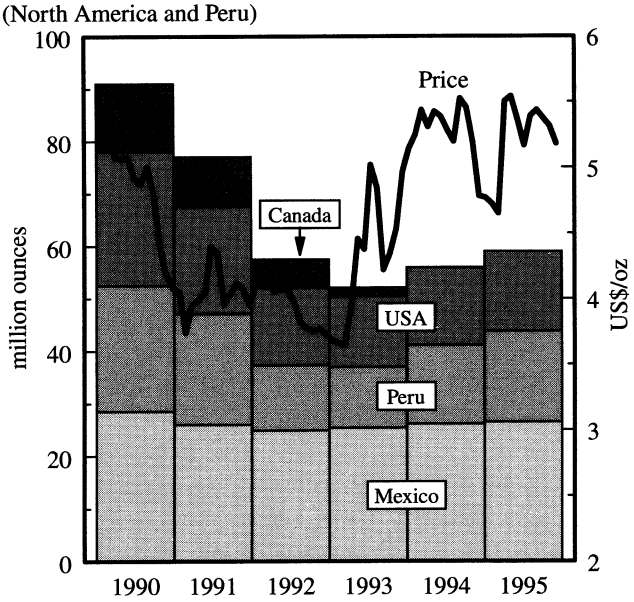
Because so much silver is derived as a by-product, detailed cost analysis of the industry is less meaningful than that for the base metal or gold mining industries where, for example, a fall in the metal price has a direct impact on the marginal producers. In the case of silver by-product output, the revenue generated is generally treated as a welcome addition, but is not a key factor in the mine's economics. Hence, even if the silver price is low, little by-product silver is lost.

Naturally, this is not the case for the primary producers which tend to be the only companies which calculate their costs in silver terms. Although this sector represents only 16% of total silver production,

Figure 13

Primary Silver Mine Production

(North America and Peru)



these producers are highly sensitive to price. This is clearly illustrated in Figure 13 where primary production from North America and Peru is compared with the silver price. The price decline in the late 1980s and early 1990s led to falling primary silver production in each of these countries. By contrast, the last two years has seen some increase in primary silver production, partly resulting from the improved prices since 1992.

Hedging

Hedging activities carried out by the world's silver producing companies are estimated to have resulted in 5.5 Moz (171 t) of accelerated supply being sold into the market last year. Figure 14 shows the outstanding silver hedged positions at year end for the past six years. Although forward selling continues to be the preferred instrument, there was a rise in the level of options during 1995, particularly call options with some companies extending maturities beyond the year 2000.

The companies involved in hedging continue to be the large gold-silver and primary producers. Few base metal producers hedge their by-product silver. Thus one explanation for the higher level of forward selling last year stems from the rise in silver production as a by-product of gold mining operations.

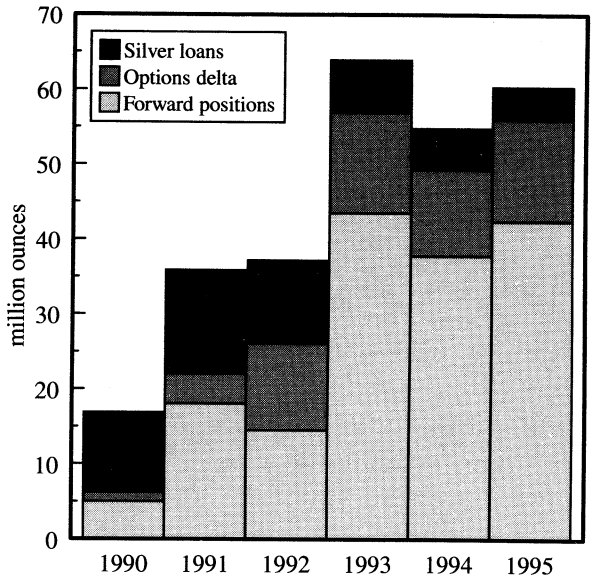
Outstanding forward selling positions at the end of 1995 increased to 42 Moz (1,306 t), just short of the record level reached in 1993. However, positions had been higher earlier in the year when the run-up in the price in the middle of the second quarter prompted increased levels of hedging from, in particular, producers in North and South America. By the end of 1995, however, some of these positions had either expired or had been closed out prematurely with a number of companies realizing handsome profits from these activities.

The use of options also rose over this period of higher volatility in the second quarter. There was a further increase towards the end of the year when two North American producers added significantly to overall positions.

By contrast, the use of silver loans, as a means of financing continues to be out of favor. One possible reason for this is that producers tend to be more bullish about the prospects for the silver price over the short to medium term. Overall last year, there was a net repayment of existing loans of 1.1 Moz (34 t).

Figure 14

World Silver Hedging: outstanding positions



Sources of Silver Mine Production

As shown below, the bulk of world silver mine production (about 84%) is derived as a by-product or co-product of other mining activities, predominantly those of lead, zinc, copper and gold.

World Mine Production of Silver by Source
(million ounces)

	1991	1992	1993	1994	1995
Primary	96.5	75.4	71.6	76.0	75.1
Lead/Zinc	234.8	222.8	201.9	194.5	192.6
Copper	129.2	123.6	122.1	114.9	125.8
Gold	44.3	57.4	60.5	55.1	71.9
Other	3.2	3.5	3.3	3.2	3.4
Total	508.0	482.7	459.4	443.7	468.8

Thus silver output is largely dependent on the production trends for these metals. Hence, if there is a downturn in the market for any of the 'source' metals and production is reduced, overall silver output will often fall too, almost regardless of the state of the silver market. However, if the silver price is sufficiently strong, it can be worth continuing to mine those multi-mineral ore deposits where the silver revenue is significant, despite reduced income from the other metals.

The following table shows world mine production between 1991 and 1995 for the metals with which silver is commonly produced.

World Mine Production of Source Metals
(thousand tonnes)

	1991	1992	1993	1994	1995
Lead	3,115	3,076	2,794	2,697	2,639
Zinc	7,287	7,186	6,768	6,822	6,681
Copper	9,098	9,415	9,432	9,397	9,860
Gold	2.160	2.233	2.290	2.280	2.272

Source: WBMS; GFMS

Over the past five years, world mine production of lead has fallen by 15% and of zinc by 8%. This is mainly the result of the drop in lead and zinc prices between 1990 and 1993, as shown below,

Average Prices of Source Metals

	1991	1992	1993	1994	1995
Copper ($/tonne)	2,340	2,285	1,909	2,307	2,936
Lead ($/tonne)	559	544	405	549	631
Zinc ($/tonne)	1,118	1,244	963	998	1,032
Gold ($/oz)	362	344	360	384	384

and the resulting cutbacks in mining capacity. During the same period, silver produced from lead and zinc mines dropped by 18%.

The fall in silver by-product from copper operations between 1991 and 1994 was reversed last year with output for 1995 almost matching that in 1991. By contrast, copper mine production rose 8% over the five years. The turnround in the copper price between 1993 and 1995 was reflected in the resumption of mining at a number of suspended operations, expansions at others plus the development of new projects. Copper mine production and by-product silver output rose accordingly in 1995. Silver derived from gold mines followed the trend in gold production from 1991 to 1994, with three years of increasing output being followed by a decline in 1994. In 1995, however, the pattern was broken - while gold production fell further, by-product silver rose strongly. Contributory factors included the steep drop in South African gold production (which affected the world gold output figure but with South African ore not being silver-rich, scarcely registered in the by-product silver total) and the commissioning of two silver-rich gold mines in Canada and Indonesia which added proportionately more to the by-product silver total than to overall gold output.

Another way of looking at this question is to examine trends in the ratio of silver recovered to source metal produced.

Ratios of World By-product Silver Recovery
(ounces of silver per tonne of source metal)

	1991	1992	1993	1994	1995
Lead/zinc	23	22	21	20	21
Copper	14	13	13	12	13
Gold ('000)	20	26	26	24	32

While world copper production rose between 1991 and 1994, for example, by-product silver output from copper mines fell due to a significant decline in the silver by-product recovery ratio. A similar decline was seen in the case of lead/zinc, whereas for gold, a strongly rising trend in the ratio can be seen.

These ratios depend largely on ore type and vary considerably from country to country.

Ratios of By-product Silver Recovery by Country
1991-1995 averages
(ounces of silver per tonne of source metal)

	Lead/zinc	Copper	Gold
Australia	22	3	6,573
Canada	9	17	26,978
Chile	3	7	348,586
India	2	10	177,043
Indonesia	N/A	5	40,650
Mexico	71	10	434,510
Peru	43	15	14,172
S Africa	21	3	3,125
Spain	N/A	900	16,031
Sweden	26	18	n/a
USA	6	8	54,073

For example, each tonne of copper from Canadian mines yielded, on average, 17 ounces of silver, whereas each tonne from Australia contributed a mere 3 ounces of by-product silver. Similarly, gold production in South Africa yielded 3,125 ounces of silver per tonne yet in Indonesia the figure was nearly 41,000 ounces and in Mexico a staggering 434,000 ounces. Broad variations can occur even within regions: while an average 43 ounces of silver were produced for every tonne of lead/zinc in Peru, only 3 ounces per tonne were produced in neighboring Chile.

Sources of Silver Mine Production (Million ounces)

Country	Mine Type	1991	1992	1993	1994	1995
Argentina	Gold	0.25	0.25	0.25	0.30	0.30
	Lead/Zinc	1.00	1.21	1.12	0.92	0.99
Australia	Gold	1.55	1.60	1.63	1.68	1.66
	Copper	0.77	1.30	1.62	0.74	1.42
	Lead/Zinc	35.62	36.26	33.79	31.17	26.49
Bolivia	Gold	0.33	0.35	1.49	1.43	1.31
	Lead/Zinc	11.75	9.79	9.21	9.89	10.63
Brazil	Gold	0.17	0.17	0.16	0.16	0.15
	Copper	0.59	0.39	0.37	0.29	0.23
	Lead/Zinc	0.24	0.13	0.13	0.13	0.13
Canada	Primary	9.58	5.45	1.70	0.07	0.00
	Gold	3.09	2.22	1.34	1.45	12.74
	Copper	14.74	13.31	12.30	10.36	12.23
	Lead/Zinc	11.41	14.76	11.06	10.20	11.96
	Other	1.73	1.86	1.87	1.72	1.85
Chile	Primary	0.61	0.57	0.42	0.84	0.53
	Gold	6.99	18.19	16.40	14.58	14.82
	Copper	14.04	14.09	14.28	16.06	18.04
	Lead/Zinc	0.10	0.10	0.09	0.12	0.11
Dom Rep	Gold	0.70	0.43	0.54	0.30	0.67
Fiji	Gold	0.02	0.03	0.04	0.05	0.06
Finland	Copper	0.96	0.87	0.94	0.84	0.87
Honduras	Lead/Zinc	1.38	1.14	0.78	0.87	0.80
India	Gold	0.43	0.27	0.27	0.43	0.50
	Copper	0.54	0.50	0.54	0.54	0.39
	Lead/Zinc	0.14	0.08	0.85	0.65	0.47
Indonesia	Gold	0.94	1.57	1.35	1.81	5.33
	Copper	1.57	1.64	1.54	1.31	2.30
Iran	Copper	0.76	0.96	0.81	1.05	1.15
	Lead/Zinc	0.76	0.96	0.81	1.05	1.15
Ireland	Lead/Zinc	0.34	0.42	0.42	0.56	0.44
Italy	Lead/Zinc	0.44	0.39	0.16	0.44	0.44
Japan	Gold	0.27	0.28	0.22	0.21	0.16
	Lead/Zinc	5.21	5.23	4.18	4.07	3.05
Malaysia	Gold	0.01	0.01	0.01	0.01	0.01
	Copper	0.43	0.49	0.44	0.42	0.35
Mexico	Primary	26.00	24.88	25.35	26.14	26.50
	Gold	4.00	4.28	6.18	6.19	6.30
	Copper	2.50	2.57	3.12	3.30	3.40
	Lead/Zinc	40.93	35.71	34.01	35.57	38.53
Mongolia	Gold	0.01	0.01	0.01	0.01	0.03
	Copper	0.66	0.75	0.83	0.86	0.58
Morocco	Primary	4.82	3.50	6.50	6.66	5.66
	Copper	0.90	0.60	0.55	0.83	0.71
	Lead/Zinc	0.90	0.60	0.55	0.83	0.71
Namibia	Gold	0.00	0.01	0.00	0.00	0.00
	Copper	1.48	1.44	1.15	1.03	1.12
	Lead/Zinc	1.48	1.44	1.15	1.03	1.12
New Zealand	Gold	0.36	0.73	0.84	0.76	0.95
Norway	Copper	0.03	0.02	0.01	0.01	0.01
	Lead/Zinc	0.28	0.31	0.21	0.23	0.16
Oman	Copper	0.09	0.13	0.09	0.15	0.14
PNG	Gold	2.58	2.13	2.19	1.52	1.21
	Copper	1.42	0.94	0.90	0.98	0.91
Peru	Primary	21.11	12.45	11.64	15.00	17.28
	Gold	0.00	0.00	0.45	0.56	0.61
	Copper	5.14	4.93	5.65	5.57	6.71
	Lead/Zinc	40.83	36.24	35.98	34.88	36.75
Philippines	Gold	0.18	0.15	0.18	0.18	0.19
	Copper	0.97	0.76	0.86	0.79	0.86
Poland	Copper	28.33	25.14	28.83	26.99	30.99
	Lead/Zinc	0.58	0.51	0.59	0.64	0.64
Portugal	Copper	1.37	1.23	1.16	1.02	1.24
Romania	Copper	1.61	1.54	1.45	1.35	1.43
Saudi Arabia	Gold	0.46	0.49	0.53	0.53	0.55
South Africa	Gold	1.88	1.97	1.92	1.78	1.64
	Copper	1.01	1.02	1.08	1.09	1.10
	Lead/Zinc	2.52	2.55	3.18	3.23	2.87
	Other	0.02	0.23	0.00	0.01	0.05
Spain	Gold	0.15	0.14	0.09	0.07	0.07
	Copper	7.35	7.36	5.79	5.56	5.07
Sweden	Gold	0.05	0.00	0.00	0.00	0.00
	Copper	1.24	1.77	1.63	1.51	1.61
	Lead/Zinc	6.84	7.29	7.29	6.59	6.43
Thailand	Lead/Zinc	0.55	0.17	0.09	0.12	0.23
Turkey	Primary	1.27	2.48	2.28	2.04	1.54
	Copper	0.03	0.03	0.03	0.06	0.33
	Lead/Zinc	0.00	0.00	0.00	0.05	0.21
United States	Primary	20.39	14.80	13.46	14.80	15.25
	Gold	15.67	17.74	19.91	16.36	17.58
	Copper	14.34	15.47	14.58	13.07	13.58
	Lead/Zinc	9.02	9.99	4.94	3.35	3.42
Zambia	Copper	0.46	0.59	0.58	0.35	0.25
Other	Primary	12.68	11.22	10.24	10.46	8.35
	Gold	4.19	4.39	4.54	4.75	5.01
	Copper	25.93	23.82	20.99	18.72	18.82
	Lead/Zinc	62.49	57.50	51.27	47.91	44.90
	Other	1.46	1.46	1.42	1.52	1.51
World	Primary	96.46	75.36	71.59	76.01	75.11
	Gold	44.26	57.38	60.54	55.12	71.85
	Copper	129.25	123.64	122.11	114.84	125.83
	Lead/Zinc	234.81	222.76	201.86	194.50	192.62
	Other	3.21	3.54	3.28	3.25	3.41
Total		507.99	482.68	459.38	443.72	468.84

5. Supply from Above-ground Stocks

Stock levels are becoming a crucial issue in the silver market. Government stocks fell by 26 Moz (813 t) and exchange/dealers' stocks by around 50 Moz (1,600 t) in 1995. While published US stocks fell by 100 Moz (3,100 t) European stocks rose by 90 Moz (2,800 t) though much of this increase is in allocated metal. Over the longer term, exchange/dealers' stocks have declined by at least 350 Moz (10,900 t) since 1990 and stood at just over 650 Moz (20,000 t) at the end of 1995.

The debate in the silver market focuses more and more each year on the perceived level of stocks and the extent to which they have been run down during the 1990s. This discussion was even more pointed in 1995 as Comex warehouse stocks fell steeply, while there was substantial movement of silver from the United States to Europe where stocks in dealers' vaults had started the year at very low levels but then rose sharply in the second half. The overall decline, therefore, was much less than the published figure for the change in US exchange stocks.

The picture of silver stocks is assembled from four main categories: government holdings; official exchange/dealers' stocks; silver coins or bullion bars held by investors; and industrial inventories. The only stocks for which data are regularly published are those held on exchanges, such as Comex or the Tokyo Commodity Exchange and the US government holdings. In general, however, official sector stocks of silver are insignificant compared to gold.

Among **government stocks**, the principal holding is in the United States, divided between the National Defense Stockpile and the Treasury Reserves. The National Defense Stockpile fell by 6.3 Moz (197 t) last year to 47.3 Moz (1,471 t); the Treasury Reserves was down only 5,625 ounces to 24.6 Moz (765 t). The overall rate of decline in official US stocks has slowed over the last few years but the more significant point is that in total these would barely satisfy one year's US photographic fabrication needs. Net sales by other governments or their central banks amounted to 19.9 Moz (616 t), including disposals by the central bank in Peru and significant quantities from Russian government holdings.

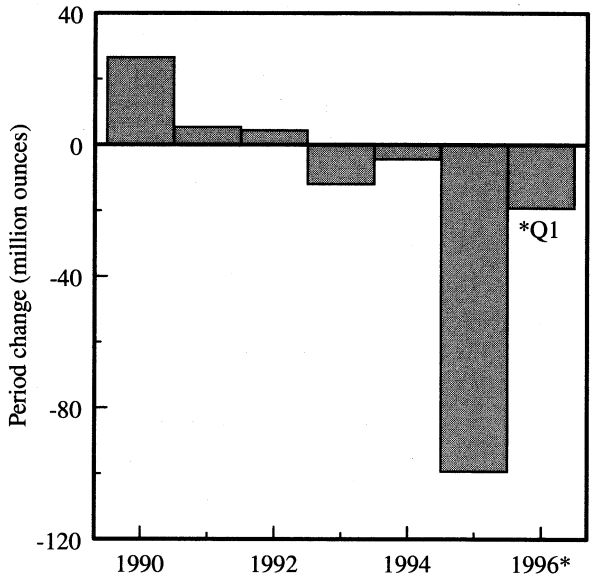
Exchange/dealers' stocks are located primarily in the United States, the United Kingdom, Switzerland and, to a lesser extent, in Germany and Japan. They include both exchange stocks and the unpublished holdings of bullion banks and dealers, including those held on behalf of investors. This is the metal most readily available to the market and has been used to fill the supply/demand 'gap' that has developed in recent years. However, a new element in 1995 is the extent to which an increased proportion of these stocks are now held on allocated account, and thus cannot be made available to the market without the owners of the metal changing their status.

In the **United States**, stocks are dominated by the five recognized Comex depositories, by the Chicago Board of Trade, and by the vaults of Wilmington Trust in Delaware. Armoured carrier companies and banks also store some silver.

The important identifiable stocks are those of Comex (now part of Nymex) which are published daily and are thus closely watched. Comex stocks fell by 38% or 99.5 Moz (3,095 t) in 1995.

Figure 15

COMEX Silver Stocks



They began the year at 258.3 Moz (8,034 t), rose to a high of 265.2 Moz (8,249 t) on 2nd March (as the silver price approached its lowest level of the year), then fell rapidly to 207.7 Moz (6,460 t) by 5th May (when the year's highest price was reached), and drifted to the year's lowest level of 147.4 Moz (4,585 t) on 22nd August (one day after the price rallied to $5.80) then rose modestly to reach 159.1 Moz (4,949 t) by the end of December. However, in the first three months of 1996, the

decline continued to 139.7 Moz (4,345 t), the lowest level since October 1986.

Since Comex stocks are the only substantial ones published, movements in and out may sometimes be designed to create an impression. Thus the sharp fall in late 1993 and early 1994 was engineered by transferring the silver to other US vaults to suggest a greater decline in stocks than had in reality occurred. But the decline in 1995 is likely to prove of more than temporary duration because so much of the silver was eventually moved to London and the cost of shipping it back is unlikely to be justified. The silver had to be moved physically because available stocks in London were too low for the normal Exchange For Physical (EFP) to be made with Comex. Moreover, to save time, much of it went by air, at a cost of 3.6 cents per ounce.

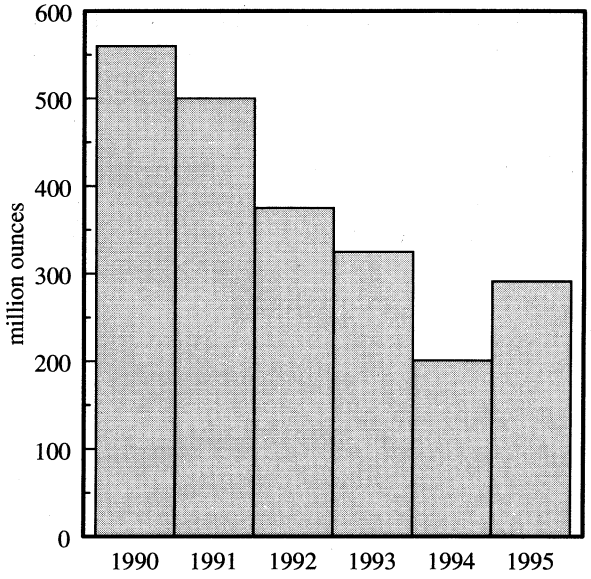
At the Chicago Board of Trade (CBoT), which holds smaller stocks, there was a small decline of 0.5 Moz (16 t), leaving 10.2 Moz (317 t) at year-end. Wilmington Trust in Delaware holds stocks for a large number of institutional and private clients in both allocated and unallocated form. The Trust's attraction is Delaware's tax advantages, competitive costs, a convenient location for shipping and the confidentiality of its holdings. The stocks, which grew steadily in the late 1980s, were augmented in 1992 by absorbing those of the Bank of Delaware. Wilmington Trust's stocks are thought to have declined in late 1994 and early 1995, but thereafter remained fairly stable. However, the ownership of the stocks is subtly changing, as some private holders have sold their silver (often small amounts in 100-ounce bars), which is credited to dealers' accounts. This trend was confirmed elsewhere in the United States, with grain, coins and 100-ounce bars having been sold back to the market. Between 10 and 30 Moz (300 t - 900 t) may have been disposed of by private investors last year - much of this silver having originally been purchased in the 1970s and 1980s. While such sales from small investors have also been seen in recent years, they seem to have been boosted last year by higher prices.

The decline in US stocks last year was largely offset, however, by the abrupt rise in Europe. Although there are no published stock figures, our research indicates that in the United Kingdom, Switzerland and Germany the quantity of silver held in vaults on account of bullion banks, other traders and investors, rose by over 90 Moz (2,800 t) to about 290 Moz (9,000 t) in 1995, after declining steadily for the previous five years.

This significant increase came in the second half of the year as over 75 Moz (2,300 t) were exported from the United States, primarily to the United Kingdom to take advantage of higher leasing rates. As with the manipulation of US stocks at the end of 1993, this movement also fostered the impression that US stocks were being rapidly depleted and that London, too, was running short (the squeeze on liquidity in London came partly because one syndicate removed silver from the market, by having it placed on account). Eventually, London became over-stocked with silver, which was even being held temporarily at UK airports. The massive inflow of silver thus spoiled a plan to force spot prices even higher by creating an artificial shortage of metal. Even so, a considerable proportion of the increased stock in Europe is in the form of allocated silver held on behalf of investment syndicates. Interestingly, too, some of the silver bars, although qualifying as Good Delivery, are not of good finish, implying that they have come from old stocks in US vaults. And early in 1996 London dealers were reporting that although the vaults had plenty of silver, they were having difficulty in locating high quality silver as demanded by the photographic industry, which was starting to command a small premium.

Figure 16

Bullion Stocks in Dealers' Vaults in Europe



Flows of silver from Mexico to London also more

than doubled in 1995 to over 19 Moz (590 t), supplementing the usual supplies from producers in Eastern Europe, the CIS (where there was also de-stocking) and South America. The European stock statistics exclude metal leased out to fabricators and private holdings by investors in safety deposits.

In **Japan**, stocks on the Tokyo Commodity Exchange (Tocom) declined for the fifth successive year. From the peak of 14.2 Moz (442 t) at the end of 1990, they had declined to 6.2 Moz (193 t) by December 1994 and fell another 1.7 Moz (53 t) to reach 4.5 Moz (139 t) in December, 1995. Inventories held by the trading houses, however, rose sharply in late 1994 and early 1995 in response to fears about domestic smelter production. However, once these fears were resolved, the stocks were generally run down, as reflected in the exceptionally low imports during the second half of the year. Published figures show a net decline of 1.2 Moz (37 t) in total trade inventory to 34.9 Moz (1,084 t) at year-end.

Increases in retailers' stocks of fabricated products in **India** represented an important component of fabrication demand in the period 1993-94. In 1995, there was little further growth in the number of outlets and there was little change in retail inventories. On the contrary, some silver retailers switched to selling gold jewelry during the past year. Dealers' stocks of silver bullion, on the other hand, increased towards the end of the year. In other words, not all the silver entering the country was fabricated or purchased by investors.

Scrap

Scrap recovery in the Western World totaled 125 Moz (3,890 t), 4% higher than in 1994. The United States and Japan accounted for 46% of the total because of their highly efficient recycling of photographic waste and the corresponding figure for all industrial countries was 79%, much of it photographic. An estimate has also been made for the CIS of 11.5 Moz (358 t), but the business is still too diffuse and secret in China to compile reliable statistics.

The scrap statistics in this Survey describe old, as opposed to new or process scrap. Tracking scrap is complex, not only because it is often processed unrecorded by informal back-street refiners: even in industrial countries, it is difficult for refiners to distinguish between genuine old scrap and regular process scrap from industrial or jewelry fabricators. However, it is important to distinguish old from new because the statistics for fabrication in this Survey are based on the silver content of fabricated products (and not on the larger quantity of silver used to make them). The difference between these two quantities represents new scrap. Since it is not counted as part of fabrication demand it must also be excluded from supply. Old scrap, on the other hand, derives from products at the end of their useful lives and is generally returned by separate routes via refineries or smelters and thus must be counted in full as a component of supply.

Although low-grade scrap from industrial sources is often exported to specialist recycling companies, scrap is shown here under the countries in which, as far as can be determined, it originated.

The picture of scrap supply in relation to fabrication by region shown in Figure 17 emphasizes the importance of the developed world as the source of scrap recovery (Japan for instance accounts for 85% of the Far East total). The relatively high shares of scrap in the developing regions is due to a number of factors, some rather localized. However one general point is that very little industrial and photographic fabrication takes place in these regions while their scrap supply benefits from the local recycling of photographic scrap. As indicated below, the low figure for Indian scrap reflects the fragmented and informal nature of the business there with the vast bulk of material escaping the statistical net (on both the supply and demand sides).

Overall, photographic scrap recovery predominates because it is the best organized sector, even in small countries with no local photographic fabricating industry, but where recovery of silver from film processing shops provides a ready, cheap source of the metal. By contrast, at current silver prices, scrap recovery from old electronic equipment is often only possible as a by-product of gold recycling via copper smelters.

With the exception of photographic wastes and obsolete silver contacts, most low-grade silver scrap in the **United States** is recovered as a by-product of the recycling of gold and copper. Overall, supply from domestically generated old silver scrap amounted to 30.0 Moz (930 t) in 1995. Photographic scrap accounted for over 78% of the total at an

Table 3
Supply of Silver from Fabricated Old Silver Scrap
Million ounces

	1986	1987	1988	1989	1990	1991	1992	1993	1994	**1995**
Europe										
Germany	-	-	-	-	16.08	16.08	16.08	15.75	15.43	**14.79**
UK & Ireland	-	-	-	-	7.23	7.23	7.23	7.33	7.88	**7.43**
France	-	-	-	-	3.10	3.80	5.34	4.00	4.18	**4.66**
Italy	-	-	-	-	2.73	2.73	2.73	2.73	2.80	**2.89**
Austria	-	-	-	-	1.93	1.93	1.93	1.93	1.93	**1.99**
Switzerland	-	-	-	-	0.07	0.07	0.07	1.42	0.50	**1.52**
Netherlands	-	-	-	-	1.13	1.13	1.17	1.13	1.24	**1.13**
Sweden	-	-	-	-	1.10	1.10	1.10	1.10	1.10	**1.10**
Norway	-	-	-	-	0.76	0.76	0.76	0.76	0.76	**0.76**
Czech Republic	-	-	-	-	0.64	0.84	0.96	0.77	0.71	**0.74**
Belgium	-	-	-	-	0.64	0.64	0.64	0.64	0.64	**0.64**
Denmark	-	-	-	-	0.68	0.63	0.63	0.63	0.63	**0.60**
Portugal	-	-	-	-	0.40	0.40	0.40	0.40	0.40	**0.40**
Spain	-	-	-	-	0.39	0.35	0.32	0.32	0.32	**0.39**
Romania	-	-	-	-	0.10	0.10	0.10	0.10	0.10	**0.10**
Other	-	-	-	-	1.00	1.00	1.09	1.16	1.16	**1.03**
Total Europe	-	-	-	-	37.97	38.79	40.55	40.17	39.77	**40.16**
North America										
United States	-	-	-	-	28.94	27.33	27.01	27.65	29.26	**30.00**
Mexico	-	-	-	-	2.25	2.25	2.25	2.25	2.25	**2.60**
Canada	-	-	-	-	1.32	1.32	1.32	1.32	1.32	**1.68**
Total North America	-	-	-	-	32.51	30.90	30.58	31.22	32.83	**34.28**
Central & South America										
Brazil	-	-	-	-	1.93	1.93	1.93	1.93	1.93	**1.93**
Argentina	-	-	-	-	0.64	0.64	0.64	0.64	0.64	**0.64**
Chile	-	-	-	-	0.23	0.23	0.23	0.23	0.23	**0.33**
Other	-	-	-	-	1.22	1.22	1.22	1.19	1.13	**1.35**
Total Central & South America	-	-	-	-	4.02	4.02	4.02	3.99	3.93	**4.25**
Middle East										
Saudi Arabia & Yemen	-	-	-	-	0.06	0.08	0.61	0.81	1.87	**3.02**
Turkey	-	-	-	-	1.77	1.86	1.93	2.03	2.25	**2.32**
Egypt	-	-	-	-	1.12	1.00	0.64	1.02	0.89	**0.82**
Arabian Gulf States	-	-	-	-	0.01	0.01	0.01	0.01	0.02	**0.02**
Other	-	-	-	-	0.16	0.16	0.16	0.23	0.23	**0.23**
Total Middle East	-	-	-	-	3.12	3.11	3.35	4.09	5.24	**6.39**
India	16.00	15.00	13.00	5.00	4.00	9.65	7.23	4.50	3.90	**4.50**
Far East										
Japan	-	-	-	-	15.67	18.93	24.19	26.25	26.89	**27.33**
South Korea	-	-	-	-	1.20	1.20	1.35	1.45	1.61	**1.93**
Taiwan	-	-	-	-	0.96	0.96	0.80	0.71	0.64	**0.77**
Singapore/Malaysia	-	-	-	-	0.40	0.40	0.40	0.40	0.50	**0.50**
Vietnam	-	-	-	-	0.26	0.26	0.26	0.23	0.32	**0.35**
Thailand	-	-	-	-	0.32	0.32	0.32	0.32	0.32	**0.32**
Indonesia	-	-	-	-	0.13	0.17	0.21	0.23	0.29	**0.29**
Hong Kong	-	-	-	-	0.26	0.26	0.26	0.26	0.26	**0.29**
Philippines	-	-	-	-	0.13	0.14	0.14	0.15	0.16	**0.18**
Total Far East	-	-	-	-	19.32	22.63	27.93	30.00	30.99	**31.96**

Table 3
Supply of Silver from Fabricated Old Silver Scrap
Million ounces

	1986	1987	1988	1989	1990	1991	1992	1993	1994	**1995**
Africa										
South Africa	-	-	-	-	0.14	0.14	0.11	0.13	0.14	**0.13**
Other	-	-	-	-	0.65	0.62	0.68	0.68	0.65	**0.76**
Total Africa	-	-	-	-	0.79	0.76	0.78	0.80	0.79	**0.89**
Australia	-	-	-	-	2.29	2.27	2.28	2.39	2.52	**2.52**
Other Western World	113.30	123.40	130.70	131.40	-	-	-	-	-	-
Western World Total	129.30	138.40	143.70	136.40	104.04	112.14	116.74	117.18	119.98	**124.97**
Other Countries	13.30	12.70	14.10	12.80	12.54	11.48	12.67	14.71	16.12	**15.84**
World Total	142.60	151.10	157.80	149.20	116.58	123.62	129.41	131.89	136.10	**140.81**

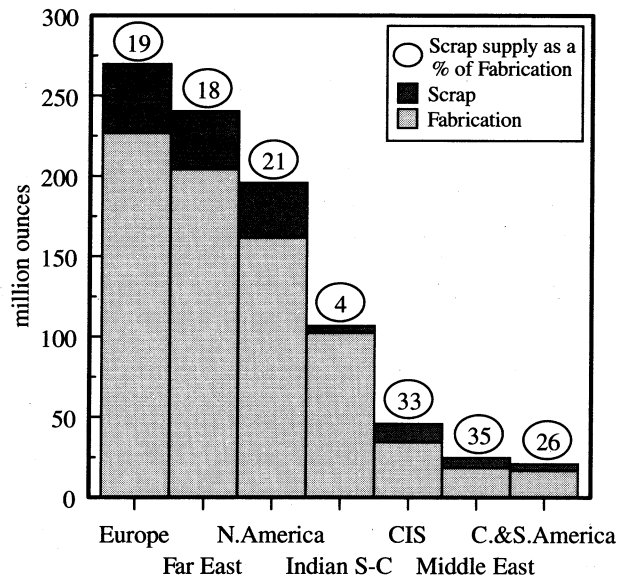
estimated 23.5 Moz (730 t). More silver is being won from spent fixer solutions due to stricter regulations on the release of chemicals and silver into the water system. The amount of old silverware and jewelry scrap fell slightly in 1995 to 4.2 Moz (131 t). The level of electronics scrap was unchanged last year at 2.1 Moz (65 t). But the structure of the industry is changing as integrated precious metals refiners are losing out to a combination of samplers and base metals smelters. Thus, although the amount of precious metals contained in electronics scrap has continued to decline, paradoxically smelters are tending, if anything, to experience an increase in the average grade of scrap treated. Finally, recycling of plated articles and miscellaneous items continued to contribute around 0.2 Moz (6 t) to the scrap total.

The United States remains at the center of a considerable international trade in old and process silver scrap. It appears that the overall quantities imported and exported, at 6 Moz (190 t) and 20 Moz (622 t) respectively, remained surprisingly flat in both 1994 and 1995. Exports of scrap are principally made to Germany, Belgium and Canada. Imports are sourced from a variety of countries including a significant quantity from Russia last year.

The quantity of silver recovered from scrap in **Japan** has risen each year since 1990 and in 1995 it was at least 27.3 Moz (850 t). The growth has been due to improved recycling by the photographic industry, which sources 35-40% of its annual needs for film and photographic papers in this way. This recovery is largely unreported in the official figures, which show only 14.9 Moz (463 t) and do not take into account the metal being recycled in highly efficient closed loop systems. These involve the photographic manufacturers taking back and recovering silver from used film and fixer solutions. This efficiency has been improved in recent years by the introduction of the popular combined film and camera systems. From the consumer's viewpoint these are "disposable": from the processor's (ie the manufacturer's) they are almost completely recyclable. Over 90% of the silver contained in them is recovered.

The amount of silver available for recycling would be higher still, but for the fact that the country's two manufacturers export a considerable proportion of their films and photographic paper, the contained silver thus escaping the domestic recycling loop. However, that may be compensated for in part by the growing market for imported film in Japan, the silver content of which will be recovered locally. Future growth in recycling rates may be slower, however, as the scope for recovery declines due to the leveling-off in the demand for the recyclable cameras. In addition rates of recovery from important sectors such as

Figure 17
World Fabrication and Scrap Supply in 1995



amateur color film and X-ray film show little potential for further growth.

The true scale of the photographic recycling may still be slightly under-estimated. By comparison, recovery from electronics is limited, but is easier to track because it passes through the smelters. It amounts to 4-5 Moz (around 150 t) annually, just under 20% of the total scrap market in Japan.

In **Germany**, the quantity of silver recovered from locally generated industrial scrap has declined recently, especially from electronic sources, due to a fall in the precious metals content. This decline was offset to some extent over the 1991-93 period by additional quantities of silver retrieved from weapons stocks, in particular torpedo batteries and power-packs, inherited from the former German Democratic Republic. Last year, however, supply from domestic scrap fell by over 4% to 14.8 Moz (460 t). By contrast, there was a nearly 10% increase in German refiners' imports of scrap from other countries, the main sources being the United States, Western Europe and the former Soviet Union.

The amount of silver won from locally generated scrap in the **United Kingdom** fell in 1995 to 7.4 Moz (231 t) from a revised 7.9 Moz (245 t) the previous year. Photographic scrap from fixer solutions, X-ray film and black and white papers accounted for around 60% of the total. Imports of scrap, mainly from other European countries, rose in 1995 with processors expecting the quantity imported to increase in future.

Photographic waste recovery is highly organized in **France** and accounts for 70% of the 4.7 Moz (145 t) scrap total. However, not all scrap is processed there and considerable quantities, especially low-grade material, are shipped to Belgium for refining.

Italy's scrap recovery rose to 2.9 Moz (90 t) due to more melting of unsold silverware, but the main source remains photographic waste at 1.6 Moz (50 t).

In **Turkey**, where recovery is organized mainly through three medium-sized refiners in Istanbul, photographic waste provides 1 Moz (30 t) and old silverware and jewelry a further 1.3 Moz (40 t).

The bulk of scrap recovery in **Egypt** derives from old jewelry collected in Upper Egypt with a fineness of between 600 and 800, amounting to 0.8 Moz (25 t). In contrast with gold, there is very little silver scrap in **Saudi Arabia**, although photographic waste now contributes about 0.1 Moz (3 t). But neighboring **Yemen** continues to provide significant quantities of Maria Theresa coins, the outflow of which has increased in the last three years with more than 3 Moz (100 t) being exported in 1995.

The rising rupee price of silver in **India** in the second half of 1995 brought an increased flow of scrap, pushing the total up to 4.5 Moz (140 t). The quantities increased further in the first months of 1996, with refiners in Bombay reporting an inflow in January double that of the 1995 average.

Singapore's recovery of electronic and photographic scrap derives largely from the surrounding region but is counted here under Singapore because it is impossible to determine the exact sources of the material. The total recovered by the two refineries in the country was steady at 0.5 Moz (15 t). In **South Korea**, scrap supplies, mainly from photographic waste and old silverware and jewelry, continued to increase to 1.9 Moz (60 t). In **Taiwan**, scrap from local photographic waste and electronics was a modest 0.8 Moz (24 t), while in **Thailand** it amounted to only 0.3 Moz (10 t) mainly from photography. Scrap recovery is increasing in **China**, not least because of the popularity of foreign color film, the silver from which is recovered by many small-scale refineries before being marketed unofficially. A conservative assessment may be 4 Moz (125 t), although larger amounts were suggested by some sources. However, as the recycling industry is so badly documented, the preparation of reliable statistics is not yet possible.

6. Fabrication Demand

Silver fabrication in the Western World rose by 1.3% in 1995 to 699 Moz (21,760 t), virtually identical to the record level set in 1993. With China and the CIS included, the total is 764 Moz (23,780 t). The best regional improvements were seen in Central and South America (+ 10.6%), the Middle East (+ 8.7%) and the Indian Sub-Continent (+ 7.4%). By contrast, fabrication in Europe and North America fell by around 2%. In the Western World, industrial and decorative fabrication maintained its lead as the foremost sector, growing 6.5% to 242 Moz (7,530 t) with photography up 3.6% to 209 Moz (6,500 t) and jewelry and silverware up 2.9% to 226 Moz (7,000 t). However, coin fabrication fell by 48% to 22 Moz (680 t).

The overall fabrication pattern summarized above confirms the broad base of silver demand with the three main groupings: industrial & decorative; photography and jewelry & silverware each requiring over 200 Moz (6,220 t) annually and, in the Western World, all showing growth during 1995, as shown in Figure 18. In China and the CIS, where information is still less precise, the picture is more erratic, with fabrication generally improving in China, but still declining in the CIS. The biggest reversal in 1995 was in coin fabrication, which almost halved, but this was due largely to Mexico ceasing fabrication of circulating coins and meeting new silver coin demand from existing stocks built up in the previous two years of high minting.

The industrial and decorative category, as the fastest growing sector, continues to demonstrate the diverse uses of silver in everything from electronics to water purification. Additional analysis of the main applications is provided in this year's Survey by two new tables (5a & 5b) showing the amounts of silver for electronics and electrical use and for brazing alloys and solder in the main manufacturing countries. This reveals that electronic and electrical applications account for over 103 Moz (3,200 t) of silver demand, while brazing alloys use almost 39 Moz (1,210 t).

The statistics for individual countries shown in this Survey count the silver use in the country in which it is initially fabricated from bullion or grain into an alloy, or special products such as silver nitrate and silver potassium cyanide, even though they may be exported to an end-user elsewhere. Consequently, the main industrial countries, such as the United States, Japan, Germany, the United Kingdom and France, are most prominent, (as shown in Figure 19). India and Italy owe their position to the large size of their jewelry and silverware industries. On the other hand, many other countries such as Hong Kong and Taiwan which are major end-users show low levels of fabrication because they tend to rely on imports.

Figure 18
World Silver Fabrication

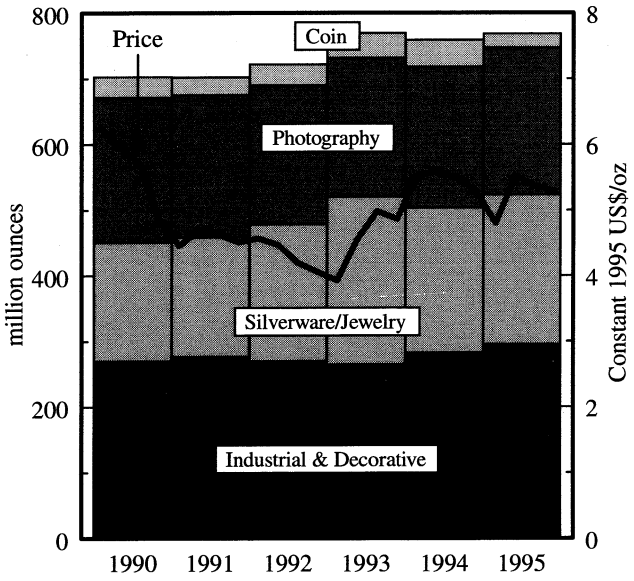


Figure 19
Top Five Silver Fabricating Countries

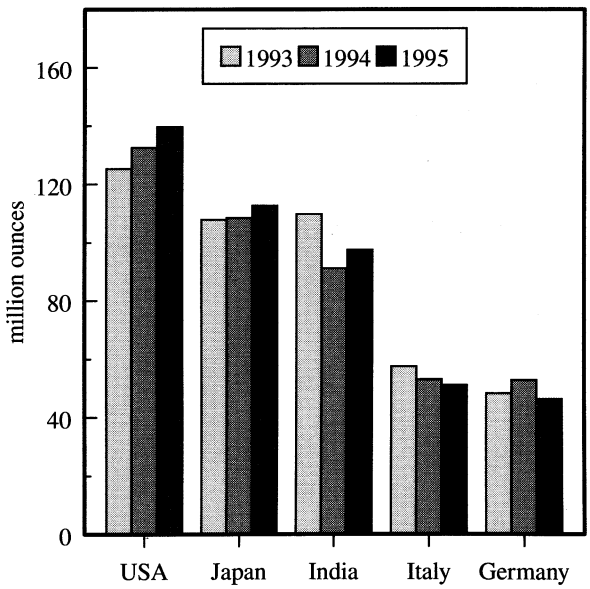


Table 4
World Silver Fabrication
Million ounces
(including the use of scrap)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	**1995**
Europe										
Italy	33.90	38.80	38.23	43.48	52.66	57.76	61.27	57.56	53.08	**51.06**
Germany	36.30	42.30	47.20	49.90	54.05	57.66	54.63	48.26	52.77	**46.32**
France	19.30	19.80	23.50	24.30	26.72	28.85	31.73	30.00	30.18	**33.40**
UK & Ireland	19.09	21.23	22.94	24.74	24.20	24.81	26.38	27.71	31.39	**32.46**
Belgium	17.60	17.90	19.20	19.20	19.90	20.18	20.22	20.65	21.28	**21.92**
Spain	-	-	-	-	10.87	10.50	6.14	5.82	9.64	**7.76**
Switzerland	-	-	-	-	5.92	7.62	6.69	6.23	7.12	**7.35**
Greece	-	-	-	-	3.22	3.38	3.54	3.71	3.86	**3.99**
Poland	-	-	-	-	5.53	3.88	2.16	2.38	2.62	**2.65**
Netherlands	1.30	2.40	1.20	1.20	2.23	1.65	1.55	1.54	2.01	**2.55**
Portugal	-	-	-	-	2.26	2.14	2.32	2.26	1.96	**2.33**
Austria	1.90	1.30	1.30	1.20	1.94	2.10	2.00	1.93	1.83	**1.94**
Norway	-	-	-	-	0.68	1.66	2.13	1.54	1.27	**1.26**
Denmark	-	-	-	-	1.08	0.97	1.07	0.97	0.97	**1.05**
Sweden	-	-	-	-	0.89	1.17	1.01	0.94	0.93	**0.87**
Finland	-	-	-	-	1.39	1.48	1.28	0.90	0.98	**0.85**
Czech Republic	-	-	-	-	1.76	1.53	1.04	0.70	0.61	**0.84**
Cyprus & Malta	-	-	-	-	0.23	0.23	0.26	0.27	0.35	**0.38**
Hungary	-	-	-	-	0.61	0.56	0.58	0.57	0.32	**0.34**
Romania	-	-	-	-	0.73	0.61	0.51	0.45	0.41	**0.29**
Bulgaria	-	-	-	-	0.16	0.16	0.23	0.32	0.18	**0.22**
Other	14.50	11.30	11.50	12.00	0.20	0.16	0.19	0.16	0.20	**0.16**
Total Europe	143.89	155.03	165.06	176.02	217.23	229.07	226.92	214.86	223.96	**219.97**
North America										
United States	129.20	127.30	125.40	132.80	127.31	122.77	122.63	125.31	132.51	**139.69**
Mexico	9.70	9.20	9.10	8.90	14.86	15.82	24.24	33.44	29.16	**19.07**
Canada	10.90	11.60	12.10	15.30	6.51	4.66	2.32	2.82	3.07	**2.64**
Total North America	149.80	148.10	146.60	157.00	148.68	143.25	149.18	161.56	164.74	**161.40**
Central & South America										
Brazil	-	-	-	-	6.79	6.69	6.62	6.92	8.29	**9.23**
Argentina	-	-	-	-	3.05	3.05	3.05	3.05	3.05	**2.92**
Peru	-	-	-	2.60	1.48	1.15	0.94	0.83	0.90	**0.99**
Colombia	-	-	-	-	0.98	0.98	1.00	0.98	0.98	**0.98**
Dominican Republic	-	-	-	-	0.19	0.13	0.16	0.35	0.08	**0.71**
Ecuador	-	-	-	-	0.37	0.37	0.37	0.53	0.66	**0.66**
Chile	-	-	-	-	0.48	0.48	0.48	0.48	0.51	**0.55**
Other	-	-	-	-	0.68	0.65	0.62	0.63	0.58	**0.61**
Total Central & South America	-	-	-	2.60	14.02	13.49	13.24	13.76	15.05	**16.65**
Middle East										
Turkey	-	-	-	-	5.17	4.90	5.76	6.24	5.76	**6.17**
Israel	-	-	-	-	2.11	2.46	3.15	3.44	3.83	**4.27**
Arabian Gulf States	-	-	-	-	1.29	1.39	1.49	1.79	2.54	**3.39**
Egypt	-	-	-	-	1.60	1.73	2.33	1.90	2.49	**2.17**
Iran	-	-	-	-	0.94	1.21	1.57	1.31	1.68	**1.63**
Saudi Arabia	-	-	-	-	0.21	0.28	0.36	0.37	0.34	**0.41**
Other	-	-	-	-	0.20	0.20	0.20	0.20	0.22	**0.31**
Total Middle East	-	-	-	-	11.52	12.17	14.86	15.24	16.86	**18.34**

Table 4
World Silver Fabrication
Million ounces
(including the use of scrap)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	**1995**
Indian Sub-Continent										
India	-	20.10	22.40	25.56	46.81	44.86	58.12	109.87	91.19	**97.49**
Other	-	-	-	-	2.57	3.28	4.08	4.82	4.02	**4.82**
Total Indian Sub-Continent	-	20.10	22.40	25.56	49.38	48.13	62.20	114.69	95.20	**102.31**
Far East										
Japan	84.90	90.90	100.40	100.80	116.21	109.30	105.37	107.88	108.46	**112.69**
Thailand	5.90	7.30	8.20	11.20	24.12	20.09	31.64	38.91	29.31	**28.03**
South Korea	-	-	-	6.26	9.01	13.14	12.20	15.89	15.95	**18.68**
Taiwan	-	-	-	-	4.50	3.27	3.98	4.21	4.66	**5.22**
Indonesia	-	-	-	-	1.54	1.85	2.10	2.00	2.85	**3.35**
Hong Kong	3.20	3.20	2.90	3.10	3.20	1.50	1.83	2.25	2.89	**2.85**
Burma, Laos & Cambodia	-	-	-	-	1.00	1.00	1.00	1.00	1.00	**1.05**
Vietnam	-	-	-	-	0.30	0.30	0.30	0.40	0.50	**0.64**
Malaysia	-	-	-	-	0.32	0.35	0.39	0.45	0.35	**0.39**
Philippines	-	-	-	-	0.15	0.15	0.15	0.16	0.17	**0.19**
Singapore	-	-	-	-	0.29	0.25	0.99	0.23	0.17	**0.13**
Other	3.00	9.30	9.60	14.30	-	-	-	-	-	-
Total Far East	97.00	110.70	121.10	135.66	160.62	151.20	159.94	173.37	166.30	**173.20**
Africa										
Morocco	-	-	-	-	0.45	0.48	0.48	0.45	0.45	**0.55**
South Africa	-	-	-	-	0.53	0.32	0.29	0.57	0.38	**0.45**
Algeria	-	-	-	-	0.38	0.35	0.32	0.29	0.29	**0.29**
Libya	-	-	-	-	0.34	0.35	0.32	0.29	0.27	**0.26**
Tunisia	-	-	-	-	0.19	0.19	0.19	0.23	0.25	**0.26**
Other	-	-	-	-	0.22	0.22	0.22	0.22	0.22	**0.22**
Total Africa	-	-	-	-	2.10	1.91	1.82	2.04	1.86	**2.02**
Australia	-	-	-	-	5.17	5.26	6.88	6.97	6.28	**5.47**
Other Western World	45.10	25.90	25.10	15.64	-	-	-	-	-	-
Western World Total	435.79	459.83	480.26	512.48	606.53	600.67	631.87	702.53	690.29	**699.40**
Other Countries										
China	-	-	-	-	22.03	23.46	23.88	25.60	29.48	**30.64**
North Korea	-	-	-	-	-	0.05	-	0.22	-	-
Soviet Union/CIS	-	-	-	-	72.60	76.50	64.78	40.07	38.30	**34.37**
Total Other Countries	132.60	108.10	117.80	118.70	94.62	100.00	88.66	65.89	67.78	**65.01**
World Total	568.39	567.93	598.06	631.18	701.15	700.67	720.53	768.42	758.07	**764.41**

The United States was the largest fabricator of silver at 139.7 Moz (4,345 t) in 1995, followed by Japan at 112.7 Moz (3,505 t) and India with 97.5 Moz (3,033 t). These three countries are in a league of their own, accounting between them for 50% of all Western World fabrication. Thereafter, only Italy and Germany have exceeded 50 Moz (1,560 t) followed by the United Kingdom, France and Thailand at around 30 Moz (930 t). Significantly, however, China is also now up to the 30 Moz level. Together, these nine countries account for 75% of world silver fabrication. The most significant newcomer in the 1990s (except for India becoming an importer rather than exporter) is South Korea, where silver use grew 17% in 1995 to 18.7 Moz (582 t), more than doubling the 1990 level. By contrast, fabrication in the CIS continues to decline falling by over 10% in 1995 to 34.4 Moz (1,069 t), less than half the 1990 level.

The Main Uses of Silver

The versatility of silver

Silver's unique properties include its strength, malleability and ductility, its electrical and thermal conductivity, its sensitivity to and high reflectance of light and the ability to endure extreme temperature ranges. This versatility means there are few substitute metals in most applications, particularly in high-tech uses in which reliability, precision and safety are paramount. At current price levels, performance is considered more important than cost.

Electrical

Silver is the best electrical and thermal conductor of all metals and is used in contacts, switches, conductors and fuses. Contacts refers to a junction between two conductors that can be separated and through which a current can flow. These perform three main functions, closing a circuit, opening a circuit or simply remaining closed indefinitely. Contacts are found in all types of domestic and industrial equipment.

Silver-cadmium oxide (85% to 97% silver) is currently the most widely used of all contact materials, providing excellent non-sticking qualities, high electrical conductivity, low electrical erosion over prolonged periods and economic advantages. However, due to environmental pressures, research is continuing into finding replacements for this alloy. Silver-tin-oxide and indium-tin-oxide, more expensive and arguably more difficult to use, already replace silver-cadmium-oxide in some products, notably in the automotive industry.

Fuses, similar to circuit breakers, are manufactured from fine silver wire although sterling silver and copper eutectic may also be used. These are used in the protection of transformers, cables or capacitor banks in distribution substations and within the high-voltage sectors of power plants and factories.

Electronics

The most significant uses in electronics are in the preparation of thick-film pastes, typically silver-palladium for use as silk-screened circuit paths, in multilayer ceramic capacitors, in the manufacture of membrane switches, silvered film in electrically heated automobile windshields, and in conductive adhesives.

Low current membrane switches have universal practicality for use in computer keyboards, telephone dialing keys, control panels on domestic appliances, facsimile and photocopy machines. Conductive adhesives serve as connectors between electronic components attached to circuit boards and between chips themselves as in 3D memory stacks. Conductive adhesives consist of polymers filled with metal particles or flakes, typically silver, developed originally as replacements for metallurgical solders and as such contain no lead and require no cleaning.

Electroplating

The ease of electrodeposition of silver from a double-alkali metal cyanide, such as potassium silver cyanide, or from silver anodes accounts for its widespread use in coating. Silver solutions are made up of a cyanide, a carbonate, silver and a brightener. The silver is usually added as the single salt, silver cyanide, or the double salt, potassium silver cyanide. Various forms of silver are used as anodes and may be in the form of plates, bars, rods, grain or in custom-designed shapes. The plating thickness of some items, such as fuse caps, is less than one micron although the silver then tarnishes more easily, and coatings of two to seven microns are normal for heavy duty electrical equipment.

Batteries

Many batteries, both primary (non-rechargeable) and secondary (rechargeable), are manufactured with silver alloys as the cathode. The inclusion of silver serves to increase current discharge within a light and narrow weight range. Silver cells are more expensive than their competitors by virtue of the higher silver contents but have superior power density. This power-to-weight advantage currently places the silver cell above its competitors, assisting electronic device manufacturers in their quest for smaller and more portable machines. The most common of these batteries is the small button-shaped silver oxide cell (approximately 35% silver by weight) used in watches, cameras and similar consumer electronic products. Its high-density power, high voltage, long life-span and relatively low cost, make it ideal for such applications.

The silver-zinc cell (approximately 40% silver by weight) possesses a higher energy density but shorter duration and is used in space and defense applications. Silver-cadmium batteries (approximately 40% silver by weight) have a lower energy density but are lighter and have an increased cycle life. Applications include space exploration (GEOS satellites), solar vehicles and aircraft. Magnesium-silver-chloride cells are used in sea-water and fresh-water environments, for items such as buoys and emergency lighting, with the water acting as the electrolyte.

Brazing and Soldering Alloys

Brazing is the joining of two or more dissimilar materials through the application of heat, a flux and a filler metal, the melting temperature of which is below that of the parent bodies. Brazing normally occurs at temperatures in excess of 600°C. At lower temperatures it is known as soldering.

Silver not only facilitates the joining of materials at lower temperatures, but creates naturally smoother, leak-tight joints with good corrosion resistance. Silver brazing alloys have diverse uses ranging from air conditioning and refrigeration equipment, through the automobile and aircraft industries, to silverware and jewelry. Until recently, cadmium-bearing silver alloys (35% silver) were most widely used. Environmental regulations, however, have restricted this alloy resulting in the silver-copper-zinc alloy and silver-tin cadmium-free alloy groups benefiting, despite higher costs. Brazing materials are manufactured in sheet, wire, rod, powders, pastes and custom designed stock shapes.

Silver solders are used predominantly in electronics for high-speed surface mounting and for the bonding of silicon chips to metallic lead-frames. This alloy comprises 65% tin, 25% silver and 10% copper. As with brazing, it is the original equipment manufacturers who dictate which alloys are necessary. The electronics industry is currently in a transition phase between tin-

lead alloys and tin-silver alloys. Circuits are getting progressively smaller rendering lead alloys obsolete. Space is now critical and lead solders are not as free flowing as silver-tin. Other new initiatives are the manufacture of microscopic silver connectors and the use of "snap-on" components which, in turn, will facilitate scrap recovery.

Catalysts

Silver is used as a catalyst in numerous chemical reactions, serving to increase the efficiency of the process without entering the reaction itself. These catalysts normally take the form of circular screens containing a mesh of 0.35mm diameter silver wires, but may also be in the form of silver crystals. Silver catalysts are particularly important in the manufacture of formaldehyde which is used to produce hard, flame-resistant thermoset resins used in the manufacture of housings for television sets, computers and electrical switch boxes. Ethylene is oxidised using a silver catalyst and used in the manufacture of polyester fibres, plastic film, molded items such as computer key-tops, detergents and anti-freeze. Silver-beryllium catalysts may be used for a similar purpose. Silver and silver-iron-palladium catalysts in motor vehicle exhausts reduce nitrious oxide emissions.

Mirrors and Other Coatings

Silver has unique optical reflectivity and responds so well to polishing that it reflects virtually 100% of light falling on it. Current mirror manufacture involves two separate solutions, dissolved silver, normally silver nitrate, and a reducing agent. This second solution causes the metallic silver to be deposited from its dissolved state. The two solutions are mixed together just prior to use and the prepared glass surface is covered with the reacting mixture, from which the silver precipitates. A protective coating is then applied to prevent damage to this layer of silver. Technologies for coating glass, cellophane, metals or other materials vary according to size and shape. Conveyor spraying, sputtering and vacuum sputtering are the most common techniques. Solar control and reflective films are widely used on windows in warmer climates serving to reduce air conditioning costs, while low emissivity coatings are best suited to colder climates in which heat is retained. In addition to coating glass for windows, thin film coatings are used in automotive glass, computer and other electronic displays and various specialised manufacturing processes. Injection coating is used in the case of angular or spherical articles such as Christmas tree decorations and thermos bottles.

Water Purification

Silver is employed increasingly as a bactericide and algicide in water purification systems. Silver-infused carbon elements combined with ion resins or ceramic filters impregnated with metallic silver are placed in cartridges through which drinking water passes. The bactericidal property of silver kills any micro-organisms that may exist whilst contributing only minuscule quantities of silver to the actual water supply. Hospitals, airlines, remote communities and, more recently, domestic households use this technology in treating water. Significant growth is expected in this sector over the next few years.

Bearings

Steel bearings electroplated with high purity silver have greater fatigue strength and higher load-carrying capacity than any other type and are used in aircraft and rocket engine applications. For heavy-duty uses these bearings are plated with an overlay as silver itself possesses poor surface characteristics. In the main engines of the space shuttle, silver seals reduce friction and prevent sparks capable of igniting the shuttle's explosive liquid-oxygen propellant.

Photography

The photographic process is based on the presence of light sensitive silver halide crystals, prepared by mixing a solution of soluble silver, usually silver nitrate, with a soluble alkali metal halide such as sodium chloride or potassium bromide. These grains are then suspended in the unexposed film. The effect of light on the silver halide disturbs the structure of this compound rendering it selectively reducible to metallic silver by reducing agents called developers. The resulting negative image is converted to the positive by repeating the process under specific conditions. Approximately 5,000 color photographs can be taken using one ounce of silver.

Photographic film manufacturers demand very high quality silver (999.9 fineness).

Jewelry and Silverware

Silver possesses working qualities similar to gold, enjoys greater reflectivity and can achieve the most brilliant polish of any metal. Consequently, the silversmith's objective has always been to enhance the play of light on silver's already bright surface. Pure silver (999 fineness) does not tarnish, but to make it durable for jewelry, it is often alloyed with small quantities of copper. It is also widely used with other base metals in gold alloys.

Sterling silver, at a fineness of 925, has been the standard of silverware since the 14th century, particularly in the manufacture of "hollow-ware" and "flatware".

Plated silverware usually has a coating of between twenty and thirty microns, while jewelry plating is only three to five microns.

Coin

Historically, silver was more widely used in coinage than gold, being in greater supply and of less value, thus being practical for everyday payments. Most nations were on a silver standard until the late 19th century with silver coin forming the main circulating currency. But after the gold rushes, the silver standard increasingly gave way to the gold. Silver was gradually phased out of regular coinage, although it is still used in some circulating coins and in American, Australian, Canadian and Mexican bullion coins for investors.

Industrial and Decorative

Industrial and decorative fabrication in the Western World rose by 6.5% to 241 Moz (7,496 t) the highest level ever recorded and up 26% since 1990. With China and the CIS included, the world total is 291 Moz (9,051 t). This sector now accounts for 38% of all silver fabrication. Japan is the largest user at 54 Moz (1,670 t) followed by the United States with 49 Moz (1,540 t) and Germany at 19 Moz (590 t). Electrical and electronic uses alone require 203 Moz (3,200 t).

Industrial and decorative fabrication in **Japan** (which was again the world's largest fabricator in this category) grew by 5% to 53.9 Moz (1,675 t) last year, compared with almost 12% growth in 1994. The growth in 1995 occurred in spite of a number of negative factors, including continued weakness in the economy, the strong yen and the disruption following the Kobe earthquake. The two principal sectors, silver nitrate for non-photographic use and contacts, both registered slightly better performances. Silver nitrate, which has taken over increasingly from gold for the plating of lead frames in semiconductors, rose to 9.3 Moz (290 t). Silver nitrate is also required for catalysts, pastes for electronics and anti-bacterial compounds used as coatings in the plastics and ceramics industries. The manufacture of contact points rose by 3% to 8.8 Moz (274 t), although some semi-fabricators reported a much larger rise in their sales of silver sheet for contacts. The contact manufacturers continued to suffer, however, from the strength of the yen which has made exporting difficult, except for those making high-current products used in specialist applications.

Brazing alloys showed slight growth to 4.8 Moz (150 t) in response to a continued increase in consumer demand for air conditioners and refrigerators, but this was sluggish compared with the previous year when a 20% increase was stimulated by a hot summer. The use of silver in electro-plating solutions, mostly based on silver potassium cyanide (SPC) was marginally higher at 3.7 Moz (115 t) of which up to 70% is for the electronics industry, with the balance being used in decorative plating. This split between the main SPC applications is, however, hard to quantify precisely because the SPC makers cannot always be certain of their end-uses (especially if it is exported). Dental alloy fabrication has been revised slightly upwards for the years since 1993 due to new information on silver's use in gold/silver alloys. For 1995, offtake was unchanged at 2.3 Moz (70 t).

In the **United States**, industrial and decorative fabrication rose by just over 7% to 49.4 Moz (1,536 t). This sector has thus maintained a steady growth rate throughout the 1990s, having risen by nearly 12 Moz (360 t) or 31% since 1991, confirming

Figure 20
Japanese Silver Fabrication

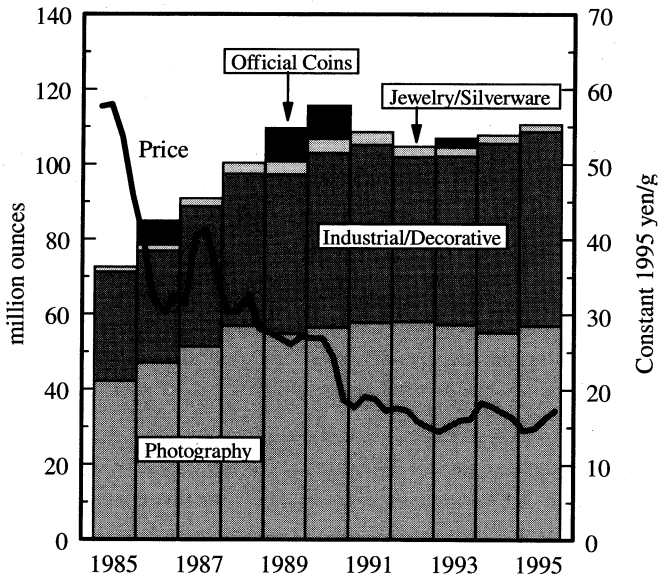
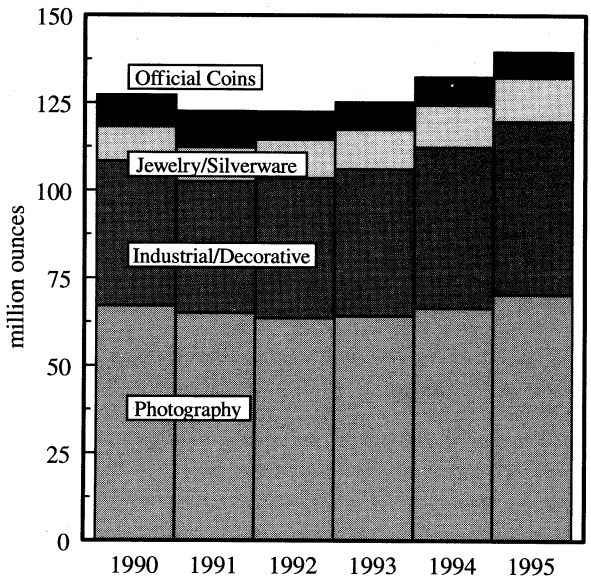


Figure 21
US Silver Fabrication



it as the real trend-setter in the widening use of silver. This expansion has been underpinned by the growth in demand from the *electronic and electrical* sector, which took 23.0 Moz (715 t) in 1995, registering a 10% improvement.

The prime use in electronics and the electrical sector is in contacts, for which the demand has both expanded and become more diversified. Besides the power control market, for instance, demand growth has come from domestic appliances, such as washing machines in which the timer alone already contains up to 100 contacts, and is becoming more complex each year. The automobile industry, too, needs an ever-increasing range of contacts. A typical American car now contains an average of 27 relays, whereas 20 years ago it often contained just three (in the headlights, starter and horn). Close to 1.1 ounces of fine silver is used per 1,000 automobile contacts and with four contacts per relay, almost one-tenth of an ounce (3 g) is consumed in every car made today.

Circuit breakers, a specialized form of silver contacts, are also particularly important in the United States, where most homes employ them instead of fuse boards (unlike in the United Kingdom where the traditional fuse is still commonplace or in continental Europe where silver-nickel and silver-graphite are used for circuit breakers).

The cost of silver is still significant when it comes to the manufacture of contacts. For a large contact, as much as 50% of the manufacturer's sales price can be represented by the raw material cost. Even for small contacts, the silver content typically accounts for 10% to 15% of the product's price. Hence there is still some incentive to economize on silver at the design stage. On the other hand, there is a cost in the form of increasing manufacturing complexity in minimizing unit silver use and with low silver prices, the trade-off between higher material costs but lower manufacturing costs may actually result in greater silver loadings. In the early 1980s, higher silver prices caused designers to reduce the average silver content of contacts, while today newer designs may even incorporate more silver in order to improve the efficiency or reliability of the component.

Whereas in the United States, silver-tin contacts are still only used in substantial quantities in the automotive industry, in Europe most new products are designed for silver-tin. Silver-tin is harder to work with and requires stricter design parameters than the traditional silver-cadmium alternative.

Miniaturization is still a long-term threat to silver use in contacts but to date, very little progress has been made in substituting them by solid-state relays which are still far too expensive. Yet, if the cost handicap and more technological difficulties are overcome, solid-state relays would eventually pose a major threat to the market for both silver-cadmium and silver-tin contacts.

The use of silver in *solders and brazing alloys* increased by 4% last year to 8.0 Moz (248 t), while demand for *catalysts* also grew to 4.6 Moz (143 t). However, a high percentage of the silver used in catalysts is recycled quickly rather than being finally consumed. Consequently, scrapped catalysts form an important part of the overall scrap number for the United States.

There are two alternative methods of manufacturing primary silver *batteries* and, depending upon which is used, either silver oxide or silver powder is required as the basic material. In the United States, the proportions are typically 50% of each. The threat posed by rechargeable alkaline batteries will only be mitigated in a minor way by the fact that silver oxide is used as a catalyst in rechargeable batteries.

The amount of silver required for *industrial and decorative electroplating* increased to 3.5 Moz (109 t). This is primarily for silver anodes, with the use of silver potassium cyanide (SPC) generally more common in plating for the electronics sector (which is included in the total for electronics and electrical).

The use of silver for *water purification* showed continued growth last year with offtake rising 10% to 2.2 Moz (68 t).

The net offtake of silver in the manufacture of *mirrors* was stable at 0.7 Moz (22 t) in 1995, the previous series having been revised downwards to take into account the large amounts of process scrap generated by this industry, not only in the United States but throughout the world. Even the most efficient US and European manufacturers of mirrors create about 40% process scrap, while in developing countries, the figure can be as high as 70%. But the logistics of moving glass result in most mirrors being manufactured and sold locally in many cases on the basis of domestically produced silver nitrate. Consequently, instead of inefficient local producers being displaced by imports of mirrors from, say, the United States, the technology itself is now being

Table 5
Silver Fabrication: Industrial and Decorative Uses
(including the use of scrap)
Million ounces

	1986	1987	1988	1989	1990	1991	1992	1993	1994	**1995**
Europe										
Germany	17.40	17.40	19.20	21.50	22.31	21.09	20.00	18.64	18.16	**18.97**
France	6.60	6.90	7.60	8.60	10.58	12.09	14.05	12.86	14.21	**15.01**
UK & Ireland	9.20	8.70	8.50	9.40	9.50	9.77	9.99	10.21	10.67	**10.92**
Italy	6.90	6.90	7.49	7.69	9.67	9.75	9.16	9.76	10.02	**10.42**
Switzerland	-	-	-	-	5.30	5.95	6.21	5.76	6.69	**6.88**
Spain	-	-	-	-	1.90	1.90	1.83	1.83	1.70	**1.67**
Netherlands	0.80	0.70	0.70	0.70	1.17	1.17	1.16	1.16	1.16	**1.16**
Austria	0.50	0.50	0.50	0.60	1.00	1.00	1.00	1.00	0.98	**1.04**
Poland	-	-	-	-	0.64	0.45	0.51	0.64	0.77	**0.87**
Czech Republic	-	-	-	-	0.76	0.68	0.56	0.50	0.41	**0.50**
Other	0.40	0.50	0.40	0.40	1.46	1.43	1.40	1.40	1.43	**1.43**
Total Europe	41.80	41.60	44.38	48.89	64.29	65.27	65.86	63.76	66.20	**68.87**
North America										
United States	55.00	46.90	48.60	55.00	41.39	37.59	40.09	42.09	46.01	**49.39**
Mexico	1.20	1.00	1.00	1.10	3.34	3.34	3.34	3.34	3.60	**3.35**
Canada	9.60	10.40	11.00	12.00	0.70	0.70	0.70	0.72	0.64	**0.74**
Total North America	65.80	58.30	60.60	68.10	45.43	41.63	44.13	46.15	50.25	**53.48**
Central & South America										
Brazil	-	-	-	-	2.42	2.42	2.42	2.51	3.23	**3.43**
Argentina	-	-	-	-	1.29	1.29	1.29	1.29	1.29	**1.22**
Chile	-	-	-	-	0.32	0.32	0.32	0.32	0.35	**0.39**
Colombia	-	-	-	-	0.34	0.34	0.34	0.34	0.34	**0.34**
Other	-	-	-	0.20	0.53	0.53	0.53	0.53	0.53	**0.53**
Total Central & South America	-	-	-	0.20	4.90	4.90	4.90	4.99	5.74	**5.91**
Middle East										
Turkey	-	-	-	-	1.03	0.98	1.14	1.24	1.11	**1.21**
Israel	-	-	-	-	0.48	0.64	0.96	1.03	1.13	**1.19**
Other	-	-	-	-	0.08	0.09	0.12	0.09	0.09	**0.11**
Total Middle East	-	-	-	-	1.59	1.71	2.22	2.35	2.32	**2.50**
Indian Sub-Continent										
India	-	9.70	11.20	9.86	18.14	19.79	19.42	28.92	31.68	**34.14**
Other	-	-	-	-	1.13	1.35	1.67	1.93	1.61	**1.61**
Total Indian Sub-Continent	-	9.70	11.20	9.86	19.26	21.14	21.09	30.84	33.28	**35.75**
Far East										
Japan	29.80	37.40	40.60	42.50	46.99	48.00	44.55	45.78	51.17	**53.85**
South Korea	-	-	-	1.00	2.30	4.00	4.00	8.47	9.55	**11.89**
Taiwan	-	-	-	-	3.00	2.77	3.38	3.63	4.08	**4.69**
Hong Kong	2.30	2.30	2.10	2.20	2.30	0.54	0.87	1.29	1.93	**1.95**
Indonesia	-	-	-	-	0.37	0.59	0.72	0.37	0.34	**0.39**
Other	0.60	0.70	0.80	1.10	-	-	-	-	-	**-**
Total Far East	32.70	40.40	43.50	46.80	54.96	55.90	53.52	59.53	67.07	**72.76**
Africa										
South Africa	-	-	-	-	0.48	0.28	0.22	0.53	0.32	**0.32**
Other	-	-	-	-	0.27	0.27	0.27	0.27	0.27	**0.37**
Total Africa	-	-	-	-	0.75	0.55	0.49	0.80	0.58	**0.68**

Table 5
Silver Fabrication: Industrial and Decorative Uses
(including the use of scrap)
Million ounces

	1986	1987	1988	1989	1990	1991	1992	1993	1994	**1995**
Australia	-	-	-	-	1.97	1.94	1.96	2.04	2.16	**2.45**
Western World Total	140.30	150.00	159.68	173.85	193.16	193.05	194.18	210.18	227.62	**242.42**
Other Countries										
China	-	-	-	-	17.29	17.66	18.80	20.10	23.21	**24.27**
Soviet Union/CIS	-	-	-	-	58.00	64.00	54.00	31.00	29.00	**25.50**
Total Other Countries	-	-	-	-	75.29	81.66	72.80	51.10	52.20	**49.77**
World Total	-	-	-	-	267.87	274.02	266.39	261.01	279.01	**291.22**

transferred, often on the initiative of US firms, which are setting up at least a dozen new conveyors on which mirrors are made in Eastern Europe and Asia. US experts expect that this will increase silver use in mirrors. They point out that since the late 1970s, consumption in the United States and other industrial countries has been steady at around 1.5 sq ft (0.14 sq m) per person. Consumption in developing countries, however, is only a fraction of this level, suggesting that the potential for growth is considerable, as western companies establish new plants there.

Among other industrial sectors, demand from *bearings* manufacturers remained steady at 0.5 Moz (16 t), while *glass coating* absorbed 0.2 Moz (6 t) a rise of 15%, due to increasing energy conservation measures. Silver use in musical instruments (one of the most intriguing applications of silver, based on the resonance the metal gives instruments) was steady at almost 0.1 Moz (2 t). Across the range of specialist uses in dentistry, medicine and food, which require 2.4 Moz (74 t), the principal application is in dental amalgams which account for 1.0 Moz (31 t) of offtake.

Industrial and decorative offtake in **Germany** increased by over 4% last year to just under 19 Moz (590 t), despite the sluggish state of the economy.

Electrical and electronics uses accounted for nearly two-thirds of demand in this category and increased by close to 9% in 1995. The largest single element of demand in the electrical and electronics category is the use of silver in contacts and contact materials. Here, by contrast, there were reports of softer demand, partly caused by the marginal impact of economization measures - something usually obscured under conditions of stronger economic growth and rising demand for contacts. Thus in contrast to the situation in the US industry, the average amount of silver used per contact was reported to be falling very slightly as manufacturers sought to lower the average silver content in each product. This is achieved through making and designing smaller contacts with smaller inlays and strips or buttons of silver.

Customers want reduced prices for contacts but without compromising performance so contact manufacturers have an incentive to reduce raw material costs which, in spite of its historically low DM price, basically results in attempts to reduce silver use. However, overall, electronics and electrical demand still increased in 1995 due to a rapid increase in the amount of silver being used in other electrical and, especially, electronic applications, for example, in the form of plating anodes and thick film pastes.

German demand for *solders and brazing alloys* dropped almost 4% last year to 4.0 Moz (125 t). However, German manufacturers are leaders in developing cadmium-free alloys, which, could result in a rebound in sales and fabrication if the trend away from cadmium-containing alloys were to accelerate.

Fabricators in the **United Kingdom** required 10.9 Moz (340 t) last year for use in a wide range of industrial and decorative end-uses. The largest offtake was for *electrical and electronic* products, including solid contacts, adhesives and pastes, and for

electroplating where, there is a large demand for silver in the form of anodes, granules and silver potassium cyanide for the plating of fuses, contacts and connectors.

The UK automotive industry uses some 5 to 6 million silver-plated switches per year. The trend here has been to move to gold switches rather than silver or nickel because the expanding network of micro-electronic circuiting in automobiles uses lower voltages for which gold is better suited. By law, all contacts associated with airbag systems must be gold-plated. There is still a high demand for silver-coated switches from the automotive sector, especially in the less critical areas such as thermostat control. Growth is evident in most of the market and especially in coatings for the auto-trade; silver is replacing nickel and tin and where silver was formerly used, gold is often being introduced. Due to the low cost of silver, very little selective plating is done.

Another significant electro-plating market is for thermostats in jug kettles, where the connectors require thick plating (40 microns or 0.001 inches). While mobile phones do not in themselves contain much silver, the rapid growth in this sector has had an effect on the silver market through the construction of ground stations employing large numbers of silver-plated connectors and housings. Due to the deregulation in the telephone equipment sector, appliances such as answer phones and modems can overload the phone circuitry, leading to an increased use of silver-plated fuses and circuit-breakers, a trend which will surely continue.

Demand for *catalysts* has been increasing, particularly from overseas markets and for use in the production of plastics.

Combined industrial and decorative fabrication in **France** rose by nearly 6% to 15 Moz (467 t). *Electrical applications*, mainly in solid silver (plus some bi-metallic) contacts, accounted for 7.9 Moz (247 t) which was the highest level since 1992. By contrast, *brazing alloys*, despite higher silver purity due to restrictions on cadmium use, declined to 1.6 Moz (50 t) because of lower exports. The best growth was in silver potassium cyanide, exports of which have doubled since 1992, taking fabrication to 2.3 Moz (72 t) in 1995. Demand for silver in rods used in nuclear power stations also rose to 0.7 Moz (22 t), the best level since 1989. Finally France preserves a unique niche in making silver thread (similar to Indian *jari*) which is used in embroidery and consumed 0.6 Moz (19 t) last year, much of the thread being exported to North Africa and the Middle East.

Industrial and decorative fabrication in **Italy** rose by almost 4% to 10.4 Moz (324 t), helped by stronger exports of silver potassium cyanide and brazing alloys, which account for nearly half of the offtake for these specialized products. Silver consumption for SPC output, most of which is used in decorative applications, amounted to 3.8 Moz (118 t), while brazing alloys required 2.4 Moz (75 t). A further 3.2 Moz (100 t) was used in the electrical sector, mainly for contacts. The market for nitrates used to make pastes for flat glass used in the automobile industry have been developing in recent years and absorbed 0.5 Moz (16 t) of silver.

In **Switzerland** demand was 6.9 Moz (214 t), with 80% of the products being exported. The main uses are in wires, contact bands and powders used in electronics, which together used 3.6 Moz (113 t). *Brazing alloys and solders* absorbed 1.8 (57 t) Moz and *plating solutions* (mostly for decorative use) use 0.9 Moz (28 t).

Industrial fabrication in **Spain** was stable at 1.7 Moz (52 t) last year, with half of the total accounted for by *electrical use*, mainly in contacts, while *brazing alloys* declined due to substitution of locally-made alloys by imports.

In **India**, industrial and decorative fabrication rose by almost 8% to 34.1 Moz (1,062 t). By contrast with the industrial countries described above, the main applications within this category in India include a wide range of chemical, pharmaceutical and food-related products, such as *Ayurvedic* medicines and the large amounts of silver foil mixed in with chewing tobacco and used to embellish certain food products. Together, these accounted for 11.3 Moz (350 t) of offtake. *Decorative plating* also increased, by 25% to 9.6 Moz (300 t). The main area of decline last year was for the manufacture of *jari*, the gold-plated silver thread which is woven into silk or cotton cloth to embellish saris. Two types of *jari* are made: real *jari* is a silk thread wound with a silver alloy wire and electro-plated with gold, while imitation *jari* uses a copper alloy wire, which is plated with silver and colored with a gold varnish. A switch from real to imitation *jari* last year, due to a squeeze on consumer spending, led to a 13% fall in silver use to 8.4 Moz

Electrical and Electronics

The increased use of silver in this sector since 1991 has come mostly from the 46.5% growth in the United States, due to consistently strong demand for silver powder and flake for the electronics industry and increasing demand for electrical contacts for the automotive and mobile telephone industries. Whilst the weakness of the electrical appliances sector limited growth in the early 1990s, the increasing complexity of home appliances has boosted demand for contacts, helping countries such as Germany and Japan move from negative to positive growth. Three countries achieved significant positive growth throughout the period: China, due to its strongly expanding industrial sector; Switzerland, with strong exports of silver wire and contact strips; and Taiwan, as a result of the rise in semiconductor production in South East Asia. South Korea has also shown strong growth in recent years as many companies shift production facilities away from larger industrialised nations to emerging countries which can offer more cost-effective labour.

Table 5a
Silver Fabrication: Electrical and Electronics
(including the use of scrap)
Million ounces

	1991	1992	1993	1994	**1995**
United States	15.69	17.10	18.29	20.90	**22.99**
Japan	17.62	15.68	15.75	16.89	**17.30**
Germany	12.73	12.07	11.25	10.93	**11.90**
China	7.76	8.20	8.60	10.61	**10.93**
France	6.43	7.65	6.21	7.59	**7.94**
South Korea	4.44	3.70	4.51	5.27	**6.43**
UK & Ireland	4.44	4.47	4.53	4.60	**4.66**
Switzerland	1.93	2.57	2.76	3.47	**3.76**
Taiwan	2.19	2.67	2.81	3.18	**3.54**
Italy	3.95	3.22	3.38	3.22	**3.22**
India	2.44	2.44	2.44	2.57	**2.96**
Brazil	0.99	0.99	1.03	1.49	**1.58**
Mexico	1.51	1.51	1.51	1.61	**1.45**
Turkey	0.98	1.14	1.24	1.11	**1.21**
Spain	0.90	0.90	0.96	0.90	**0.90**
Hong Kong	0.48	0.32	0.49	0.71	**0.74**
Netherlands	0.64	0.64	0.64	0.64	**0.64**
Australia	0.42	0.42	0.44	0.47	**0.55**
Austria	0.23	0.23	0.23	0.23	**0.24**
Egypt	0.09	0.12	0.09	0.09	**0.11**
Romania	0.10	0.10	0.10	0.10	**0.10**
Total	85.96	86.14	87.25	96.56	**103.14**

Brazing Alloys and Solders

The United States has dominated the expansion of this sector, accounting for 85% of the world's growth since 1991. Despite stricter EPA restrictions on hazardous metals such as cadmium and lead, increased local consumption and rising exports to developing countries helped the United States to increase its market share in this sector. The situation has been very different in Germany and Japan. Only the unusually hot Japanese summer of 1994, which boosted demand for brazing alloys in air conditioners, kept Japanese demand rising, whilst Germany, showed a decline every year since 1991, although positive developments in cadmium-free brazing alloys may reverse this trend in the future. The fastest growth was attained by South Korea and Taiwan as demand has increased from the expanding electrical and electronics industry. Although the estimates for Chinese demand in this sector are subject to greater error than for other countries there is no doubt that it is large and growing.

Table 5b
Silver Fabrication: Brazing Alloys and Solders
(including the use of scrap)
Million ounces

	1991	1992	1993	1994	**1995**
United States	5.59	6.49	7.20	7.68	**7.99**
China*	4.50	5.00	5.20	5.50	**6.00**
Japan	4.77	4.19	3.84	4.73	**4.80**
Germany	5.09	4.83	4.50	4.18	**4.02**
Italy	1.93	2.09	2.25	2.19	**2.41**
UK & Ireland	2.25	2.25	2.28	2.31	**2.31**
India	1.45	1.45	1.45	1.61	**1.93**
Switzerland	2.57	2.41	1.77	1.80	**1.80**
France	2.09	2.38	1.96	1.80	**1.61**
South Korea	0.20	0.30	0.80	0.96	**1.22**
Mexico	1.20	1.20	1.20	1.32	**1.16**
Taiwan	0.58	0.71	0.82	0.90	**1.16**
Brazil	0.56	0.56	0.58	0.84	**0.81**
Australia	0.58	0.59	0.61	0.65	**0.75**
Canada	0.41	0.41	0.41	0.41	**0.51**
Spain	0.58	0.48	0.35	0.26	**0.19**
Israel	0.00	0.00	0.13	0.16	**0.16**
Austria	0.16	0.16	0.16	0.13	**0.11**
Total	34.51	35.50	35.51	37.42	**38.93**

* estimated

(260 t). Demand for silver from the *electrical sector*, mainly in the form of contacts, continued to rise, by 15% last year, to 3.0 Moz (93 t) with the main reason for the increase being the electrification program which is sweeping the country. Demand for *brazing alloys and solders* also increased, to 1.9 Moz (60 t) due to the general improvement in industrial production.

South Korea's role as a substantial industrial user of silver was further enhanced by a 24% increase in its fabrication within this category to 11.9 Moz (369 t), ranking it sixth in the Western World, in front of the UK and Italy. Industrial use has tripled since 1992 and growth seems set to continue. The largest component is the manufacture of *electrical contacts*. Korea has ten main contact makers, whose combined demand rose by 25% in 1995 to 5.6 Moz (175 t), driven by the expansion of the automobile industry, which uses up to 70% of the contacts produced. Silver use in the selective plating of lead frames for the semiconductor industry also advanced, helped by the increasing production of DRAMS (memory chips) of which South Korea is now the foremost producer. Strong consumer demand for air conditioners and refrigerators led to a 27% increase in the fabrication of *brazing alloys* to 1.2 Moz (37 t). The only sectors not to show improvement were *decorative plating*, where production is reported to be moving to China because of lower labor costs, and *mirrors* which showed little if any growth in 1995.

Overall, industrial and decorative fabrication in **Taiwan** rose by almost 15% to 4.7 Moz (146 t). The improvement came on the back of strong growth in the *electronics* sector, which led to the output of silver potassium cyanide plating salts rising to 2.8 Moz (87 t) partly at the expense of imports. The main use for these salts is in the plating of lead frames, of which Taiwan is the world's largest producer. By contrast, silver use in *contacts* was down 16% to just under 1 Moz (30 t) mainly because some of this activity has been transferred to China. *Brazing alloys*, however, of which there are three main manufacturers, showed 28% growth to 1.2 Moz (36 t).

Demand for silver in industry and in decorative plating continued to grow in **China**, although more slowly than in the early 1990s. Fabrication is estimated to have risen by 5% to 24.3 Moz (755 t). The main use is in the manufacture of *contacts* which accounted for 10.9 Moz (340 t). Production could increase further if other Taiwanese contact manufacturers transfer fabrication to the mainland. *Brazing alloys* also continued as a strong sector, accounting for 6.0 Moz (187 t) and reflecting the widening consumer demand for air conditioners and refrigerators. Other applications of silver in *batteries*, *catalysts*, *cathodes* and *mirrors* rose slightly to 5.7 Moz (178 t) but the biggest percentage improvement, of over 14%, came in *decorative plating* which absorbed 1.6 Moz (50 t), confirming reports from South Korea and Hong Kong that decorative plating work is being transferred to China.

Hong Kong is also an important manufacturer of lead frames for semiconductors, but much of the plating salts used is imported (and therefore counted in this Survey in the country of original manufacture). However, local production of silver potassium cyanide (SPC), which grew in recent years, stabilized at 1.9 Moz (59 t) last year, with incremental demand being supplied largely by imports. The plating of lead frames with the locally produced SPC accounted for 0.7 Moz (22 t) in 1995, the rest being applied in *decorative applications* mainly in China. The silver nitrate used for *mirrors* and silver oxide *batteries* is now all imported.

Photography

Silver use in photography in the Western World rose by 4.6% to a record level of almost 210 Moz (6,530 t) exceeding the previous best of 206 Moz (6,420 t) in 1990. Including estimates for China and the CIS, the world total was 222 Moz (6,910 t). Manufacture improved in both the United States and Japan which between them account for 57% of world output, helped in part by inventory building for the launch in April 1996 of the new Advanced Photo System (APS).

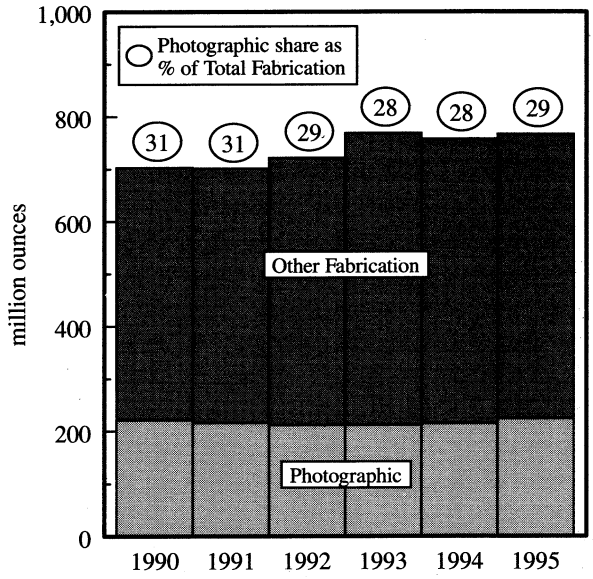
With virtually no trend growth over the last 6 years, the photographic industry's share of overall fabrication has gradually fallen as can be seen in Figure 22.

The photographic industry remains concentrated in a handful of countries. The United States, Japan, Belgium, the United Kingdom, Germany and France account for 90% of worldwide silver use in this sector. Even industrial countries, such as Italy and Spain, rely almost entirely on imports of silver nitrate for their own film or photographic paper-making, while in many countries, imported films from the three principal manufacturers, Eastman Kodak, Agfa and Fuji, are preferred by consumers to local brands. In India, for instance, local silver nitrate use for film has fallen from over 5.6 Moz (175 t) five years ago to 0.6 Moz (19 t) as imported films win market share. This preference for famous names is also slowing the growth of domestic film manufacture in China.

The test for the photographic industry in 1996 will be the success of the new Advanced Photo System (APS), described on the following page, in stimulating the popular market for color photography by simplifying it even further. The APS represents a combined industry response to the challenge of digital imaging, showing its confidence in the future of silver-based photography. While digital photography is attracting more attention in the professional market, among the broad spectrum of amateur photographers, the high cost of equipment and low quality of pictures from amateur digital cameras do not yet make it a significant alternative to silver-halide film.

The **United States** is estimated to account for 40% of worldwide sales of photographic products. Over the last 25 years US photographic industry revenues

Figure 22
Photographic versus Total Fabrication



(in terms of both equipment and supplies) have on average grown at between 7% and 8% per annum. However, after double digit growth in the 1970s, the average annual rate of increase in sales slumped to 5% in the 1980s and to just 2% per annum in the 1990-94 period. Put simply, these figures show that, by the early 1990s, the US market had matured after a period of (at times) explosive growth. Another sign of maturity is that, apart from a blip up in 1993, amateur camera sales in the United States have steadily declined since 1990. And although amateur film sales have continued to increase during the 1990s, according to data from the Photo Marketing Association, unit growth averaged only 0.7% per annum from 1990 to 1994. Much of the growth in film has in fact come from sales of single-use cameras (see Figure 23 overleaf). US sales of these have risen from 3.8 million units in 1988 to 53.9 million last year. However, the high rate of scrap recovery on single use cameras limits this product's impact on silver demand.

It is against the backdrop of mature markets in much of the developed world that the Advanced Photo System (APS) was launched in April 1996. The industry hopes that the new system will stimulate demand in much the same way as did the Instamatic Camera System and 110 Film developed by Kodak in the early 1960s. The build-up of inventory for the

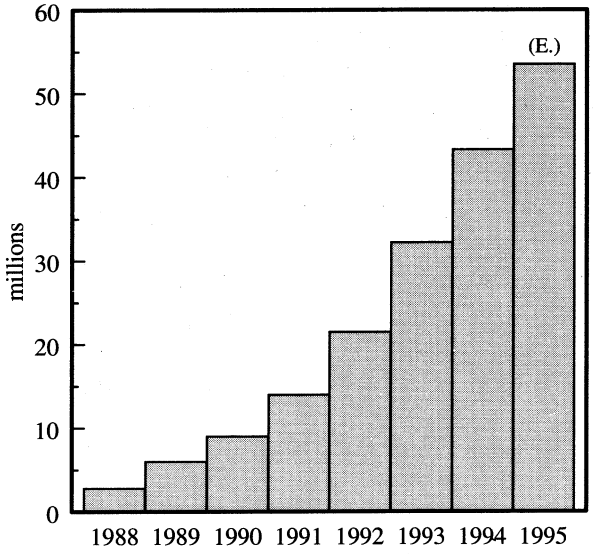
Table 6
Silver Fabrication: Photographic Use
(including the use of scrap)
Million ounces

	1986	1987	1988	1989	1990	1991	1992	1993	1994	**1995**
Europe										
Belgium	17.20	17.40	18.80	18.80	18.97	19.35	19.74	20.13	20.80	**21.28**
UK & Ireland	8.10	10.40	12.30	13.00	12.57	13.05	14.05	14.63	17.68	**18.42**
France	7.70	8.40	11.20	10.80	12.54	13.41	14.31	14.73	13.66	**15.91**
Germany	10.40	10.50	12.10	12.50	16.08	16.56	15.75	15.43	16.08	**14.79**
Poland	-	-	-	-	2.89	2.25	0.48	0.48	0.48	**0.48**
Hungary	-	-	-	-	0.39	0.35	0.32	0.26	0.19	**0.16**
Spain	-	-	-	-	1.61	1.45	0.64	0.35	0.19	**0.10**
Romania	-	-	-	-	0.48	0.39	0.32	0.26	0.19	**0.06**
Other	7.70	5.90	2.60	2.00	0.64	0.48	0.16	-	-	-
Total Europe	51.10	52.60	57.00	57.10	66.17	67.28	65.77	66.27	69.28	**71.20**
North America										
United States	55.40	60.20	62.50	65.20	67.00	65.01	63.50	64.01	66.30	**70.30**
Mexico	4.30	3.90	4.00	4.00	2.25	2.25	3.22	3.86	3.86	**4.12**
Canada	-	-	-	-	2.89	1.93	-	-	-	-
Total North America	59.70	64.10	66.50	69.20	72.14	69.19	66.72	67.87	70.16	**74.42**
Central & South America										
Brazil	-	-	-	-	2.57	2.57	2.57	2.64	3.22	**3.86**
Argentina	-	-	-	-	0.80	0.80	0.80	0.80	0.80	**0.80**
Total Central & South America	-	-	-	-	3.37	3.37	3.37	3.44	4.02	**4.66**
India	-	4.10	4.80	4.80	5.63	2.57	2.57	2.25	1.61	**0.64**
Far East										
Japan	47.00	51.30	56.80	54.80	56.50	57.80	58.02	57.20	55.07	**56.91**
Indonesia	-	-	-	-	0.10	0.13	0.16	0.18	0.21	**0.23**
Taiwan	-	-	-	-	0.10	0.10	0.10	0.10	0.10	**0.05**
Total Far East	47.00	51.30	56.80	54.80	56.70	58.03	58.28	57.48	55.38	**57.18**
Australia	-	-	-	-	2.25	2.25	2.25	2.09	1.93	**1.61**
Western World Total	157.80	172.10	185.10	185.90	206.26	202.69	198.96	199.40	202.38	**209.71**
Other Countries										
China	-	-	-	-	4.34	4.43	4.68	5.10	5.60	**5.60**
Soviet Union/CIS	-	-	-	-	10.00	9.00	8.00	7.20	7.00	**6.80**
Total Other Countries	-	-	-	-	14.34	13.43	12.68	12.30	12.60	**12.40**
World Total	-	-	-	-	220.60	216.12	211.64	211.70	214.98	**222.11**

APS launch helps to explain the rise in output of color paper and film in 1995. In addition, changes in the various manufacturers' market shares in both the United States and abroad had an impact on the level of US production. Following 3.6% growth in US fabrication demand for silver in 1994, output expanded by a further 6% last year to 70.3 Moz (2,187 t).

The principal cause of this growth was an estimated 8% rise in the commercial photography sector in the United States. In particular, demand for color paper expanded strongly in 1995. Although the anti-dumping measures enacted by the United States against one of the Japanese manufacturers played a part, the rise in domestic fabrication was also helped by an underlying growth in demand. This was in turn based upon consumers' preference for larger prints and promotions, often involving multiple copies. Regarding print size, whereas traditional prints in the United States are 3.5 by 4.5 inches, increasingly

Figure 23
US Single-use Camera Sales



Source: Photo Marketing Association International

consumers are choosing larger 4 x 6 inch prints. Demand for this larger format increased strongly in 1995. Growth in paper fabrication is expected to be helped by the introduction of the APS which has a built-in tendency to increase paper usage.

The challenge from digital photography continues to develop but the threat seems a modest one given the two significant quality problems which the new technology must still overcome. These are the inferior (and expensive) image capture and the low quality of the output medium. Silver halide paper is much better than thermal or ink-jet paper in terms of quality, although the gap has narrowed. On the other hand, camera price is becoming less of an issue. Nevertheless, although in 1996 the price of digital cameras will fall, the average consumer is still accustomed to a much lower price for traditional cameras. Consequently, for the foreseeable future,

New Technologies in Photography

The future of silver use in photography will be influenced by the success of the newly-launched APS (Advanced Photo System) and the relative growth of digital imaging, the former representing an evolution of silver-halide technology, while the latter, utilizing electronic means of image capture and storage, represents a threat.

At the heart of the APS is a new film format with a number of features designed to improve and simplify photography. The most significant improvements will be the choice of three different print sizes and the ability to select the frames for printing from an initially produced sheet of minature prints.

The new cartridge adds features such as a disk to store various types of film information which can be used by the cameras to adjust for lighting conditions and prevent accidental double-exposures.

The film itself is made from a stronger and thinner base and is coated with more advanced emulsions. The reverse side of the film has a transparent magnetic layer which can record digital information to be used by the photofinishing equipment.

Although each frame of film will capture the full image entering through the lens, the selection of different print formats allows the photofinishing equipment to magnify a suitable area of the frame to produce prints with a range of aspect ratios.

The most important question for silver may be whether the APS will encourage more prints to be made because of a wide range of options, or less prints because of the built-in facilities for print selection.

Turning to digital imaging, the threat to silver lies in the replacement of the film by a semiconductor chip known as a charge-coupled device (CCD). The photographs are then downloaded onto computer on which they can be manipulated or printed.

The quality of the image is directly proportional to the number of photocell elements in the CCD, which ranges from 250,000 in amateur cameras to over 6 million in the professional market. By contrast, the average 35mm negative contains approximately 10 billion silver-halide crystals!

Cameras currently being introduced for the amateur market cost in the region of $1,000 and produce images of up to 756 by 504 dots, or "pixels", making them suitable for amateur use on a computer screen, but far from acceptable for large prints.

Much more expensive professional digital cameras have, however, become fairly popular with photo-journalists, who can now send photographs across the world via mobile phone and computer links.

The most significant impact of digital photography on the demand for silver may, however, come from the medical X-ray sector, with some hospitals investing heavily in sophisticated computer equipment to replace the conventional X-ray light box.

the professional market holds the key to the expansion of digital photography. But professionals command only about 10% of the commercial market; the amateur sector still accounts for 90%.

Despite a growing challenge from imported film, overall silver use by **Japan**'s photographic industry grew by just over 3% in 1995 to 56.9 Moz (1,770 t). The improvement was chiefly due to the export of competitively priced amateur color film to other Asian markets and stock-building for the launch of the APS. The pattern in the domestic market continues to change, with growing overseas competition involving heavy advertising and the forming of alliances with supermarket chains offering cut-price film. These foreign suppliers have been aided by the strong yen, which has also forced significant price-cutting by the two domestic manufacturers in Japan.

The performance of the various sectors was mixed. Production of X-ray film increased marginally for both domestic and export markets, but manufacturers reported that serious growth was being curtailed by digital imaging. The market for commercial black and white film continues its decline. Growth in retail sales of color roll film, the largest sector of the market, was largely absorbed by increased imports and the domestic fabricators sustained film sales only through price cutting in the domestic market (for which there was some scope because of their efficient recovery of silver from used film) and higher exports. The demand for single-use "lens cameras", as they are known in Japan, which have built up a 20% share of all color roll film sales in recent years (and helped greatly to improve the efficiency of silver recycling) now appears to have peaked. Fabrication of photographic paper continues to decline due to cheap imports and many shops are now offering "free prints", provided they process the film. The graphic arts sector was also down 2-3% because of the impact of digital imaging.

In **Belgium**, most of the silver used in the photographic sector ends up in X-ray and graphic arts products manufactured locally or is exported after initial processing into silver nitrate or emulsions. Overall, Belgium's fabrication increased slightly in 1995 to 21.3 Moz (662 t) from a revised 20.8 Moz (647 t) the previous year.

Fabrication in the **United Kingdom** increased by over 4% in 1995 reaching 18.4 Moz (573 t). But, unlike 1994, when growth in output was entirely accounted for by rising exports of silver nitrate, last year's advance owed more to increased domestic consumption of silver in photographic products such as color and black and white film.

Demand for silver in **Germany** was adversely affected by an increase in imports of silver nitrate. Fabrication dropped by 8% to 14.8 Moz (460 t). Exports of silver nitrate were unchanged from the previous year's level. However, local production of photographic materials benefited from increased demand from the German and especially foreign markets, for film and, particularly, color paper.

A record year for the export of silver nitrate led to a 16% rise in fabrication in **France**. Total use was 15.9 Moz (495 t) of which exports, mainly to the Netherlands and Italy, accounted for over 60%. By comparison, the domestic market demand for commercial film, X-rays and the graphic arts was stable.

Although commercial and X-ray film is made in **Italy**, all the silver nitrate required is imported from France and Germany and the fabrication is counted in those countries. Similarly, in **Spain** manufacturers now rely almost entirely on imported nitrates, with a mere 0.1 Moz (3 t) made in the country.

Although **China** is growing as a market both for amateur color and X-ray film, with several plants in such cities as Beijing and Guangzhou, manufacture did not increase because foreign film is increasingly available in both categories and is often preferred to local brands. Silver use in China was stable at 5.6 Moz (175 t).

Photographic use in **India** is influenced by consumer preference for foreign film (some of which is packaged locally), with the result that domestic fabrication has declined to 0.6 Moz (19 t), compared with 2.3 Moz (70 t) just two years ago.

Photographic demand in **Mexico** increased slightly last year to 4.1 Moz (128 t). Over 75% of production is for export and this sector experienced some growth in 1995.

An increase in exports was also behind the strong growth in demand in **Brazil** last year to 3.9 Moz (121 t).

Jewelry and Silverware

Jewelry and silverware fabrication rose by 2.9% to 226 Moz (7,040 t) in the Western World, and 228 Moz (7,100 t) with the CIS included (no estimate is yet available for China). India, the largest producer at 63 Moz (1,950 t), showed growth of 8%, but in Italy (see special report overleaf) and Thailand, the two other leading fabricators, output was down. However, the latter three countries accounted for 130 Moz (4,060 t) of world demand. The manufacture of solid silverware continues to decline in most countries, while silver jewelry production is expanding in Italy, the United States and Mexico.

India is easily the largest consumer of silverware and jewelry with fabrication rising by 8% to 62.7 Moz (1,950 t), accounting for over 27% of world use in this sector. Although output is still well down on the exceptional record of 78.7 Moz (2,448 t) in 1993 (the first year of import liberalization and the stocking of many new shops), the improvement last year shows not only that the large inventories built up in that year are being reduced, but that demand can grow despite higher rupee prices. The growth in offtake seems to have been based on the rural areas, where yet another good harvest ensured rising demand for simple household silverware and ornaments, such as the heavy bangles, armlets, and *payals* (ankle chains). Many women acquire more than 10 pairs of *payals* of different styles and sizes by the time they reach maturity.

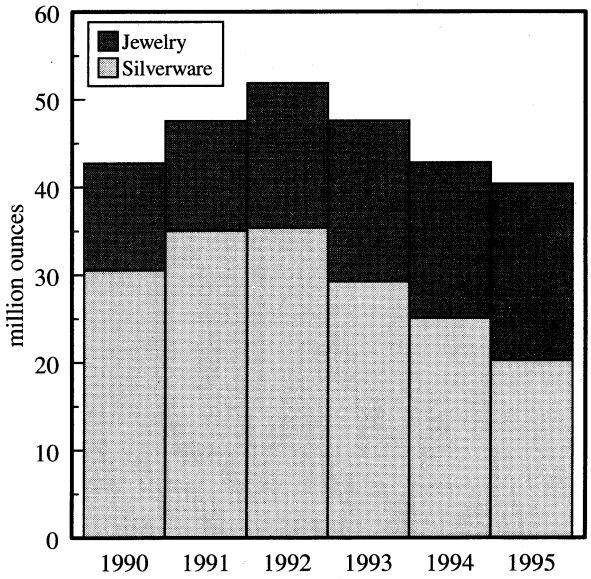
But the underlying reason for such substantial consumption of silver is the diversity of its uses by all sections of society, both among the farming communities of the countryside and business people in the cities. A typical city showroom may find that 40% of its sales are corporate gifts, 20% in ornaments related to marriage, 20% in household silverware, while the rest is for personal gifts, religious artifacts, medallions and ornate ingots. Many of the items sold serve as gifts for all occasions, family, social and business. An individual shop may carry a stock of 1,600 oz (50 kg) of silver and more than 200,000 new shops have opened since liberalization in 1993.

Both silverware and ornaments are usually between 850 and 950 fine, but there is an increasing demand for standardization and improved quality control. There is no generally accepted fineness, such as sterling silver, in India and many cases of under-title products have been reported.

Italy remains comfortably the second most important fabricator of jewelry and silverware, although manufacture declined for the third year in succession to 40.38 Moz (1,256 t) and is now 11.5 Moz (358 t) below the record level of 1992. This fall is a result of the country's political and economic difficulties which have cut into the traditional market for heavy items of silverware which were often given as corporate gifts. Silverware accounted for 20.2 Moz (630 t) in 1995 (see Figure 24). However, this decline is being offset by rapidly growing exports of silver jewelry and also by silver used in alloys in gold jewelry, which together, mean jewelry used 20.1 Moz (625 t) last year.

Figure 24

Italian Jewelry and Silverware Fabrication



After rapid growth in the early 1990s, silver jewelry manufacture in **Thailand** has declined for the last two years. Fabrication in 1995 fell to 27.4 Moz (850 t), well down on the peak of 38.5 Moz (1,199 t) in 1993. Silverware represents only a small part of the total: jewelry alone accounted for 26 Moz (800 t) last year. Yet the industry remains substantial, well-organised and continues to export around the world. Thailand ranks as the third largest fabricator in this sector, far ahead of the United States in fourth place. Although the recent consolidation has led to the closure of some workshops, several of the larger

Italy: an ancient heritage and the industry leader

For many years Italy has been the foremost fabricator of silverware and jewelry using in excess of 40 Moz (1,240 t) in each of the past six years. Only in the last three years has the Italian total been surpassed (by the rapid rise in India) while the world's third largest fabricator in this sector, Thailand, has approached but never reached the Italian figure. The tradition in Italy is an ancient one, stretching back to Roman times when silver was regarded as a symbol of power, prestige and culture; refined silver dinner services graced the tables of the patriarchs of Rome and Pompeii. The silversmith's art flowered during the Renaissance, inspired by the genius of masters such as Benvenuto Cellini and Michelangelo. Italian craftsmanship later reached a new peak of technical excellence and artistic expression in Baroque churches and palaces. With this heritage, Italian manufacturers of silverware and jewelry held their position at the forefront of the industry, in both style and technique.

Although in the 20th century, the silverware industry has inevitably become more mechanised, many articles are still assembled, decorated and finished by hand in ateliers displaying consummate workmanship in such cities as Alessandria, Bologna, Brescia, Padua, Palermo and Vicenza. Silverware, prized for decorating the table at home and as the traditional gift on social occasions, was already consuming well over 16 Moz (500 t) annually by the 1970s, until the metal's escalating price abruptly brought catastrophe. Families sold their dinner services rather than accumulating new items. The industry took almost a decade to recover, with many factories making the switch from solid silverware to silver-plating. Real recovery came only after 1986 when the price fell back to $5.46 and an economic boom brought the Italian consumer confidently back to the market for tableware and decorative objects. Silverware fabrication alone soared to over 34 Moz (1,050 t) by 1992, before declining as Italy was embroiled in political and economic crises.

Yet the industry has responded robustly with consolidations, new technology and new marketing (above all to support its exports to Western Europe and the United States). While hundreds of small workshops remain, the National Federation of Silversmiths embraces 100 major producers, and the industry employs over 5,000 people.

Italian silverware is usually 800 fine, other legal titles being 835 and 925. The manufacture and selling of silver requires a government license; every item must bear the manufacturer's identification mark.

The domestic market, with 16,000 retailers selling silverware, remains predominant: exports, despite increasing in recent years, still account for 20% of production. Tastes have, however, been changing. Demand has fallen sharply for solid silver cutlery sets and heavy handmade items such as tea and coffee sets once widely accepted as corporate gifts or tangenti. *Corruption scandals have cut corporate gift-giving, while the average Italian family today has less purchasing power and chooses lighter objects. Silver frames, boxes and icons are increasingly popular as gifts, but their overall silver content has fallen as fine laminated silver is combined with leather, glass or plexiglass. Silver frames are made by applying fine strip (often rolled to less than 0.1mm) to an aluminium or plastic base. The future will depend not just on a return to prosperity in the domestic market, but also on the extent to which new export markets can be developed in such countries as Spain, Portugal and Greece, where tradition still favors elaborate silverware, and in South America where customs barriers have been falling.*

While silverware languishes somewhat, production of silver jewelry (as in gold) flourishes. The most popular product is 925 silver chain which is produced industrially on a huge scale for export. Chain output now approaches 13 Moz (400 t) annually and continues to grow. Several factories produce around 1 Moz (30 t) per year, with the largest consuming as much as 5 Moz (155 t). Exports reign supreme, taking over 80% of production. Silver jewelry is made primarily in just two centers; Arezzo, which accounts for over 50% of output, followed closely by Vicenza.

Articles other than chain are produced by microfusion, stamping and, to a lesser degree, by electro-forming. Styles range from mass-produced articles to exquisite designer pieces and mini-gioielleria which are gold-plated and set with zircons. While the Italians themselves have a special feeling for gold, silver jewelry fulfills a popular role as a rapidly changing fashion item, whose design is closely linked to new collections with fresh jewelry being created to match new trends.

factories retain the capacity to use at least 1-2 million ounces a year.

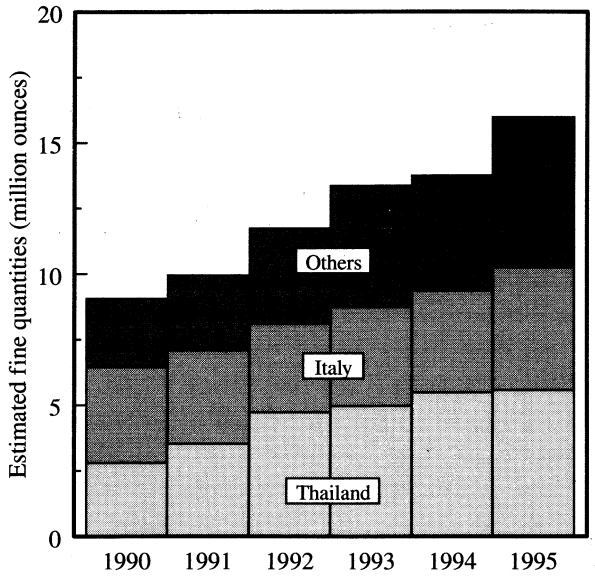
The jewelry is divided between plain silver items, which account for 40% of output, and gem-set articles with diamonds, semi-precious stones and marcasite. While the jewelry is usually stamped 925 fine (22.2 k), it is often made to a fineness of 950 to avoid any challenge concerning its quality in export markets. Exports have been focused primarily on the United States, Japan, Korea and Germany. Increasing competition and in some cases recession in these markets have contributed to the decline in Thai fabrication over the last two years. Bangkok manufacturers report, for instance, that in the US, locally-made silver jewelry is now price competitive with their exports (a fact confirmed by the increase in US fabrication in the last few years). They are also facing competition from manufacturers with lower labor costs and overheads especially in Indonesia.

The decline in silver use has been slowed somewhat, however, by steady growth in carat gold gem-set jewelry, where silver is an important alloying element. Since the domestic market in Thailand is limited (mainly to tourists), the future of the industry will depend on meeting the competition on the world scene.

In the **United States**, silver demand in the combined jewelry and silverware category increased by over 4% in 1995 to 12.5 Moz (389 t). Fabrication levels for silverware were broadly stable at 6.2 Moz (191 t) whereas jewelry production expanded by nearly 8% to reach 6.3 Moz (194 t). This may be the first time that the quantity of silver used in the manufacture of jewelry in the United States has exceeded that for silverware. Silver jewelry is currently fashionable especially among younger people who are buying a lot of inexpensive "big-look" silver jewelry. But besides this "traditional market", modern shiny designs have broadened silver jewelry's appeal and, as a consequence, the middle and upper tier of the market is reported to be the fastest growing. This development has not gone unnoticed by the TV shopping channels which are helping to fuel growth in demand by ordering more silver jewelry.

As Figure 25 shows, much of the rise in demand is being met by an increase in imports. These are estimated to have increased between 1990 and 1995 by more than 76%. Between them, Thailand and Italy account for two-thirds of US imports. In 1995 total

Figure 25
US Silver Jewelry Imports



US silver jewelry imports are estimated to have reached nearly 16 Moz (500 t) in fine silver terms. If correct, this would imply that US consumption exceeded 20 Moz (620 t) for the first time last year.

Mexico's production of silver jewelry increased by an estimated 27% in 1995 to just over 11 Moz (342 t). Exports of jewelry, principally to the United States, performed well, helped by the massive devaluation of the Mexican Peso in late 1994 and early 1995. Tourist purchases also rose strongly, again reflecting the weakness of the local currency. More surprisingly perhaps, sales to Mexicans showed some growth. This was partly caused by the economic crisis prompting some substitution of gold jewelry by cheaper alternatives, such as costume and silver jewelry. But an interesting development is that silver jewelry has become more fashionable among the local population which, in the past, largely shunned silver in favor of gold. Nevertheless, most of the country's output is still consumed by tourists or exported with genuine local offtake still at a relatively low level.

Last year production fell in **Germany** to 10.3 Moz (320 t) bringing the cumulative decline since 1991 to 29%. The drop has been most acute in silverware with a slump in the amount of silver used for cutlery and tableware more than offsetting an increase in the manufacture of small gift items.

Traditionally, Germany has been an important manufacturer of solid and plated cutlery but besides the cyclical effect of the weak economy in 1995, in

Table 7
Silver Fabrication: Jewelry and Silverware
(including the use of scrap)
Million ounces

	1986	1987	1988	1989	1990	1991	1992	1993	1994	**1995**
Europe										
Italy	22.60	28.20	28.60	33.90	42.76	47.68	51.89	47.58	42.83	**40.38**
Germany	8.50	11.20	12.70	12.70	13.21	14.50	13.50	11.57	11.57	**10.29**
Greece	-	-	-	-	3.22	3.38	3.54	3.70	3.86	**3.79**
UK & Ireland	1.70	2.00	2.00	2.20	2.03	1.90	2.23	2.72	2.87	**2.96**
Spain	-	-	-	-	6.96	5.90	3.22	3.38	3.05	**2.67**
France	2.80	2.30	2.50	2.70	1.41	1.38	1.32	1.45	1.32	**1.32**
Portugal	-	-	-	-	1.99	1.97	2.04	1.85	1.42	**1.63**
Norway	-	-	-	-	0.64	1.15	1.15	1.18	1.20	**1.20**
Poland	-	-	-	-	1.29	0.96	1.06	1.13	1.19	**1.19**
Denmark	-	-	-	-	0.87	0.87	0.87	0.87	0.87	**0.87**
Finland	-	-	-	-	1.20	1.28	1.04	0.85	0.86	**0.73**
Sweden	-	-	-	-	0.53	0.81	0.65	0.54	0.61	**0.51**
Cyprus & Malta	-	-	-	-	0.23	0.23	0.26	0.26	0.35	**0.38**
Austria	0.20	0.20	0.20	0.20	0.48	0.48	0.48	0.48	0.38	**0.35**
Switzerland	-	-	-	-	1.06	0.90	0.87	0.77	0.71	**0.32**
Netherlands	0.50	0.50	0.50	0.50	0.39	0.42	0.39	0.35	0.27	**0.26**
Romania	-	-	-	-	0.06	0.06	0.06	0.06	0.06	**0.06**
Other	11.00	8.90	10.80	11.60	0.60	0.60	0.57	0.50	0.50	**0.54**
Total Europe	47.30	53.30	57.30	63.80	78.29	83.89	84.54	78.77	73.49	**69.45**
North America										
United States	8.50	8.00	6.40	5.80	9.81	9.71	10.90	11.29	11.99	**12.50**
Mexico	2.20	2.00	2.10	2.10	8.04	8.68	9.00	9.16	8.68	**11.03**
Canada	-	-	-	-	0.99	1.15	0.86	0.88	0.95	**1.21**
Total North America	10.70	10.00	8.50	7.90	18.84	19.54	20.76	21.33	21.62	**24.74**
Central & South America										
Brazil	-	-	-	-	1.80	1.70	1.61	1.77	1.83	**1.93**
Argentina	-	-	-	-	0.96	0.96	0.96	0.96	0.96	**0.90**
Peru	-	-	-	2.40	1.29	0.96	0.64	0.64	0.71	**0.80**
Dominican Republic	-	-	-	-	0.16	0.10	0.13	0.32	0.05	**0.68**
Colombia	-	-	-	-	0.64	0.64	0.64	0.64	0.64	**0.64**
Ecuador	-	-	-	-	0.32	0.32	0.32	0.48	0.61	**0.61**
Other	-	-	-	-	0.48	0.48	0.48	0.48	0.48	**0.48**
Total Central & South America	-	-	-	2.40	5.65	5.16	4.78	5.29	5.28	**6.04**
Middle East										
Turkey	-	-	-	-	4.12	3.91	4.61	5.00	4.64	**4.95**
Arabian Gulf States	-	-	-	-	1.29	1.39	1.49	1.79	2.54	**3.39**
Israel	-	-	-	-	1.61	1.77	2.09	2.41	2.64	**2.96**
Egypt	-	-	-	-	1.51	1.64	2.19	1.80	1.77	**2.05**
Iran	-	-	-	-	0.94	1.21	1.57	1.31	1.68	**1.63**
Saudi Arabia	-	-	-	-	0.21	0.28	0.36	0.37	0.34	**0.41**
Other	-	-	-	-	0.20	0.20	0.20	0.20	0.22	**0.31**
Total Middle East	-	-	-	-	9.87	10.39	12.50	12.88	13.83	**15.69**
Indian Sub-Continent										
India	-	6.30	6.40	10.90	23.03	22.50	36.13	78.70	57.90	**62.70**
Other	-	-	-	-	1.45	1.93	2.41	2.89	2.41	**3.22**
Total Indian Sub-Continent	-	6.30	6.40	10.90	24.47	24.42	38.54	81.59	60.31	**65.91**

Table 7
Silver Fabrication: Jewelry and Silverware
(including the use of scrap)
Million ounces

	1986	1987	1988	1989	1990	1991	1992	1993	1994	**1995**
Far East										
Thailand	5.30	6.60	7.40	10.10	24.10	20.05	31.57	38.54	28.90	**27.40**
South Korea	-	-	-	4.30	4.50	5.30	5.00	7.20	6.40	**6.75**
Indonesia	-	-	-	-	1.07	1.13	1.22	1.45	2.30	**2.74**
Japan	1.70	2.20	3.00	3.50	3.80	3.50	2.80	2.49	2.22	**1.93**
Burma, Laos & Cambodia	-	-	-	-	1.00	1.00	1.00	1.00	1.00	**1.05**
Hong Kong	0.90	0.90	0.80	0.90	0.90	0.96	0.96	0.96	0.96	**0.90**
Vietnam	-	-	-	-	0.30	0.30	0.30	0.40	0.50	**0.64**
Taiwan	-	-	-	-	0.40	0.40	0.50	0.48	0.48	**0.48**
Malaysia	-	-	-	-	0.30	0.35	0.39	0.45	0.35	**0.39**
Philippines	-	-	-	-	0.15	0.15	0.15	0.16	0.17	**0.19**
Singapore	-	-	-	-	0.20	0.20	0.10	0.10	0.03	**0.03**
Other	3.00	9.30	9.60	14.30	-	-	-	-	-	-
Total Far East	10.90	19.00	20.80	33.10	36.72	33.34	43.99	53.23	43.31	**42.49**
Africa										
Morocco	-	-	-	-	0.38	0.42	0.42	0.39	0.39	**0.39**
Algeria	-	-	-	-	0.32	0.29	0.26	0.23	0.23	**0.23**
Tunisia	-	-	-	-	0.16	0.16	0.16	0.20	0.22	**0.23**
Libya	-	-	-	-	0.28	0.29	0.26	0.23	0.21	**0.20**
South Africa	-	-	-	-	0.05	0.04	0.04	0.03	0.06	**0.12**
Other	-	-	-	-	0.16	0.16	0.16	0.16	0.16	**0.16**
Total Africa	-	-	-	-	1.34	1.35	1.29	1.24	1.26	**1.32**
Australia	-	-	-	-	0.54	0.54	0.54	0.57	0.60	**0.60**
Western World Total	68.90	88.60	93.00	118.10	175.75	178.66	206.96	254.90	219.71	**226.25**
Soviet Union/CIS	-	-	-	-	4.60	3.50	2.70	1.80	2.10	**1.93**
World Total	-	-	-	-	180.35	182.16	209.66	256.70	221.81	**228.18**

recent years local output has suffered from an increase in imports and changing consumer trends. Increasingly, demand has shifted away from plated and solid silver cutlery towards more affordable but well crafted and designed stainless steel sets. The latter also have the advantage of being 'dishwasher friendly' and non-tarnishing with a similarly highly polished surface to the silver alternative.

There has also been some decline in the jewelry sector which is estimated to account for approximately one-third of offtake in the sector. Most of this was due to a fall in the manufacture of silver chains, where German manufacturers have lost out to cheaper imports from Italy and elsewhere.

Silverware and jewelry fabrication in the **United Kingdom and Ireland** increased by a little over 3% last year to almost 3.0 Moz (92 t). The average silver content of domestically produced articles hallmarked was unchanged at a little under 23 g of fine silver per piece. Silverware accounts for between 65-75% of production with good growth in the output of small gift items and trinkets in recent years. From a relatively low level in 1994, imports increased strongly in 1995 and this may have limited the rise in local production.

In **France**, fabrication was steady at 1.3 Moz (40 t), virtually all in jewelry, as the French prefer silver-plated to solid silver wares. Although, consumption of silver jewelry has been rising, the demand is being satisfied by imports from Italy, Thailand and Spain.

Silverware fabrication has continued to decline in **Spain**, from nearly 7 Moz (216 t) in 1990 to 2.7 Moz (83 t) in 1995, as heavy silver table sets and cutlery go out of fashion. Jewelry offtake, however, was

maintained at 1.1 Moz (33 t) with silver chain being successful in the domestic market and in the form of exports to the United States and France.

Turkey has a growing silverware and jewelry industry geared increasingly to export markets. Total fabrication was 5 Moz (150 t) last year, of which two-thirds was silverware. The number of workers in silver has increased over the last two years and exports to Italy, Germany, the US, Japan and Taiwan are expanding. Jewelry fabrication, which is carried out in many small workshops, has benefited from a substantial recovery in tourism.

Israel is becoming an increasingly important manufacturer, with fabrication nearly doubling during the 1990s to reach almost 3 Moz (92 t) last year. The silverware sector accounts for 90% of the fabrication, primarily making Judaica wares, of which 60% are exported to the United States and northern Europe.

Fabrication of silverware and jewelry rose by 15% in **Egypt** to 2 Moz (60 t) due to an improvement in the economy in general and of the tourist sector in particular, the latter having recovered from the 1994 slump resulting from concerns about terrorist attacks. Around 50% of manufacture consists of gift items and Pharaonic jewelry, such as scarabs and cartouches for tourists, with a further 20% accounted for by silver chain for local people. The balance is in silverware, mainly bought by wealthier Egyptians.

Silver represents only a fraction of the manufacture of jewelry in **Saudi Arabia**, which remains overwhelmingly gold-orientated, but the number of shops in the main *souks* of Jeddah and Riyadh selling silver has increased in the last two years. Local fabrication is now 0.4 Moz (12 t) with the rest of demand being met by imports.

Lebanon is beginning to revive as a jewelry manufacturing and retailing center after the long years of civil war, with local fabrication rising to 0.2 Moz (6 t) and imports of silver jewelry from Italy also increasing. But Dubai and its neighbors such as Ajman, in the **United Arab Emirates**, produce most silver jewelry in the region, with output up to 0.4 Moz (12 t) from many small workshops. The Dubai *souk* also has an increasing number of shops selling locally made Indian and, increasingly, Italian jewelry.

Pakistan liberalized its import policy on silver in 1995 with the metal mainly being used for silver jewelry by those who cannot afford gold. Fabrication rose to 3.2 Moz (100 t) in 1995. Silverware forms an insignificant part of demand because Islamic law prohibits the use of precious metals in eating utensils.

Malaysia is a modest user of silver, there being little tradition for silverware, while jewelry manufacture is mainly in gold although the country's substantial production of carat gold alloys does consume some silver. Fabrication is 0.4 Moz (12 t).

Silver jewelry fabrication continues to expand quite rapidly in **Indonesia** as low labor costs and increasing experience in the export markets make it a competitor with Thailand in other Asian markets and the United States. While the hand-crafted output is still centered on Bali, the factories of Surabaya in eastern Java have expanded their output of karat gold chain and other karat gold articles which require silver for alloying. Fabrication rose 19% to 2.7 Moz (85 t) in 1995.

South Korea's jewelry fabrication increased to 6.8 Moz (210 t) in 1995, compared with 6.4 Moz (199 t) the previous year, helped by demand from fashion-conscious young people for silver rings and chains. Demand also increased for silver used as an alloying element in 18 karat gold jewelry, which now accounts for half the country's gold jewelry fabrication. As 14 karat jewelry is also becoming popular, silver's use as an alloying element should grow. By contrast, silverware manufacture is stagnating with the decline in the traditional custom of offering solid silver spoons as gifts at births, weddings, or Lunar New Year or Thanksgiving Day. Corporate gifts of silverware have also been reduced since 1994 due to government tax regulations. Consequently, fabrication remained at 3.8 Moz (118 t) last year.

In **Taiwan**, silver jewelry is much less popular than gold and silverware is rarely seen, so that most silver is required as an alloy in karat gold items. Total fabrication is no more than 0.5 Moz (15 t).

Demand for silverware and jewelry in **Japan** declined to 1.9 Moz (60 t) as the economy faced another difficult year and the firm yen gave imports of jewelry from Thailand and the United States (which together exceeded local fabrication) a competitive edge.

The local manufacture of silverware and jewelry continues to decline in **Hong Kong**, to 0.9 Moz (28 t) with the main use now being in the manufacture of alloys for 18 karat gold jewelry. Some high quality hand-made jewelry workshops remain, but most of this business has moved to China.

Official Coins

Official coin fabrication in the Western World fell by 49% in 1995 to less than 22 Moz (684 t), its lowest level since 1989, down from 41 Moz (1,275 t) in 1994. Mexico accounted for more than half of this decline, minting only 0.6 Moz (8 t) compared with 13 Moz (400 t) for its circulating coin issue in 1994. However, silver bullion coins also fell by nearly 24% due to lack of investor interest. The United States alone, at 7.5 Moz (233 t), accounted for one-third of output, while the next best performance came from Spain at 3.3 Moz (102 t) with its legal tender 2,000 peseta coin. Adding in China and the CIS, world coin fabrication stood at 23 Moz (715 t).

The full impact of the sharp fall in coin fabrication last year must really be seen in the context of **Mexico**, the largest fabricator of silver coin in the preceding two years, which used existing stocks of 10, 20 and 50 peso circulating coins to meet new demand in 1995. Thus, after accounting for almost 44% of all coins produced in 1993 and 30% the following year, Mexico made virtually no contribution last year. With those two exceptional figures for Mexico stripped out, overall coin fabrication has actually maintained a rather flat level since the late 1980s, in the range of 24-33 Moz (750-1,000 t) per annum. In Mexico only a small quantity of proof coins was made in each of the normal circulating categories, along with modest output of the Libertad (or Onza) series showing the Winged Goddess of Victory in five sizes from 1/20th of an ounce to 1 ounce in 999 fine silver; just over 500,000 of the 1 ounce Libertad were made.

In the absence of Mexico, the **United States** became the leading coin manufacturer with 7.5 Moz (233 t), down from 8.2 Moz (255 t) the previous year. The decline was due to falling sales of the American Eagle bullion coin, down 17% at 4.6 Moz (143 t), the lowest level since 1986 when the program began. The pattern of sales, however, was similar to the previous year, with good orders from January to March, encouraged by a low silver price, then a lull during much of the rest of the year until a surge took the December sales to over one million ounces (from collectors who realized that with only a limited number of coins having been issued, they might achieve some rarity value). The US position was enhanced by sales of commemorative coins, which rose from 2.7 Moz (84 t) to 2.9 Moz (90 t), with good performances from the US Veterans and Olympics programs. The Olympic coin sales continue in 1996 in the run-up to the games in Atlanta.

Spain, meanwhile, is continuing with its major new legal tender silver 2,000 pesetas coin, which was successfully launched in 1994. That year, 4.7 Moz (145 t) was required; in 1995 this declined to 3.3 Moz (102 t). The Spanish legal tender coin program follows similar issues by its European Union partners **Germany** and **France** with their 10 DM and 100 franc coins. The German 10 DM coin (silver content 625 fine), which has been issued regularly for many years, took 2.3 Moz (71 t) in 1995, down from the exceptional 7.0 Moz (217 t) of the previous year when there were three issues in a single year (but one being of a coin dated 1993). On average, Germany uses around 4.5 Moz (140 t) annually, but with somewhat erratic issues, and the expectation is that in 1996 there will be a further extra issue, dated 1995, taking fabrication back over 5 Moz. In contrast, France's program of 100 franc coins which was using upwards of 2 Moz (60 t) annually from the mid-1980s onwards has been cut back so that in 1994 only 1.6 million circulating coins containing 0.9 Moz (28 t) of silver were minted, with an increase to 1.9 million coins requiring 1 Moz (31 t) last year. The French Mint also uses about 0.2 Moz (5 t) annually in coins for collectors. In **Portugal** the special VI series of silver coins with a face value of US$200 has been expanded,

Figure 26
World Silver Coin Fabrication

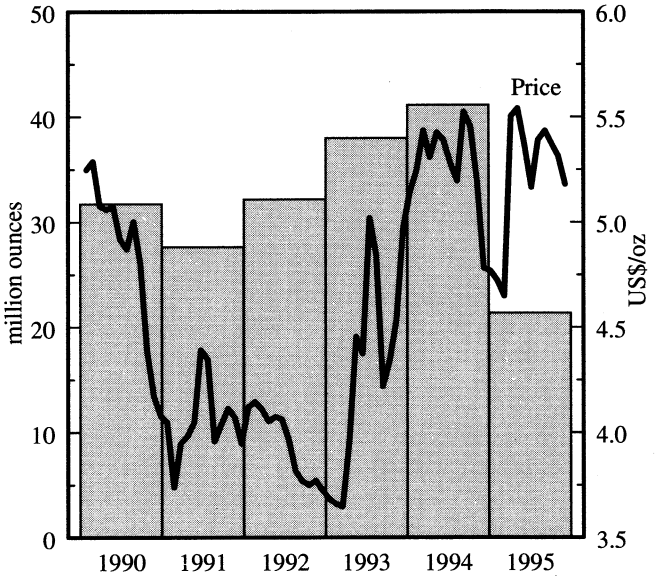


Table 8
Silver Fabrication: Coins and Medals
(including the use of scrap)
Million ounces

	1986	1987	1988	1989	1990	1991	1992	1993	1994	**1995**
Europe										
Spain	-	-	-	-	0.40	1.25	0.45	0.25	4.69	**3.32**
Germany	-	3.20	3.20	3.20	2.44	5.51	5.38	2.62	6.96	**2.27**
France	2.20	2.20	2.20	2.20	2.19	1.97	2.06	0.96	0.99	**1.15**
Netherlands	-	1.20	-	-	0.67	0.06	0.00	0.03	0.58	**1.13**
Austria	1.20	0.60	0.60	0.40	0.46	0.62	0.52	0.45	0.47	**0.55**
Portugal	-	-	-	-	0.11	0.01	0.12	0.25	0.38	**0.54**
Italy	0.20	0.20	0.24	0.29	0.23	0.34	0.22	0.21	0.24	**0.26**
UK & Ireland	0.09	0.13	0.14	0.14	0.10	0.09	0.11	0.15	0.17	**0.16**
Belgium	-	-	-	-	0.45	0.35	0.00	0.05	0.00	**0.16**
Switzerland	-	-	-	-	0.19	1.35	0.19	0.15	0.14	**0.14**
Poland	-	-	-	-	0.71	0.22	0.10	0.13	0.18	**0.11**
Czech Republic	-	-	-	-	0.10	0.11	0.09	0.01	0.01	**0.11**
Finland	-	-	-	-	0.16	0.17	0.21	0.02	0.09	**0.09**
Denmark	-	-	-	-	0.11	0.00	0.10	0.00	0.00	**0.08**
Bulgaria	-	-	-	-	0.00	0.00	0.07	0.16	0.02	**0.06**
Hungary	-	-	-	-	0.06	0.06	0.10	0.18	0.00	**0.05**
Sweden	-	-	-	-	0.04	0.04	0.04	0.08	0.00	**0.04**
Norway	-	-	-	-	0.00	0.47	0.94	0.32	0.03	**0.03**
Other	-	-	-	-	0.04	0.00	0.03	0.03	0.04	**0.20**
Total Europe	3.69	7.53	6.38	6.23	8.47	12.61	10.73	6.05	14.98	**10.44**
North America										
United States	10.30	12.20	7.90	6.80	9.11	10.46	8.14	7.92	8.21	**7.50**
Canada	1.30	1.20	1.10	3.30	1.93	0.88	0.76	1.22	1.48	**0.69**
Mexico	2.00	2.30	2.00	1.70	1.23	1.55	8.68	17.08	13.02	**0.57**
Total North America	13.60	15.70	11.00	11.80	12.27	12.89	17.57	26.21	22.71	**8.76**
Central and South America	-	-	-	-	0.10	0.06	0.19	0.04	0.01	**0.04**
Middle East	-	-	-	-	0.02	0.01	0.06	0.01	0.66	**0.05**
Far East										
Thailand	-	-	-	-	0.02	0.04	0.07	0.20	0.20	**0.30**
Singapore	-	-	-	-	0.09	0.05	0.89	0.13	0.14	**0.10**
Japan	6.40	-	-	-	8.92	0.00	0.00	2.41	0.00	**0.00**
Other	-	-	-	-	1.02	0.00	0.00	0.00	0.00	**0.00**
Total Far East	6.40	-	-	-	10.03	0.09	0.95	2.74	0.33	**0.40**
South Africa	-	-	-	-	0.01	0.01	0.03	0.01	0.01	**0.01**
Australia	-	-	-	-	0.41	0.52	2.13	2.27	1.60	**0.82**
Other Western World	2.50	3.50	4.10	5.20	0.00	0.00	0.00	0.00	0.00	**0.00**
Western World Total	23.60	23.23	17.38	18.03	31.33	26.22	31.69	37.34	40.32	**20.53**
Other Countries										
China	-	-	-	-	0.40	1.37	0.40	0.40	0.67	**0.76**
North Korea	-	-	-	-	0.00	0.05	0.00	0.22	0.00	**0.00**
Soviet Union/CIS	-	-	-	-	0.00	0.00	0.08	0.07	0.20	**0.13**
Total Other Countries	-	-	-	-	0.40	1.41	0.48	0.69	0.87	**0.89**
World Total	-	-	-	-	32.33	28.36	32.82	38.99	42.25	**22.86**

contributing to the total of 0.5 Moz (17 t) used last year. In **Austria**, minting of the 100 and 500 schilling coins rose 17% to 0.6 Moz (17 t).

In the **United Kingdom**, however, silver use for coins at the Royal Mint and the Pobjoy Mint was slightly down, at a revised total of 0.2 Moz (5 t). The Royal Mint's output included coins for Alderney and Cyprus, while the Pobjoy minted coins for Gibraltar, the Isle of Man and the Seychelles. **Poland**, a major producer of silver, continued its regular issue of commemorative coins, which included a coin for the 50th anniversary of the United Nations but total silver use fell to 0.1 Moz (3 t). Silver bullion coin sales were disappointing in both Canada and Australia. In **Canada**, sales of the 1 ounce Maple Leaf from the Royal Canadian Mint fell to 0.3 Moz (10 t) compared with 1.1 Moz (34 t) the previous year, due to a lack of investor interest and a strong secondary market in the coin. In compensation, however, commemorative coin sales rose to 0.4 Moz (11 t), the best in five years, aided by a strong showing for the coin marking the 325th anniversary coin of the Hudson's Bay Company.

Australia also suffered a fall in sales of the Kookaburra bullion coins, down to 0.8 Moz (25 t) compared with more than 2 Moz (71 t) just two years earlier. But **China** had a good year, with China Gold Coin Inc. reporting fabrication up 13% to 0.8 Moz (24 t), helped by strong exports especially to the United States. The Panda remains the most popular series, with 246,000 of the 10 Yuan Panda coin issued and a further 115,000 of the 5 Yuan coin.

7. Investment: Futures and Options

The silver market has moved into an interesting phase over the last two years as the perceptions of speculators and investors have changed. More attention is now focused on the outstanding level of silver stocks in the United States and Europe, raising a question in some speculators' minds as to how long stocks can fill the gap between mine supply and fabrication demand and what the position may be towards the year 2000. This had led to speculators building up substantial positions in the market and in some cases endeavoring to create an exaggerated impression of the rate of decline of stocks. During 1995, a part of these positions was switched out of futures into allocated physical silver, often held in European vaults, thus presenting the market with a new situation.

Equally, however, it is interesting that there has been no real follow-through by a wider range of investors, either as individuals or through hedge funds. This is not a broad movement into silver as an investment or speculative vehicle, as happened in the 1970s or early 1980s. Indeed, the general trend has remained for smaller investors, especially in North America, to take advantage of price rallies to sell out long-held positions in 100-ounce silver bars or coin bags. This disinvestment in North America amounted to at least 10 Moz (300 t) in 1993, up to 20 Moz in 1994 and possibly as much as 30 Moz in 1995. A lot of people have been getting out of silver, while a few big players have been getting in.

This attitude is also confirmed by the disappointing performance of silver warrants, which flourished briefly in 1994 and, although these are still offered by several bullion houses, have not been widely taken up and represent a small part of the market. A warrant issue of five million ounces does not mean a market impact in terms of silver bullion of five million, or even five thousand ounces. The appeal of warrants initially was felt particularly in Europe, where some banks, notably in Switzerland, preferred to offer their clients a warrant as a securitized instrument with a clearly posted price that could be checked on a Reuters' screen. However, as more dealers and their clients become accustomed to the derivatives revolution they have moved increasingly to the over-the-counter (OTC) market for options instead of warrants.

Derivatives more generally have replaced physical silver in investors' and speculators' portfolios. This may provide an explanation for the lack of price impact of the build-up of substantial positions by speculative groups in the last two years. This was effected initially through derivatives, but last year more by taking delivery of allocated metal. In the late 1970s or early 1980s, when the choice of available derivatives, particularly in options, was much more limited, a move by a syndicate was often followed by others in the market who observed what was happening, thus widening the investment circle and creating momentum. In the past year, market-makers have been aware of what was happening, but did not wish to take large silver positions on to their books (because carrying costs have increased and are being monitored more closely) and instead have merely played the volatility through options. The delta hedging on these may have had some impact, but not to the extent that the build-up of large physical positions did in the 1980s.

Potentially, however, silver still stands to benefit much more directly than gold from any broad investment interest, because of the limited range of shares in primary silver mines. The selection of gold mine stocks for the investor is now wide and, in North America in particular, is often the preferred route into gold investment, but in silver, despite the creation of a few pure silver vehicles on the Canadian exchanges, the choice is still limited. Investor interest in silver, therefore, translates quickly into purchases of the metal itself or more recently, of associated derivatives. Thus, the way ahead for the silver price is intriguing: it may turn on how long the owners of the existing large allocated positions are ready to hold them, and whether a broader spectrum of investors will eventually be persuaded to join them.

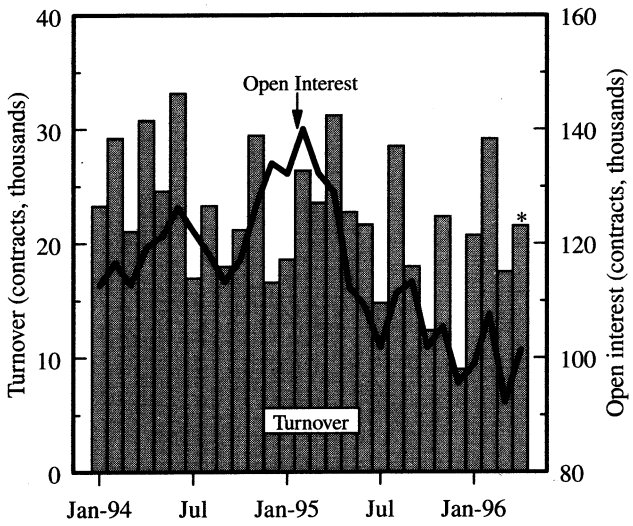
Futures Exchanges

Trading volume on Comex (which has been part of Nymex since August 1994) reached 5,183,236 contracts, 14% below the 1994 level but otherwise the highest turnover in the past decade. It was the fourth best year ever for the Comex silver contract, reflecting the continued activities of speculative syndicates, particularly in the months of April and August.

Figure 27

COMEX Silver Futures

Average Daily Turnover and Open Interest



*to 11th April

After a quiet start to the year, turnover picked up rapidly (March seeing the year's lowest price) to reach an exceptional 70,233 contracts on 30th March alone and 592,620 contracts in April as a whole (including 102,535 contracts in two days in the middle of the month) as Comex stocks fell rapidly and the price rose towards its high of the year, (reached on 5 May). This burst of action took turnover for the first half-year to an exceptionally high 3,003,337 contracts. The second half was much quieter at just over 2 million contracts, except for a busy August at 655,854 contracts (the third best month ever, including 98,553 contracts in just two days on 17th/18th August). This reflected not just a new price rally to $5.80 per ounce, but a rapid decline in exchange stocks as a great deal of silver began to move from the United States to Europe. The remainder of the year, by comparison, saw less activity, with turnover in December drifting to only 179,755 contracts.

This pattern was matched on other futures exchanges in North America where, although turnover was generally slightly down, April and May were the busiest months. The best growth, however, continued to be on the Tokyo Commodity Exchange (Tocom) where turnover in the 30 kilogram (933 oz) contract rose 38% to 1,440,297. Volume in August and September, at over 250,000 contracts per month, were fuelled by speculation as to what the movements on Comex might really mean.

Futures Turnover

	Number of Contracts					Total Silver Equivalent (million ounces)		
Contract (oz)	Comex 5,000	Tocom*	CBoT 1,000	CBoT 5,000	MidAmerica 1,000	Comex + Tocom	Others	Total
1985	4,821,206	1,838,488	1,034,830	0	47,163	24,697	1,082	25,779
1986	3,849,687	706,455	511,239	0	9,981	19,476	521	19,997
1987	5,055,652	1,471,815	509,965	12,092	9,578	25,751	580	26,331
1988	4,664,655	2,302,428	481,566	4,165	12,063	24,064	514	24,578
1989	4,376,611	643,891	254,713	2,397	13,562	22,325	280	22,606
1990	3,913,609	504,332	178,801	2,256	11,005	20,055	201	20,256
1991	4,154,704	1,057,598	114,268	640	13,106	21,794	131	21,925
1992	3,016,339	231,864	52,658	472	8,888	15,305	64	15,369
1993	4,855,924	661,452	89,141	1,022	10,986	24,918	105	25,023
1994	5,994,345	1,042,185	88,663	10,278	17,170	30,977	157	31,135
1995	5,183,236	1,440,297	76,667	8,617	13,320	27,305	133	27,440

*10 kg contracts up to June 1989, thereafter 30 kilogram contracts

Options Turnover

Contract (oz)	Number of Contracts: Comex 5,000	Comex 5 day 5,000	CBoT 1,000	Toronto 100	Total Silver Equivalent (million ounces): Comex	Others	Total
1985	531,315	0	10,819	75,850	2,657	18	2,675
1986	579,427	0	3,081	23,132	2,897	5	2,903
1987	918,064	0	10,009	34,664	4,590	13	4,604
1988	872,106	0	8,303	7,188	4,361	9	4,370
1989	752,645	0	8,346	5,325	3,763	9	3,772
1990	747,499	0	1,398	965	3,737	1	3,739
1991	1,019,093	798	2,804	1,276	5,099	3	5,102
1992	676,543	9,606	20,105	331	3,431	20	3,451
1993	1,094,702	1,262	12,423	4,583	5,480	13	5,493
1994	1,316,650	368	5,952	8,300	6,585	7	6,592
1995	1,146,513	221	1,476	656	5,734	2	5,735

Back on Comex the 5,000 ounce options contract also had its second best year with turnover of 1,146,513 contracts, though still 13% down on 1994. Again, it was the months of March, April and May, when the silver price was at its most volatile, that saw the greatest trading volumes. However, the Comex five-day 5,000 ounce options contract almost dropped out of sight, with only 221 contracts being traded in the whole year, of which 110 were in May alone.

The options trading on the Exchange, of course, is only a mirror of the OTC market for which no statistics are available, but which attracts a much larger clientele. In general, as understanding of options grows every year, there are more participants, whether producers starting to hedge, funds taking positions, or even industrial users who are becoming accustomed to using options to protect themselves from sudden price movements.

Appendix I
Silver Prices in 1995, in US dollars per ounce

1. London Prices

	London Silver Market - Spot			London Silver Market - 3-Months		
	High	Low	Average	High	Low	Average
January	4.9225	4.6225	4.7695	4.9920	4.6895	4.8370
February	4.8235	4.4900	4.7217	4.8925	4.5515	4.7870
March	5.1600	4.4160	4.6485	5.2260	4.4700	4.7061
April	5.9150	5.2100	5.5030	5.9955	5.2770	5.5772
May	6.0375	5.2750	5.5405	6.1210	5.3450	5.6150
June	5.5075	5.2300	5.3637	5.5780	5.2975	5.4327
July	5.3550	5.0700	5.1648	5.4220	5.1335	5.2303
August	5.7985	5.0300	5.3899	5.8585	5.0915	5.4377
September	5.5615	5.2125	5.4350	5.5930	5.2515	5.4664
October	5.4425	5.3225	5.3741	5.5040	5.3565	5.4260
November	5.4290	5.1800	5.3151	5.4920	5.2395	5.3763
December	5.2560	5.1050	5.1797	5.3180	5.1665	5.2404
Year	6.0375	4.4160	5.1971	6.1210	4.4700	5.2574

	London Silver Market - 6-Months			London Silver Market - 12-Months		
	High	Low	Average	High	Low	Average
January	5.0755	4.7695	4.9177	5.2720	4.9505	5.1055
February	4.9680	4.6220	4.8632	5.1315	4.7745	5.0370
March	5.3045	4.5390	4.7769	5.4800	4.6900	4.9329
April	6.0885	5.3555	5.6593	6.2770	5.5350	5.8407
May	6.2105	5.4165	5.6917	6.3965	5.5645	5.8495
June	5.6475	5.3630	5.5008	5.7890	5.4960	5.6364
July	5.4920	5.1995	5.2969	5.6260	5.3265	5.4275
August	5.9245	5.1585	5.4991	6.0785	5.2870	5.6414
September	5.6315	5.3115	5.5141	5.7605	5.4515	5.6397
October	5.5655	5.4075	5.4811	5.6875	5.5040	5.5951
November	5.5525	5.2970	5.4350	5.6775	5.4145	5.5564
December	5.3775	5.2245	5.2991	5.4970	5.3385	5.4154
Year	6.2105	4.5390	5.3241	6.3965	4.6900	5.4688

2. US Prices

	Comex Spot Settlement			Handy & Harman		
	High	Low	Average	High	Low	Average
January	4.8930	4.5950	4.7488	4.9100	4.6100	4.7593
February	4.8320	4.4890	4.6948	4.8000	4.2500	4.6850
March	5.2930	4.3750	4.6618	5.2200	4.3600	4.6433
April	5.8600	5.2430	5.5355	5.8800	5.2300	5.5239
May	6.1020	5.2640	5.5340	6.0100	5.2000	5.5523
June	5.4940	5.0140	5.3336	5.4900	5.2150	5.3527
July	5.3380	5.0300	5.1548	5.3400	5.0100	5.1819
August	5.7890	5.0940	5.3880	5.7400	5.1050	5.3959
September	5.5050	5.1850	5.4034	5.5200	5.2100	5.4078
October	5.4190	5.2580	5.3354	5.4300	5.2700	5.3459
November	5.4240	5.1290	5.2832	5.4300	5.1600	5.2826
December	5.2250	5.0750	5.1440	5.2400	5.0850	5.1475
Year	6.1020	4.3750	5.1850	6.0100	4.2500	5.1872

Appendix II
Silver Prices, 1975-95, in US dollars per ounce

1. London Prices

	London Silver Market - Spot			London Silver Market Averages		
	High	Low	Average	3-Month	6-Month	12-Month
1975	5.2110	3.9280	4.4256	4.5002	4.5851	4.7669
1976	5.0840	3.8300	4.3532	4.4065	4.4720	4.6178
1977	4.9750	4.3130	4.6333	4.6956	4.7764	4.9355
1978	6.2640	4.8180	5.4218	5.5190	5.6269	5.8559
1979	32.2000	5.9350	11.0679	11.3306	11.5396	11.9393
1980	49.4500	10.8900	20.9837	21.4906	21.9717	22.8673
1981	16.3030	8.0300	10.4869	10.9114	11.3460	12.1741
1982	11.1100	4.9010	7.9219	8.1590	8.4065	8.9233
1983	14.6680	8.3700	11.4301	11.6935	11.9697	12.5365
1984	10.1100	6.2200	8.1446	8.3564	8.5877	9.0810
1985	6.7500	5.4500	6.1319	6.2519	6.3815	6.6681
1986	6.3100	4.8530	5.4645	5.5515	5.6417	5.8253
1987	10.9250	5.3600	7.0156	7.1405	7.2674	7.5325
1988	7.8215	6.0500	6.5324	6.6611	6.7952	7.0762
1989	6.2100	5.0450	5.4999	5.6273	5.7554	6.0152
1990	5.3560	3.9500	4.8316	4.9307	5.0308	5.2493
1991	4.5710	3.5475	4.0566	4.1115	4.1719	4.3023
1992	4.3350	3.6475	3.9464	3.9821	4.0200	4.1070
1993	5.4200	3.5600	4.3130	4.3449	4.3805	4.4593
1994	5.7475	4.6400	5.2851	5.3435	5.4077	5.5607
1995	6.0375	4.4160	5.1971	5.2574	5.3241	5.4688

2. US Prices

	Comex Spot Settlement			Handy & Harman		
	High	Low	Average	High	Low	Average
1975	5.2500	3.9200	4.4193	5.2250	3.9100	4.4185
1976	5.1370	3.8340	4.3506	5.1000	3.8150	4.3535
1977	4.9760	4.2850	4.6235	4.9600	4.3000	4.6230
1978	6.3170	4.8110	5.4068	6.2960	4.8290	5.4009
1979	34.4500	5.9230	11.1135	28.0000	5.9610	11.0938
1980	48.7000	10.8000	20.6568	48.0000	10.8000	20.6316
1981	16.2900	7.9850	10.5014	16.4500	7.9500	10.5116
1982	11.2100	4.9800	7.9311	11.2100	4.8850	7.9473
1983	14.7150	8.4000	11.4340	14.7450	8.3400	11.4413
1984	10.0640	6.2950	8.1585	10.0350	6.2600	8.1407
1985	6.8350	5.5250	6.1459	6.7350	5.5700	6.1454
1986	6.2850	4.8540	5.4653	6.1950	4.8700	5.4679
1987	9.6600	5.3790	7.0198	10.2000	5.3600	7.0192
1988	7.8270	5.9980	6.5335	7.9900	6.0100	6.5369
1989	6.1940	5.0300	5.4931	6.1700	5.0150	5.4940
1990	5.3320	3.9370	4.8174	5.3900	3.9300	4.8182
1991	4.5450	3.5080	4.0355	4.5300	3.5800	4.0407
1992	4.3180	3.6400	3.9334	4.3150	3.6300	3.9366
1993	5.4430	3.5230	4.3026	5.3700	3.5450	4.3018
1994	5.7810	4.5730	5.2808	5.7550	4.6250	5.2873
1995	6.1020	4.3750	5.1850	6.0100	4.2500	5.1872

Appendix III
Silver Prices, 1975-95
The Effects of Exchange Rates and Inflation

1. Actual Prices * (money of the day)

	London US$/oz	India * Rupee/kg	Thailand Baht/oz	Japan Yen/10g	Korea Won/10g	Italy Lire/g	Germany DM/kg	Mexico Peso/oz
1975	4.426	1,160	90.19	422	689	93	350	0.06
1976	4.353	1,217	88.81	415	677	116	352	0.07
1977	4.633	1,120	94.52	400	721	131	346	0.10
1978	5.422	1,393	110.26	367	844	148	350	0.12
1979	11.068	1,896	225.99	780	1,722	296	652	0.25
1980	20.984	2,783	429.67	1,530	4,098	578	1,226	0.48
1981	10.487	2,650	228.83	744	2,296	383	762	0.26
1982	7.922	2,675	182.20	634	1,862	344	618	0.45
1983	11.430	3,435	262.89	873	2,851	558	938	1.37
1984	8.145	3,514	192.53	622	2,111	460	745	1.37
1985	6.132	3,880	166.53	470	1,715	376	580	1.58
1986	5.465	4,105	143.71	296	1,549	262	382	3.34
1987	7.016	5,124	180.46	326	1,855	292	405	9.67
1988	6.532	6,231	165.23	269	1,536	273	369	14.85
1989	5.500	6,803	141.34	244	1,187	243	332	13.54
1990	4.832	6,779	123.62	225	1,099	186	251	13.59
1991	4.057	6,993	103.51	176	956	162	216	12.24
1992	3.946	7,580	100.24	161	991	156	198	12.21
1993	4.313	6,163	109.15	154	1,110	214	229	13.44
1994	5.285	6,846	132.92	174	1,365	274	276	17.84
1995	5.197	6,864	129.09	157	1,289	272	239	33.36

* Prices are calculated from the London price and the average exchange rate for the year.
In the case of India, the price shown is the one actually quoted in the Bombay market.

2. Real Prices **(Constant 1995 money)

	London US$/oz	India Rupee/kg	Thailand Baht/oz	Japan Yen/10g	Korea Won/10g	Italy Lire/g	Germany DM/kg	Mexico Peso/oz
1975	12.533	5,423	278.31	763	3,783	652	649	41.40
1976	11.664	6,154	263.00	686	3,252	700	626	50.17
1977	11.649	5,228	260.22	611	3,117	667	592	58.77
1978	12.670	6,346	281.34	538	3,187	670	584	69.38
1979	23.247	8,131	524.68	1,102	5,498	1,166	1,045	113.30
1980	38.822	10,709	833.34	2,006	10,165	1,878	1,864	154.78
1981	17.577	9,018	393.87	929	4,697	1,044	1,089	72.10
1982	12.512	8,434	297.99	772	3,551	805	840	71.65
1983	17.492	9,686	414.41	1,042	5,257	1,138	1,234	114.14
1984	11.951	9,148	300.93	726	3,805	846	957	68.18
1985	8.689	9,570	254.05	538	3,018	634	729	49.81
1986	7.597	9,309	215.30	337	2,660	417	481	56.43
1987	9.412	10,683	263.88	371	3,082	444	509	70.71
1988	8.421	11,874	232.64	304	2,383	395	458	50.66
1989	6.762	12,211	188.86	269	1,742	330	401	38.47
1990	5.636	11,169	155.92	241	1,485	238	295	30.51
1991	4.540	10,115	123.54	182	1,181	195	246	22.40
1992	4.288	9,809	114.85	164	1,152	179	216	19.35
1993	4.551	7,499	120.76	155	1,232	235	240	19.40
1994	5.434	7,559	139.63	174	1,426	288	281	24.08
1995	5.197	6,864	129.09	157	1,289	272	239	33.36

** Derived from the actual prices shown above using consumer price indices.

THE SILVER INSTITUTE

1112 SIXTEENTH STREET, NW

SUITE 240

WASHINGTON, DC 20036

202-835-0185